Clay Macon
Regional Hazard Mitigation Plan

DRAFT – June 2015

ATKINS

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SECTION 1
INTRODUCTION

This section provides a general introduction to the *Clay Macon Regional Hazard Mitigation Plan*. It consists of the following five subsections:

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1.1 BACKGROUND

Natural hazards, such as winter storms, thunderstorms, 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 Clay Macon Region is located in the western part of North Carolina and includes the two counties plus the municipal governments within the counties. This area is vulnerable to a wide range of natural hazards such as winter storms, severe thunderstorms, floods, and landslides. It is also vulnerable to human-caused hazards, including hazardous material spills. These hazards threaten the life and safety of residents in the Clay Macon 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.

Both of the counties and their municipal jurisdictions have an existing hazard mitigation plan that has evolved over the years, as described in Section 2: *Planning Process*. 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 Clay Macon Region's vulnerability to identified hazards. The Plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

1.1.1 The Disaster Mitigation Act and the Flood Insurance Reform Act

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

Additionally, the Biggert Waters Flood Insurance Reform Act of 2012 modified the existing Flood Mitigation Assistance (FMA) program. One of the requirements of this Act is that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for these FEMA mitigation programs.

The Clay Macon Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region IV and the North Carolina Division of Emergency Management (NCDEM) 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 Clay Macon Regional Hazard Mitigation Plan is to:

- Merge the existing Clay County and Macon County hazard mitigation plans into one regional plan;
- Complete update of existing plans to demonstrate progress and reflect current conditions;
- Increase public awareness and education;
- Maintain grant eligibility for participating jurisdictions; and
- Maintain compliance with state and federal legislative requirements for local hazard mitigation plans.

1.3 SCOPE

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

TABLE 1.1: PARTICIPATING JURISDICTIONS IN THE CLAY MACON REGIONAL HAZARD MITIGATION PLAN

Clay County	
Hayesville	
Macon County	
Franklin	Highlands

1.4 AUTHORITY

The Clay Macon Regional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans and has been adopted by each participating county and local jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. 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); and

- Biggert Waters Flood Insurance Reform Act of 2012(P.L. 112-141).

1.5 SUMMARY OF PLAN CONTENTS

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

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

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

The Risk Assessment begins by identifying hazards that threaten the Clay Macon Region. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, FEMA's Hazus®MH loss estimation methodology is used to evaluate known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as the participating jurisdictions in the Clay Macon 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 Clay Macon 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 Clay Macon 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 Clay Macon 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 Clay Macon 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 Clay Macon Regional plan will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

County-specific **Annexes** have been created to include specific information for each county and participating jurisdiction. Topics covered in the annexes include community profile, risk assessment, vulnerability, and capability assessment information. The mitigation actions relevant for each particular county and their participating municipal jurisdictions are also included in the Annex.

SECTION 2
PLANNING PROCESS

This section describes the planning process undertaken to develop the Clay Macon Regional Hazard Mitigation Plan. It consists of the following eight subsections:

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

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process culminates in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term community vision.

To ensure the functionality of a hazard mitigation plan, responsibility is assigned for each proposed mitigation action to a specific individual, department, or agency along with a schedule or target completion date for its implementation (see Section 10: *Plan Maintenance*). Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the Plan remains a current, dynamic, and effective planning document over time that becomes integrated into the routine local decision making process.

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

- saving lives and property,
- saving money,
- speeding recovery following disasters,
- reducing future vulnerability through wise development and post-disaster recovery and reconstruction,

- expediting the receipt of pre-disaster and post-disaster grant funding, and
- demonstrating a firm commitment to improving community health and safety.

Typically, communities that participate in mitigation planning are described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that the investments made before a hazard event will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Mitigation measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health, and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with other concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing community goals or initiatives that will help complement or hinder their future implementation.

2.2 HISTORY OF HAZARD MITIGATION PLANNING IN THE CLAY MACON REGION

Each of the two counties participating in this Plan has a previously adopted hazard mitigation plan. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below:

- *Clay County Multi-Jurisdictional Hazard Mitigation Plan* (8/9/11)
  - Town of Hayesville
- *Macon County Multi-Jurisdictional Hazard Mitigation Plan* (8/9/11)
  - Town of Franklin
  - Town of Highlands

Each of the county-levels plans was developed using the multi-jurisdictional planning process recommended by the Federal Emergency Management Agency (FEMA). For this plan, all of the aforementioned jurisdictions have joined to form a regional plan. All of the jurisdictions that participated in previous planning efforts have participated in the development of this regional plan. The process of merging all of the above plans into this regional plan is described in more detail below.

2.3 PREPARING THE 2015PLAN

Hazard mitigation plans are required to be updated every five years to remain eligible for federal mitigation funding. To simplify planning efforts for the jurisdictions in the Clay Macon Region, decided to join together to create the *Clay Macon Regional Hazard Mitigation Plan*. This allows resources to be shared amongst the participating jurisdictions and eases the administrative duties of all of the participants by combining the two existing county plans into one multi-jurisdictional plan.

To prepare the 2015 *Clay Macon Regional Hazard Mitigation Plan*, Atkins was hired as an outside consultant to provide professional mitigation planning services. To meet requirements of the Community Rating System, the region ensured that the planning process was facilitated under the direction of a professional planner. Nathan Slaughter from Atkins served as the lead planner for this project and is a member of the American Institute of Certified Planners (AICP).

Per the contractual scope of work, the consultant team followed the mitigation planning process recommended by FEMA (Publication Series 386 and Local Mitigation Plan Review Guide) and recommendations provided by North Carolina Division of Emergency Management (NCEM) mitigation planning staff[1]. The Local Mitigation Plan Review Tool, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this Plan. These standards are based upon FEMA's Final Rule as published in the Federal Register in Part 201 of the Code of Federal Regulations (CFR). The planning team used FEMA's Local Mitigation Plan Review Guide (October 2011) for reference as they completed the Plan.

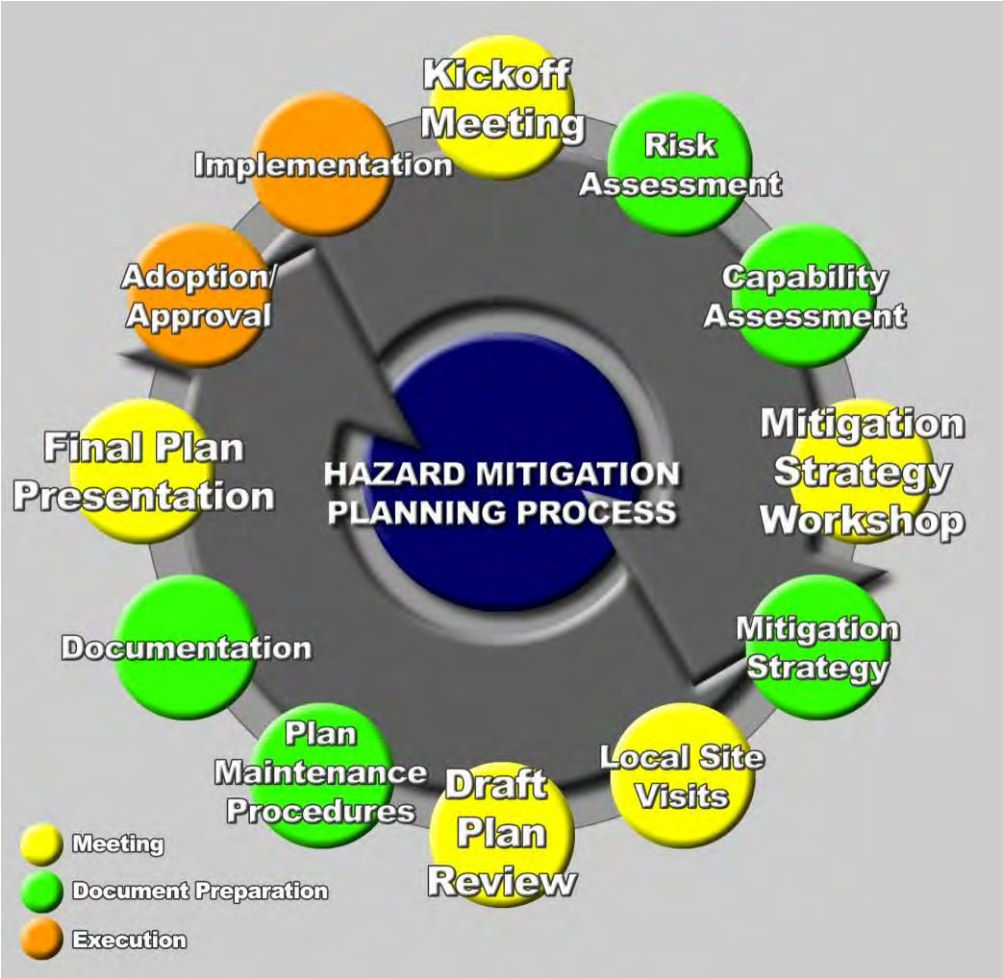
Although each participating jurisdiction had already developed a plan in the past, the combination of the two plans into one regional plan still required making some plan update revisions based on FEMA's Local Mitigation Plan Guide. Since all sections of the regional plan are technically new, plan update requirements do not apply. However, since this is the first regional plan among the jurisdictions, key elements from the previous approved plans are referenced throughout the document (e.g., existing actions) and required a discussion of changes made. For example, all of the risk assessment elements needed to be updated to include most recent information. It was also necessary to formulate a single set of goals for the region, but they were based on previously determined goals (Section 8: *Mitigation Strategy*). The Capability Assessment section includes updated information for all of the participating jurisdictions and the Mitigation Action Plan provides implementation status updates for all of the actions identified in the previous plans.

The process used to prepare this Plan included twelve major steps that were completed over the course of approximately nine months beginning in November 2014. Each of these planning steps (illustrated in **Figure 2.1**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*.

Over the past five years, each participating jurisdiction has been actively working to implement their existing plans. This is documented in the Mitigation Action Plan through the implementation status updates for each of the Mitigation Actions. The Capability Assessment also documents changes and improvements in the capabilities of each participating jurisdiction to implement the Mitigation Strategy.

[1] A copy of the negotiated contractual scope of work between the participating counties and Atkins is available through Macon County upon request.

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR THE CLAY MACON REGION



2.4 THE CLAY MACON REGIONAL HAZARD MITIGATION PLANNING TEAM

In order to guide the development of this Plan, the Clay Macon jurisdictions created the Clay Macon Regional Hazard Mitigation Planning Team (Regional Hazard Mitigation Planning Team or Regional Planning Team). The Regional Hazard Mitigation Planning Team represents a community-based planning team made up of representatives from various county and municipal departments, and other key stakeholders identified to serve as critical partners in the planning process.

Beginning in November 2014, the Regional Hazard Mitigation Planning Team members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e-mail distribution list.

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

- participate in Regional Hazard Mitigation Planning Team meetings and workshops

- provide best available data as required for the risk assessment portion of the Plan
- provide information that will help complete the Capability Assessment section of the plan and provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan
- support the development of the Mitigation Strategy, including the design and adoption of regional goal statements
- help design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan
- review and provide timely comments on all study findings and draft plan deliverables
- support the adoption of the 2015 *Clay Macon Regional Hazard Mitigation Plan*

Table 2.1 lists the members of the Regional Hazard Mitigation Planning Team who were responsible for participating in the development of the Plan. Committee members are listed in alphabetical order by last name.

TABLE 2.1: MEMBERS OF THE CLAY MACON REGIONAL HAZARD MITIGATION PLANNING TEAM

NAME	Position	DEPARTMENT / AGENCY
Beck II, Sam R.	Floodplain Administrator	Clay County Building Department
Cabe, Warren	Director	Macon County EM
Crisp, Pam	EM Administrative Assistant	Clay County EM
Gee, Danny	Area Coordinator	NCEM
Lancaster, Ricky	Fire Marshal	Clay County EM
Leek, Paul	County Manager	Clay County
Logan, Clay	Commissioner	Clay County
Mason, Matt	Planner	Macon County
Nichols, Randy	Commissioner	Clay County
Peck, Dr. Rob	Commissioner	Clay County
Seagle, Todd	911 Supervisor	Macon County EM
Setser, Justin	Planner	Town of Franklin
Teem, Jimmy	Fire Inspector	Macon County EM

Table 2.2 lists points of contact for several of the jurisdictions who elected to designate their respective county officials to represent their jurisdiction on the planning team, generally because they did not have the time or staff to be able to attend on their own. Although these members designated county officials to represent them at in-person meetings, each was still contacted throughout the planning process and participated by providing suggestions and comments on the Plan via email and phone conversations. These members are listed in alphabetical order by last name below.

TABLE 2.2: MEMBERS DESIGNATING REPRESENTATIVES TO CLAY MACON REGIONAL HAZARD MITIGATION PLANNING TEAM

NAME	Position	DEPARTMENT / AGENCY
Josh Ward	Planner/Zoning	Town of Highlands Administrator

NAME	Position	DEPARTMENT / AGENCY
Harry Baughn	Mayor	Town of Hayesville

Finally, it should be noted that many neighboring communities were offered the opportunity to participate in the planning process by being invited to meetings, through phone conversations, and in-person discussions. Among those invited to participate were representatives from Emergency Management offices in several of the counties that surround Clay and Macon Counties including Cherokee, Swain, Graham, and Jackson Counties. During these discussions, no major comments or suggestions were received concerning the plan.

2.4.1 Multi-Jurisdictional Participation

The *Clay Macon Regional Multi-Jurisdictional Hazard Mitigation Plan* includes two counties and three incorporated municipalities. To satisfy multi-jurisdictional participation requirements, each county and its participating jurisdictions were required to perform the following tasks:

- Participate in mitigation planning workshops;
- Identify completed mitigation projects, if applicable; and
- Develop and adopt (or update) their local Mitigation Action Plan.

Each jurisdiction participated in the planning process and has developed a local Mitigation Action Plan unique to their jurisdiction. Each jurisdiction will adopt their Mitigation Action Plan separately. This provides the means for jurisdictions to monitor and update their Plan on a regular basis.

2.5 COMMUNITY MEETINGS AND WORKSHOPS

The preparation of this Plan required a series of meetings and workshops for facilitating discussion, gaining consensus and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan. The following is a summary of the key meetings and community workshops held during the development of the plan update.[2] In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency, such as the approval of specific mitigation actions for their department or agency to undertake and include in the Mitigation Action Plan.

January 6, 2015 CM-HMPT Meeting

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

January 6, 2015
First Regional Hazard Mitigation Planning Team Meeting – Clay County Sheriff's Office

Nathan Slaughter of Atkins (project consulting team), started the meeting by welcoming the representatives from the County, participating municipal jurisdictions, and other stakeholders.

Mr. Slaughter led the kickoff meeting and began by providing an overview of the items to be discussed at the meeting and briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, project description, and presentation slides). He then provided a brief overview of mitigation and discussed the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

He gave a list of the participating jurisdictions for the regional plan, noting all local governments in the County are participating in the existing county-level hazard mitigation plan. The planning grant expires in August of 2015, so the planning team will work to develop a draft to submit to FEMA by June of 2015.

Mr. Slaughter then explained the six different categories of mitigation techniques (emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection) and gave examples of each. This explanation culminated with an Ice Breaker Exercise for the attendees.

Mr. Slaughter instructed attendees on how to complete the exercise. Attendees were divided into small groups and given an equal amount of fictitious FEMA money and asked to spend it in the various mitigation categories. Money could be thought of as grant money that communities received towards mitigation. Attendees were asked to target their money towards areas of mitigation that are of greatest concern for their community. Ideally, the exercise helps pinpoint areas of mitigation that the community may want to focus on when developing mitigation grants. Mr. Slaughter then presented the Ice Breaker Exercise results which were:

- Emergency Services- 70
- Prevention- 63
- Natural Resource Protection- 34
- Public Education and Awareness- 22
- Property Protection- 19
- Structural Projects- 12

Mr. Slaughter then discussed the key objectives and structure of the planning process, explaining the specific tasks to be accomplished for this project, including the planning process, risk assessment, vulnerability assessment, capability assessment, mitigation strategy and action plan, plan maintenance procedures, and documentation. The project schedule was presented along with the project staffing chart, which demonstrates the number of experienced individuals that will be working on this project. The data collection needs and public outreach efforts were also discussed.

Mr. Slaughter then reviewed the roles and responsibilities of Atkins, participating jurisdictions, and stakeholders. The presentation concluded with a discussion of the next steps to be taken in the project development, which included discussing data collection efforts, continuing public outreach, and the next meeting for the HMPT.

Mr. Slaughter thanked everyone for attending and made himself available for any questions or issues. The meeting was adjourned.

April 21, 2015
Second Regional Hazard Mitigation Planning Team Meeting – Clay County Sheriff's Office

Nathan Slaughter of Atkins (project consultant) welcomed everyone to the meeting. He then initiated the meeting with a review of the handouts, which included an agenda, presentation slides, proposed goals for the plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions. Mr. Slaughter then reviewed the project schedule and stated that a draft of the Hazard Mitigation Plan would be presented to the Hazard Mitigation Planning team in June.

He then passed the meeting over to Ryan Wiedenman of Atkins, who presented the findings of the risk assessment, starting with a review of the Presidential Disaster Declarations that have impacted the counties. He then explained the process for preparing Hazard Profiles and discussed how each hazard falls into one of four categories: Atmospheric, Geologic, Hydrologic, and Other. He indicated that each hazard must be evaluated and then profiled and assessed to determine a relative risk for each hazard.

Mr. Wiedenman reviewed the Hazard Profiles and the following bullets summarize the information presented:

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

- EXTREME HEAT. There have been no recorded extreme heat events reported by NCDC since 1950; however, the greatest extent of reported heat in the region was 101 degrees which indicates that extreme heat can be a hazard of concern for the region, though future occurrences are relatively unlikely.

- HAILSTORM. There have been 84 recorded events since 1984. Future occurrences are highly likely.

- LIGHTNING. There have been 14 recorded lightning events since 1998, causing one injury and approximately $138,194 in reported property damages. Future occurrences are highly likely.

- TORNADOES. There have been 9 recorded tornado events reported in the region since 1965. $1.3 million in property damages. No deaths or injuries have been reported. Future occurrences are possible.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that 34 storm tracks have come within 75 miles of the Clay Macon Region since 1859. Future occurrences are likely.

- SEVERE THUNDERSTORM WINDS. There have been 160 severe thunderstorm events reported since 1970 with $1.9 million in reported property damages. 2 injuries have been reported. Future occurrences are highly likely.

- WINTER STORM. There have been 155 recorded winter events in the Clay Macon Region since 1996. Future occurrences are highly likely.

- EARTHQUAKES. There have been 46 recorded earthquake events in the Clay Macon Region since 1913. The strongest had a recorded magnitude of V MMI. Future occurrences are likely.

- LANDSLIDE. There have been 811 recorded landslide events in the Clay Macon Region. Future occurrences are highly likely.

- DAM FAILURE. There are 76 dams in the Clay Macon Region, 34 of which are classified as high hazard dams. There have been two reported significant failures (Echo Valley Pond and Balfour Lake Lower Dam). Future occurrences are unlikely.

- EROSION. Erosion was included in the previous Macon County plan but impacts are minimal. It was not included in the Clay County plan. Future occurrences are possible.

- FLOOD. There have been 35 flood events recorded in the Clay Macon Region since 1996. There have been 28 NFIP losses since 1978 and approximately $1 million in claims. 3 repetitive loss properties in the region account for 6 of the recorded losses. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS. There have been 10 reported hazardous materials events reported in the region. Future occurrences are possible.

- WILDFIRE. There is an average of 56 fires per year reported in the Clay Macon Region with an average of 248 acres burned annually. Future occurrences are likely.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Winter Storm and Freeze followed by Thunderstorm/High Wind, Landslide, and Flooding.

In concluding the review of Hazard Profiles, Mr. Wiedenman stated if anyone had additional information for the hazard profiles, or had concerns with any of the data presented, they should call or email him.

Mr. Wiedenman then presented the Capability Assessment Findings. Atkins has developed a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, Community Rating System (CRS) participation, and the Local Capability Assessment Survey conducted by Atkins.

Mr. Wiedenman reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions are in the low to moderate range for Planning and Regulatory Capability and in the limited range for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability planners. Based upon the scoring methodology developed by Atkins, it was determined that most of the

participating jurisdictions have moderate capability to implement hazard mitigation programs and activities.

Mr. Wiedenman also discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 32 responses had been received. Mr. Wiedenman explained that the survey would close soon, so the HMPT could make one final push to get the survey out to the public. Based on the survey results, respondents felt that severe thunderstorm/high wind posed the greatest threat to their neighborhood, followed by flood and landslide. 81 percent of the respondents were interested in making their homes more resistant to hazards. However, 74 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Wiedenman then reminded team members of the results of the icebreaker exercise from the first Hazard Mitigation Team meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

- Emergency Services- 70
- Prevention- 63
- Natural Resource Protection- 34
- Public Education and Awareness- 22
- Property Protection- 19
- Structural Projects- 12

Mr. Wiedenman gave an overview of Mitigation Strategy Development and presented the existing goals for the plans and explained how Atkins developed recommended goals by combining previous goals. The Hazard Mitigation Team accepted the recommended goals for the plan. Mr. Wiedenman then provided an overview and examples of suggested mitigation actions tailored for the Clay Macon region. Mr. Wiedenman then asked each county and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by May 12, 2015. Mr. Wiedenman also asked planning team members to include any new mitigation actions by May 12, 2015.

Mr. Wiedenman thanked the group for taking the time to attend and explained that if team members had any issues or questions about the planning process or their next steps, they could contact him. The meeting was adjourned.

2.6 INVOLVING THE PUBLIC

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

An important component of the mitigation planning process involved public participation. Individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community "buy-in" from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at

making a home, neighborhood, school, business or entire city safer from the potential effects of hazards.

Public involvement in the development of the *Clay Macon Regional Hazard Mitigation Plan* was sought using two methods: (1) public survey instruments were made available in hard copy and online; and (3) copies of the draft Plan deliverables were made available for public review on county and municipal websites and at government offices. The public was provided two opportunities to be involved in the development of the regional plan at two distinct periods during the planning process: (1) during the drafting stage of the Plan; and (2) upon completion of a final draft Plan, but prior to official plan approval and adoption.

Each of the participating jurisdictions will hold public meetings before the final plan is officially adopted by the local governing bodies. These meetings will occur at different times once FEMA has granted conditional approval of the Plan. Adoption resolutions will be included in Appendix A.

2.6.1 Public Participation Survey

The Regional Hazard Mitigation Planning Team was successful in getting citizens to provide input to the mitigation planning process through the use of the *Public Participation Survey*. The *Public Participation Survey* was designed to capture data and information from residents of the Clay Macon Region that might not be able to attend public meetings or participate through other means in the mitigation planning process.

Copies of the *Public Participation Survey* were distributed to the Regional Hazard Mitigation Planning Team to be made available for residents to complete at local public offices. A link to an electronic version of the survey was also posted on each county's website. A total of 32 survey responses were received, which provided valuable input for the Regional Hazard Mitigation Planning Team to consider in the development of the plan update. Selected survey results are presented below.

- Approximately 44 percent of survey respondents had been impacted by a disaster, mainly hurricanes and flooding.
- Respondents ranked Severe Thunderstorm/High Wind as the highest threat to their neighborhood (26 percent) followed by Flood (16 percent), Landslide (13 percent), and Wildfire (13 percent).
- Approximately 45 percent of respondents have taken actions to make their homes more resistant to hazards and 81 percent are interested in making their homes more resistant to hazards.
- 74 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services, Natural Resource Protection, and Prevention were ranked as the most important activities for communities to pursue in reducing risks.

A copy of the survey is provided in Appendix B and a detailed summary of the survey results are provided in Appendix D.

2.7 INVOLVING THE STAKEHOLDERS

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

At the beginning of the planning process for the development of this plan, the project consultant worked with each of the County Emergency Management leads to initiate outreach to stakeholders to be involved in the planning process. The project consultant sent out a list of recommended stakeholders provided from FEMA Publication 386-1 titled **Getting Started: Building Support for Mitigation Planning**. The list of recommended stakeholders is found in Appendix C of that publication (Worksheet #1: Build the Planning Team) and has been included in **Appendix D** of this plan to demonstrate the wide range of stakeholders that were considered to participate in the development of this plan. Each of the County Emergency Management leads used that list for reference as they invited stakeholders from their counties to participate in the planning process.

In addition to the efforts described above, the regional Hazard Mitigation Planning Team encouraged more open and widespread participation in the mitigation planning process by designing and distributing the *Public Participation Survey*. These opportunities were provided for local officials, residents, businesses, academia, and other private interests in the region to be involved and offer input throughout the local mitigation planning process.

2.8 DOCUMENTATION OF PLAN PROGRESS

Progress in hazard mitigation planning for the participating jurisdictions in the Clay Macon Region is documented in this plan update. Since hazard mitigation planning efforts officially began in the participating counties with the development of the initial Hazard Mitigation Plans in the late 1990s and early 2000s, many mitigation actions have been completed and implemented in the participating jurisdictions. These actions will help reduce the overall risk to natural hazards for the people and property in the Clay Macon Region. The actions that have been completed are documented in the Mitigation Action Plan found in Section 9.

In addition, community capability continues to improve with the implementation of new plans, policies and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 7: *Capability Assessment*. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and hazard mitigation planning and have proven this by developing the Regional Hazard Mitigation Planning Team to update the Plan and by continuing to involve the public in the hazard mitigation planning process.

SECTION 3
COMMUNITY PROFILE

This section of the Plan provides a general overview of the Clay Macon 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 Clay Macon Region is located in the Blue Ridge Mountains in the southwestern portion of North Carolina. The region is characterized by high mountain peaks, sloping mountainsides, and fertile creek and river valleys. For the purposes of this plan, the Clay Macon Region includes Clay and Macon Counties. An orientation map is provided as **Figure 3.1**.

The Clay Macon Region is the home of the Nantahala River, one of the most popular whitewater rafting destinations in the nation, as well as the Nantahala National Forest. The rivers, streams, waterfalls, valleys, coves, and mountains are a geographic and recreational anchor for the region. Biking, hiking, camping, boating, swimming, fishing, whitewater rafting, horseback riding, golfing, and even gem mining are all popular activities. The region has a rich history of natural, cultural, agricultural, music, and craft heritage which can be explored through historic trails, local museums, agritourism, festivals, and mountain artisan shows.

The total land area of each of the participating counties is presented in **Table 3.1**.

TABLE 3.1: TOTAL LAND AREAS OF PARTICIPATING COUNTIES

County	Total Land Area
Clay County	215 square miles
Macon County	516 square miles

Source: United States Census Bureau, 2010

The Clay Macon Region enjoys a generally mild year-round climate that is characterized by colder winters and warm summers; however, variation in elevation and topography can drastically affect local weather. The average annual temperature for this area is approximately 55˚F, with an average high of 68˚F and low of 42˚F. Typically, the warmest month in the Clay Macon Region is July and the coldest month is January. The highest recorded temperature in the region was 101˚F (in 1952) and the lowest recorded temperature was -19˚F (in 1985). Precipitation is generally well distributed throughout the year and annual totals average between 54 and 72 inches.[1]

[1] State Climate Office of North Carolina.

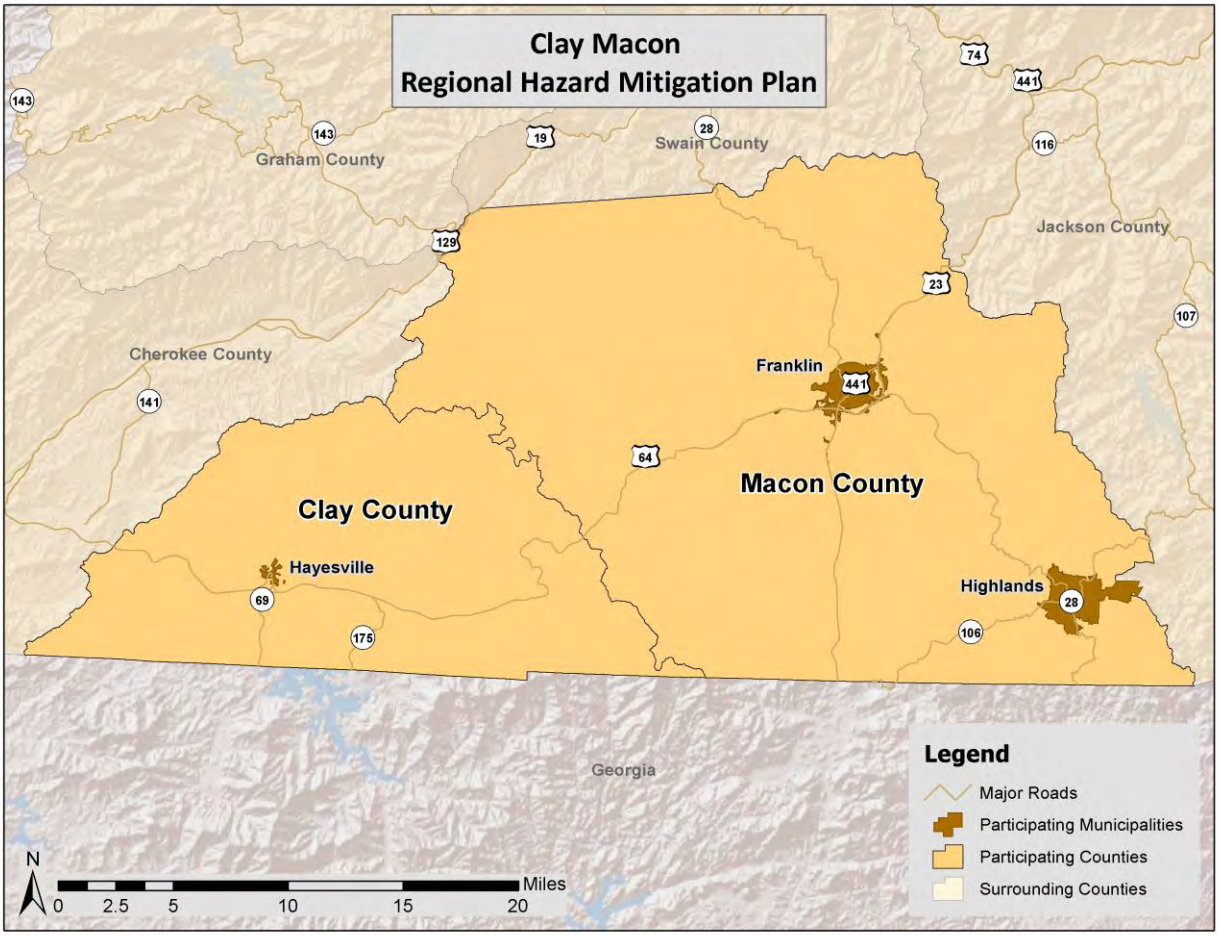
In general, the spring months are marked by unpredictable weather and changes can occur rapidly with sunny skies yielding to snow in just a few hours. Average high temperatures increase from 60˚F in March to the mid 70s in May. There is a similar increase in average low temperatures, which are just above freezing in March and climb to nearly 50˚F in May.

In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the low to mid 80s in July and August. Summertime is typically moderately warn and humid, however, at higher elevations, weather tends to be more pleasant during the summer months.

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

Winter in the Clay Macon Region is generally moderate but extremes do occur, especially at higher elevations. Winter lows frequently drop below freezing and temperatures can be even lower at higher elevations. In the winter months, the average high temperature falls between the upper 40s and lower 50s and the average low temperature is in the mid 20s. The region averages between 7 and 14 inches of snow per year depending on altitude of the location. Winter precipitation usually results from low pressure storms which frequently pass through the area.

FIGURE 3.1: CLAY MACON REGION ORIENTATION MAP



3.2 POPULATION AND DEMOGRAPHICS

Macon County is the largest participating county by area and also has the largest population. Between 2000 and 2010, the region experienced substantial population growth. Clay County had the highest county growth rate at 20.6 percent. Population counts from the US Census Bureau for 1990, 2000, and 2010 for both of the participating counties are presented in **Table 3.2**.

TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING COUNTIES

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Clay County	7,155	8,775	10,587	20.6%
Macon County	23,499	29,811	33,922	13.8%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of the participating counties ranges from 48 to 50 years. The racial characteristics of the participating counties are presented in **Table 3.3**. Generally, whites make up the majority of the population in the region accounting for over 93 percent of the

population in all Clay Macon Region Counties. Macon County has a slightly more diverse population than Clay County.

TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING COUNTIES

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Clay County	96.6%	0.6%	0.3%	0.2%	0.0%	0.8%	1.4%	2.4%
Macon County	93.8%	1.3%	0.5%	0.6%	0.0%	2.7%	1.1%	6.6%

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

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the 2010 US Census, there were 32,385 housing units in the Clay Macon Region, the majority of which are single family homes or mobile homes. Housing information for the two participating counties is presented in **Table 3.4**. As shown in the table, both counties have a high percentage of seasonal housing units.

TABLE 3.4: HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Clay County	5,425	7,140	22.0%	$163,000
Macon County	20,746	25,245	32.3%	$167,800

Source: United States Census Bureau

3.3.2 Infrastructure

Transportation

There are several US highways that cross the Clay Macon Region. US Route 64 is the major east-west thoroughfare connecting the region to its neighboring counties (Cherokee and Jackson) and it also runs through Franklin and Hayesville. This highway is also part of the designated scenic byway called Waterfall Byway. Waterfall Byway winds through five counties, including Clay and Macon, and earns its name from the 200 waterfalls that surround the route. The major north-south highway in the region is US 23/441, which connects Macon County to Tennessee and Jackson County. NC 28 is a primary state highway that also runs north to south through the Nantahala National Forest.

Within Clay County, a public transportation system made up 16 service vehicles serves local human service agencies and the public through subscription. Macon County Transit also provides public transportation for its county's citizens through appointments on a first call first served basis.

Currently, there is no rail service in the Clay Macon Region; however, the Great Smoky Mountain Railroad, which operates tourist excursions in addition to moving freight, runs just north of Macon County.

Asheville Regional Airport is the largest airport in the mountains serving the Clay Macon Region and all of Western North Carolina. The airport currently offers non-stop commercial flights on 4 airlines to 11 cities. The major airport located nearest to the region is the Charlotte Douglas International Airport, which offers non-stop commercial flights on 10 airlines to more than 140 destinations across the United States as well as to several international destinations. Other major nearby airports include the Hartsfield-Jackson Atlanta International Airport in Georgia and the Nashville Metropolitan Airport in Tennessee. An additional general aviation airport servicing the Clay Macon Region includes the Macon County Airport.

Utilities

Electrical power in the Clay Macon Region is provided by one public utility, two electricity cooperatives, and one municipality in Macon County. Duke Energy Progress provides service to Macon County and the southwest corner of Clay County. The electricity cooperatives servicing the region include Haywood Electric Membership Corporation in the southeastern corner of Macon County and Blue Ridge Mountain Electric Membership Corporation (which is a Tennessee Valley Authority distributor) in the southwestern corner of Clay County. The Town of Highlands also provides municipally-owned and operated electric service to its residents.

Water and sewer service is provided in some areas of the region by Clay County, the Town of Franklin, and the Town of Highlands, but generally municipal water systems are extremely limited in the mountains and private or shared wells and septic systems are considered the norm.

Community Facilities

There are a number of public buildings and community facilities located throughout the Clay Macon Region. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 14 fire/EMS stations, 3 police stations, and 14 schools located within the study area.

Two hospitals are located in the Clay Macon Region (both in Macon County).[2] The larger of the two is Angel Medical, a 59-bed general hospital located in the Town of Franklin. The Highlands-Cashiers Hospital, in the Town of Highlands, has 24 beds as well as a skilled nursing facility with 80 beds.

The Clay Macon Region contains numerous local parks, campgrounds, recreation areas, and hiking trails. These include the Nantahala National Forest, Appalachian Trail, Jackrabbit Mountain Biking and Hiking Trail, Hiwassee River, Nantahala Lake, and Chatuge Lake. These facilities offer recreational opportunities to area residents and visitors alike.

3.3.3 Land Use

Many areas of the Clay Macon Region are undeveloped or sparsely developed due to the mountainous terrain and the conservation of land in the Nantahala National Forest. As shown in **Figure 3.1** above, there are several small incorporated municipalities located throughout the study area, and these areas are where the region's population is generally concentrated. The incorporated areas are also where

[2] Licensed Hospitals in North Carolina, 11/2014 http://www.ncdhhs.gov/dhsr/data/hllist.pdf

many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of rural residential development, agricultural uses, recreational areas, and forestland.

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

3.4 EMPLOYMENT AND INDUSTRY

The early modern economy in the Clay Macon Region was built around extractive industries; such as mining, logging, and agriculture; manufacturing; and textiles. Like many other mountain towns in North Carolina, the jurisdictions in the Clay Macon Region have focused recent economic development efforts on cultural and natural heritage tourism. Second home development is another growing industry that can also help to boost the economy and promote revitalization.

According to the North Carolina Employment Security Commission (NCESC), in 2012, Clay County had an average annual employment of 1,923 workers and an average unemployment rate of 9.3 percent (compared to 9.2 percent for the state). In 2012, the Retail Trade industry employed 23.0 percent of the county's workforce followed by Public Administration (14.9%); Health Care and Social Assistance (13.9%); and Educational Services (11.8%). The American Community Survey (ACS) found the average annual median household income in Clay County was $38,536 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

In 2012, Macon County had an average annual employment of 10,548 workers and an average unemployment rate of 10.4 percent. In 2012, according to NCESC, the Retail Trade industry employed the most people, with 16.8 percent of the workforce, followed by Health Care and Social Assistance (15.1%); Accommodation and Food Services (12.6%); and Educational Services (8.9%). The average annual median household income in Harnett County, according to the ACS, was $38,134 from 2008 to 2012.

SECTION 4
HAZARD IDENTIFICATION

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

- 4.1 Overview
- 4.2 Description of Full Range of Hazards
- 4.3 Disaster Declarations
- 4.4 Hazard Evaluation
- 4.5 Hazard Identification Results

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

4.1 OVERVIEW

The Clay Macon 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 Clay Macon Region has included a comprehensive assessment of both types of hazards.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating counties in the Clay Macon Region (Clay County and Macon County) have identified a number of hazards that are to be addressed in its Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Clay Macon Regional Hazard Mitigation Planning Team members, research of past disaster declarations in the participating counties[1], and review of the North Carolina State Hazard Mitigation Plan (2010). Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

Table 4.1 lists the full range of natural hazards initially identified for inclusion in the Plan and provides a brief description for each. This table includes 23 individual hazards. Some of these hazards are considered to be interrelated or cascading, but for preliminary hazard identification purposes these individual hazards are broken out separately.

Next, **Table 4.2** lists the disaster declarations in the Clay Macon Region

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

Next, **Table 4.3** documents the evaluation process used for determining which of the initially identified hazards are considered significant enough to warrant further evaluation in the risk assessment. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be further assessed, how this determination was made, and why this determination was made. The table works to summarize not only those hazards that *were* identified (and why) but also those that *were not* identified (and why not). Hazard events not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the Regional Hazard Mitigation Planning Team during the plan update process.

Lastly, **Table 4.4** provides a summary of the hazard identification and evaluation process noting that 15 of the 23 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "☑").

4.2 DESCRIPTION OF FULL RANGE OF HAZARDS

TABLE 4.1: DESCRIPTIONS OF THE FULL RANGE OF INITIALLY IDENTIFIED HAZARDS

Hazard	Description
ATMOSPHERIC HAZARDS	
Avalanche	A rapid fall or slide of a large mass of snow down a mountainside.
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities.
Hailstorm	Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops into parts of the atmosphere where the temperatures are below freezing.
Heat Wave / Extreme Heat	A heat wave may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. A heat wave combined with a drought can be very dangerous and have severe economic consequences on a community.

Hurricane and Tropical Storm	Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.
Lightning	Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a “bolt” when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 73 people are killed each year by lightning strikes in the United States.
Nor’easter	Similar to hurricanes, nor’easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their associated strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful. Nor’easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding.
Severe Thunderstorm	Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Thunderstorms may result in hail, tornadoes, or straight-line winds. Windstorms pose a threat to lives, property, and vital utilities primarily due to the effects of flying debris and can down trees and power lines.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm.

Winter Storm and Freeze	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
GEOLOGIC HAZARDS	
Earthquake	A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.
Expansive Soils	Soils that will exhibit some degree of volume change with variations in moisture conditions. The most important properties affecting degree of volume change in a soil are clay mineralogy and the aqueous environment. Expansive soils will exhibit expansion caused by the intake of water and, conversely, will exhibit contraction when moisture is removed by drying. Generally speaking, they often appear sticky when wet, and are characterized by surface cracks when dry. Expansive soils become a problem when structures are built upon them without taking proper design precautions into account with regard to soil type. Cracking in walls and floors can be minor, or can be severe enough for the home to be structurally unsafe.
Landslide	The movements of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high.
Land Subsidence	The gradual settling or sudden sinking of the Earth's surface due to the subsurface movement of earth materials. Causes of land subsidence include groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.
Tsunami	A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up", and wave heights to increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore.

Volcano	A mountain that opens downward to a reservoir of molten rock below the surface of the earth. While most mountains are created by forces pushing up the earth from below, volcanoes are different in that they are built up over time by an accumulation of their own eruptive products: lava, ash flows, and airborne ash and dust. Volcanoes erupt when pressure from gases and the molten rock beneath becomes strong enough to cause an explosion.
HYDROLOGIC HAZARDS	
Dam and Levee Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam. Dam failure can result from natural events, human-induced events, or a combination of the two. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning.
Erosion	Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.
Flood	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding and urban drainage).
Storm Surge	A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas.

OTHER HAZARDS	
Hazardous Materials Incident	Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and possibly wildlife as well.
Terror Threat	Terrorism is defined by FEMA as, "the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom." Terrorist acts may include assassinations, kidnappings, hijackings, bomb scares and bombings, cyber attacks (computer-based), and the use of chemical, biological, nuclear and radiological weapons.
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

4.3 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the Clay Macon Regional planning area. Since 1973, six presidential disaster declarations have been reported in the Clay Macon Region. This includes three storms related to severe storms and flooding and/or high winds and landslides, one winter storm, and two storms related to hurricane/tropical storm events.

TABLE 4.2: CLAY MACON REGION DISASTER DECLARATIONS

Year	Disaster Number	Description	Clay County	Macon County
1973	394	SEVERE STORMS & FLOODING	X	X
1995	1073	SEVERE STORMS, FLOODING, HIGH WINDS	X	X
1996	1087	BLIZZARD OF 96		X
2004	1546	TROPICAL STORM FRANCES		X
2004	1553	HURRICANE IVAN		X
2013	4146	SEVERE STORMS, FLOODING, LANDSLIDES, AND MUDSLIDES		X

4.4 HAZARD EVALUATION

TABLE 4.3: DOCUMENTATION OF THE HAZARD EVALUATION PROCESS

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
ATMOSPHERIC HAZARDS			
Avalanche	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of US Forest Service National Avalanche Center website	• The United States avalanche hazard is limited to mountainous western states including Alaska, as well as some areas of low risk in New England. • Avalanche hazard was removed from the North Carolina State Hazard Mitigation Plan after determining the mountain elevation in Western North Carolina did have enough snow to produce this hazard. • Avalanche is not included in either of the previous Clay Macon hazard mitigation plans. • There is no risk of avalanche events in North Carolina.
Drought	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of the North Carolina State Climate Office website	• Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. • Droughts are discussed in NC State Hazard Mitigation Plan as a lesser hazard. • The NC State Hazard Mitigation Plan lists drought as a top hazard for the Mountain 1 Region, which includes the Clay Macon counties. • Drought is included in one of the two previous Clay Macon hazard mitigation plans. • There are reports of at least moderate drought conditions in eight out of the last fourteen years in the Clay Macon Region, according to the North Carolina State Climate Office

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Hailstorm	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Although hailstorms occur primarily in the Midwestern states, they do occur in every state on the mainland U.S. Most inland regions experience hailstorms at least two or more days each year. • Hailstorm events are discussed in the NC State Hazard Mitigation Plan under the severe thunderstorm hazard. • Hail is addressed under the severe thunderstorm hazard in both of the previous Clay Macon hazard mitigation plans. Given the frequency of the event, individual analysis is warranted. • NCDC reports 84 hailstorm events (0.75 to 2.75 inch size hail) for the Clay Macon Region between 1984 and 2014. For these events there was almost $20,000 (2014 dollars) in property damages reported.
Heat Wave / Extreme Heat	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the North Carolina State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Many areas of the United States are susceptible to heat waves, including North Carolina. • The NC State Hazard Mitigation Plan reports the western portion of the state as having a relatively low vulnerability in the state. However, given the state's location in the typically hot and humid southeast of the United States, some vulnerability still exists. • Extreme temperatures were included in one of the previous county hazard mitigation plans in tandem with the drought hazard. • Although NCDC does not report any extreme heat events for the Clay Macon Region, high temperatures are a threat to most of the state which warrants consideration.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Hurricane and Tropical Storm	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations • FEMA Hazus-MH storm return periods	• The Atlantic and Gulf regions are most prone to landfall by hurricanes and tropical storms. • Hurricane and tropical storm events are discussed in the NC State Hazard Mitigation Plan and are listed as a top hazard in the Mountain 1 Region, which includes the Clay Macon counties. • Hurricane and tropical storm were addressed in both of the previous Clay Macon hazard mitigation plans. • NOAA historical records indicate 4 tropical storms and 30 tropical depressions have come within 75 miles of the Clay Macon Region since 1859. • NCDC reports 1 tropical storm event since 2004 for the Clay Macon Region. This event resulted in nearly $19,000 (2014 dollars) of reported property damage. • 2 out of 6 disaster declarations in the Clay Macon Region are directly related to hurricane and tropical storm events. • The 50-year return period peak gust for hurricane and tropical storm events in the Clay Macon Region is around 51 mph.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Lightning	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of Vaisala's NLDN Lightning Flash Density Map	• The central region of the Florida has the highest density of lightning strikes in the mainland U.S.; however, lightning events are experienced in nearly every region. • Lightning events are discussed in the NC State Hazard Mitigation Plan as part of the severe thunderstorm hazard. • Lightning is addressed under the severe thunderstorms in both of the previous hazard mitigation plans. Given the damage and reported injuries, individual analysis is warranted. • NCDC reports 14 lightning events for the Clay Macon Region since 1998. These events have resulted in a recorded 1 injury and $2.1 million (2014 dollars) in property damage. • According to Vaisala's U.S. National Lightning Detection Network, the Clay Macon Region is located in an area that experienced an average of 2 to 4 lightning flashes per square kilometer per year between 1997 and 2010.
Nor'easter	NO	• Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Nor'easters are discussed in the state plan. The Mountain 1 Region, which includes the Clay Macon counties, has the lowest vulnerability in the state. • Nor'easters were identified in one of the previous Clay Macon hazard mitigation plans. • NCDC does not report any nor'easter activity for the Clay Macon Region. However, nor'easters may have affected the region as severe winter storms. In this case, the activity would be reported under winter storm events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Severe Thunderstorm	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations	• Over 100,000 thunderstorms are estimated to occur each year on the U.S. mainland, and they are experienced in nearly every region. • Severe thunderstorm events are discussed in the NC State Hazard Mitigation Plan and are identified as the top hazard in the Mountain 1 Region, which includes the Clay Macon Counties. Additionally, the Mountain 1 Region has the greatest vulnerability in the state. • Severe thunderstorm events were addressed in both of the previous Clay Macon hazard mitigation plans. • NCDC reports 160 thunderstorm wind and high wind events in the South Clay Macon counties since 1970. These events have resulted in 2 injuries and almost $2.0 million (2014 dollars) in property damage. • 3 of the region's 6 disaster declarations were directly related to severe storm and/or high wind events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Tornado	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations	• From 1953 to 1993, North Carolina averaged 10 to 25 tornadoes per year. • Tornado events are discussed in the NC State Hazard Mitigation Plan. The Mountain 1 Region, which includes the Clay Macon Region, is one of the regions with the lowest vulnerability in the state. • Tornado events were addressed in both of the previous Clay Macon hazard mitigation plans. • NCDC reports 9 tornado events in Clay Macon Region counties since 1965. These events have resulted in over $1.3 million (2014 dollars) in property damage with the most severe being an F1. • None of the region's 6 disaster declarations was directly related to tornadoes.
Winter Storm and Freeze	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations	• Winter storms affect every state in the continental U.S. and Alaska. • Severe winter storms, including snow storms and ice storms, are discussed in the NC State Hazard Mitigation Plan. They are listed as a top hazard in the Mountain 1 Region, which includes the Clay Macon counties. • Winter storm events were addressed in both of the previous Clay Macon hazard mitigation plans. • NCDC reports that the Clay Macon counties have been affected by 155 snow and ice events since 1996. • 1 of the region's 6 disaster declarations was directly related to winter storm events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
GEOLOGIC HAZARDS			
Earthquake	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of the National Geophysical Data Center • USG Earthquake Hazards Program website	• Although the zone of greatest seismic activity in the United States is along the Pacific Coast, eastern regions have experienced significant earthquakes. • Earthquake events are discussed in the NC State Hazard Mitigation Plan and both of the participating counties in the Clay Macon Region are in the region with the highest vulnerability to an earthquake event in the state. • 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. • Both of the previous hazard mitigation plans in the Clay Macon Region address earthquake. • 46 events are known to have occurred in the region according to the National Geophysical Data Center. The greatest MMI reported was a V (slightly strong). • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Clay Macon Region is approximately 5 to 7%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Expansive Soils	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of USDA Soil Conservation Service's Soil Survey	• The effects of expansive soils are most prevalent in parts of the Southern, Central, and Western U.S. • Expansive soils are identified in the NC State Hazard Mitigation Plan but they are not included as a top hazard for the Mountain 1 Region, which includes the Clay Macon counties. • Neither of the previous Clay Macon hazard mitigation plans identify expansive soils as a potential hazard. • According to FEMA and USDA sources, the Clay Macon Region is located in an area that has a "little to no" clay swelling potential.
Landslide	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey database of historic landslides	• 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. • Landslide/debris flow events are discussed in the state plan and ranked as the top hazard for the Mountain 1 Region, which includes the Clay Macon counties. Additionally, the Mountain Region received the highest vulnerability score in the state. • Both of the previous Clay Macon hazard mitigation plans address landslides. • USGS landslide hazard maps indicate "high landslide incidence" (more than 15% of the area is involved in landsliding) is found across the Clay Macon Region. Both counties also have areas of moderate incidence with high susceptibility. • Data provided by NCGS indicate 811 recorded landslide events in the Clay Macon Region.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Land Subsidence	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans	• Land subsidence affects at least 45 states, including North Carolina. However, because of the broad range of causes and impacts, there has been limited national focus on this hazard. • The state plan delineates certain areas that are susceptible to land subsidence hazards in North Carolina; however the Clay Macon counties have zero vulnerability. • Neither of the previous Clay Macon hazard mitigation plans identify land subsidence as a potential hazard.
Tsunami	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses).	• 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. • Tsunamis are discussed in the state plan and described as a "greater" hazard for the state. However, the Mountain Region, which includes the Clay Macon counties, scored a zero for tsunami hazard risk. • One of the previous plans in the Clay Macon Region addresses tsunami, but there was no historical evidence of tsunami events in the county. • FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Volcano	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of USGS Volcano Hazards Program website	• More than 65 potentially active volcanoes exist in the United States and most are located in Alaska. The Western states and Hawaii are also potentially affected by volcanic hazards. • There are no active volcanoes in North Carolina. • There has not been a volcanic eruption in North Carolina in over 1 million years. • No volcanoes are located near the Clay Macon Region.
HYDROLOGIC HAZARDS			
Dam and Levee Failure	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of North Carolina Division of Land Management website	• The National Inventory of Dams shows dams are located in every state. • Dam failure is discussed in the NC State Hazard Mitigation Plan and is listed as a top hazard for the Mountain 1 Region, which includes the Clay Macon counties. • Both of the previous Clay Macon hazard mitigation plans address dam failure (one of the plans addresses it under the flooding hazard). • Of the 76 dams reported on the North Carolina Inventory of Dams, 34 are high hazard (45%). (High hazard is defined as "where failure or mis-operation will probably cause loss of human life.")

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Erosion	YES	• Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans	• Coastal erosion is discussed in the NC State Hazard Mitigation Plan but only for coastal areas (there is no discussion of riverine erosion). The Clay Macon Region is not located in a coastal area. • Riverine erosion is discussed in one of the previous Clay Macon hazard mitigation plans. • Although erosion was not previously identified as a top hazard, it remains a natural, dynamic, and continuous process in the Clay Macon Region that warrants inclusion as a potential hazard.
Flood	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical disaster declarations • Review of FEMA DFIRM data • Review of FEMA's NFIP Community Status Book and Community Rating System (CRS)	• Floods occur in all 50 states and in the U.S. territories. • The flood hazard is thoroughly discussed in the NC State Hazard Mitigation Plan. The Clay Macon Region was found to have relatively low vulnerability compared to the state. • Both of the previous hazard mitigation plans in the Clay Macon Region address flood hazard. • NCDC reports that Clay Macon Region counties have been affected by 35 flood events since 1996. These events caused an estimated $6.5 million (2014 dollars) in property damages. • 3 of the 6 Presidential Disaster Declarations were flood-related and an additional two were hurricane or tropical storm-related which caused flooding issues. • Almost 4% of the Clay Macon Region is located in an identified floodplain (100- or 500-year). • All but 1 municipality participate in the NFIP; however, no jurisdictions currently participate in the CRS.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Storm Surge	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Given the inland location of the Clay Macon Region, storm surge would not affect the area. • Storm surge is discussed in the NC State Hazard Mitigation Plan under the hurricane hazard and indicates that the Mountain Region, which includes Clay and Macon Counties, has zero vulnerability to storm surge. • None of the previous hazard mitigation plans in the Clay Macon Region identify storm surge as a hazard. • No historical events were reported by NCDC
OTHER HAZARDS			
Hazardous Materials Incident	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of previous Clay Macon county hazard mitigation plans • Review EPA Toxic Release Inventory (TRI) • Review of USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) incident database	• Cities, counties, and towns where hazardous materials fabrication, processing, and storage sites are located, and those where hazardous waste treatment, storage or disposal facilities operate are at risk for hazardous materials events. • One of the previous plans in the Clay Macon Region includes hazardous materials incident. • 3 TRI facilities are located in the Clay Macon Region. • 3 of the 10 PHMSA-reported HAZMAT incidents in the region were classified as "serious" incidents. In total, these incidents have resulted in over $4,000 (2014 dollars) in property damages.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Terror Threat	NO	• Review of previous Northern Piedmont county hazard mitigation plans • Review of local official knowledge	• Terrorism threat was included in one of the previous Clay Macon hazard mitigation plans. • There is no history of past incidents or any current expectations of an incident.
Wildfire	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Clay Macon county hazard mitigation plans • Review of Southern Wildfire Risk Assessment (SWRA) Data • Review of the NC Division of Forest Resources website	• Wildfires occur in virtually all parts of the United States. Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases. • Wildfires are discussed in the state plan as a "greater" hazard of concern and are listed as a top hazard for the Mountain 1 Region, which includes Clay and Macon Counties. • Both of the previous plans in the Clay Macon Region address wildfire. • A review of SWRA data indicates that there are areas of elevated concern in the Clay Macon Region. • According to the North Carolina Division of Forest Resources, the Clay Macon Region experiences an average of 56 fires each year which burn a combined 248 acres. • Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases.

4.5 HAZARD IDENTIFICATION RESULTS

TABLE 4.4: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS

ATMOSPHERIC HAZARDS	GEOLOGIC HAZARDS
☐ Avalanche	☑ Earthquake
☑ Drought	☐ Expansive Soils
☑ Hailstorm	☑ Landslide
☑ Heat Wave / Extreme Heat	☐ Land Subsidence
☑ Hurricane and Tropical Storm	☐ Tsunami
☑ Lightning	☐ Volcano
☐ Nor'easter	**OTHER HAZARDS**
☑ Severe Thunderstorm	☑ Hazardous Materials Incident
☑ Tornado	☐ Terror Threat
☑ Winter Storm and Freeze	☑ Wildfire
HYDROLOGIC HAZARDS	
☑ Dam and Levee Failure	
☑ Erosion	
☑ Flood	
☐ Storm Surge	

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

SECTION 5
HAZARD PROFILES

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

44 CFR Requirement
44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan 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 Clay Macon Region hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard, its location and extent, notable historical occurrences, and the probability of future occurrences. Each profile also includes specific items noted by members of the Clay Macon Regional Hazard Mitigation Planning Team as it relates to unique historical or anecdotal hazard information for the counties in the Clay Macon Region, or a participating municipality within them.

The following hazards were identified:

- **Atmospheric**
  - Drought
  - Extreme Heat
  - Hailstorm
  - Hurricane and Tropical Storm
  - Lightning

  - Severe Thunderstorm (including straight-line winds)
  - Tornado
  - Winter Storm and Freeze
- **Geologic**
  - Earthquake
  - Landslide
- **Hydrologic**
  - Dam and Levee Failure
  - Erosion
  - Flood
- **Other**
  - Hazardous Materials Incident
  - Wildfire

5.2 STUDY AREA

The Clay Macon Region includes two counties: Clay and Macon. **Table 5.1** provides a summary table of the participating jurisdictions within each county. In addition, **Figure 5.1** provides a base map, for reference, of the Clay Macon Region.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE CLAY MACON REGIONAL HAZARD MITIGATION PLAN

Clay County	
Hayesville	
Macon County	
Franklin	Highlands

FIGURE 5.1: CLAY MACON REGION BASE MAP

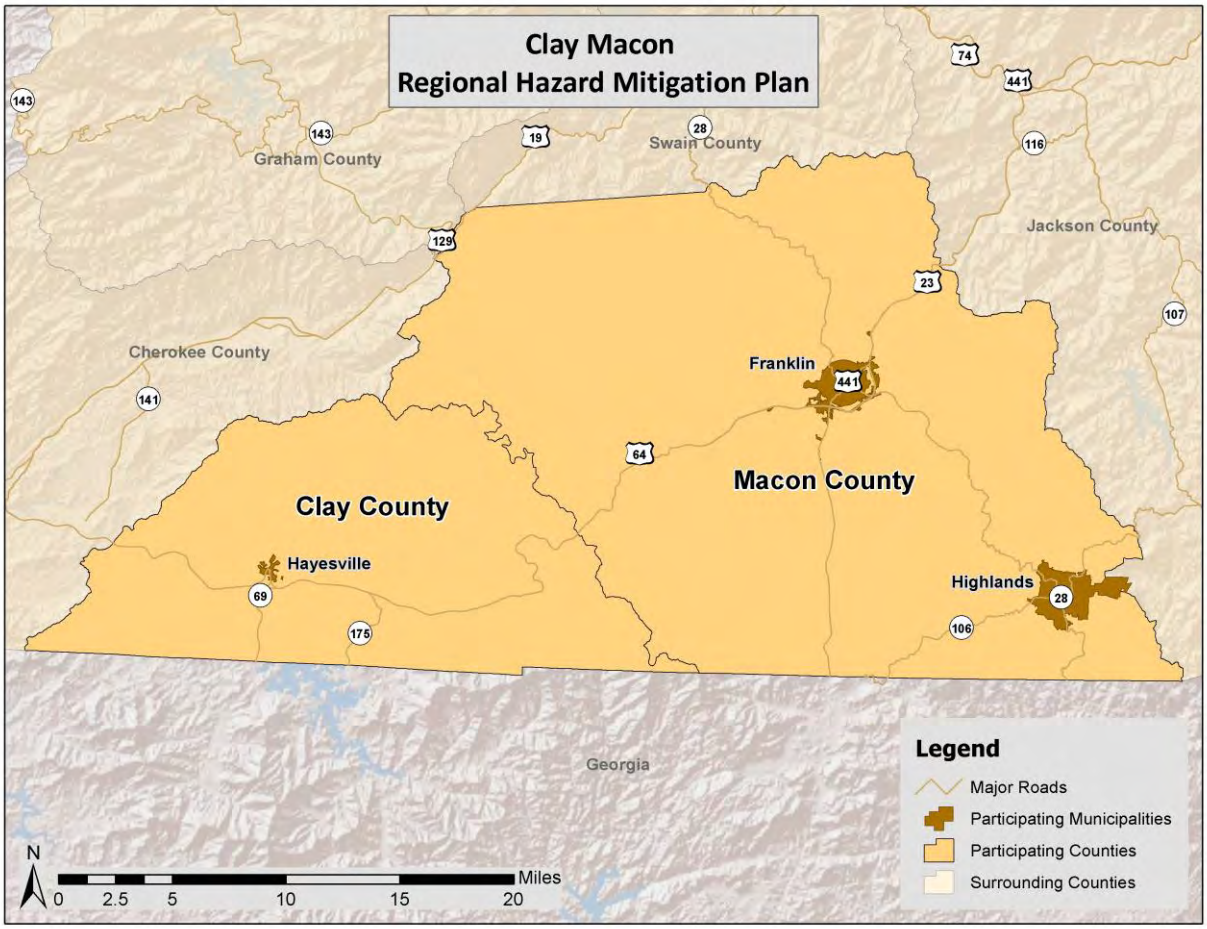


Table 5.2 lists each significant hazard for the Clay Macon Region and identifies whether or not it has been determined to be a specific hazard of concern for the three municipal jurisdictions and each of the two county's unincorporated areas. This is the based on the best available data and information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

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS IN THE CLAY MACON REGION

Jurisdiction	Atmospheric								Geologic		Hydrologic			Other	
	Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm	Earthquake	Landslide	Dam and Levee Failure	Erosion	Flood	HAZMAT	Wildfire
Clay County															
Hayesville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Macon County															
Franklin	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Highlands	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Atmospheric Hazards

5.3 DROUGHT

5.3.1 Background

Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts.

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

TABLE 5.3 DROUGHT CLASSIFICATION DEFINITIONS

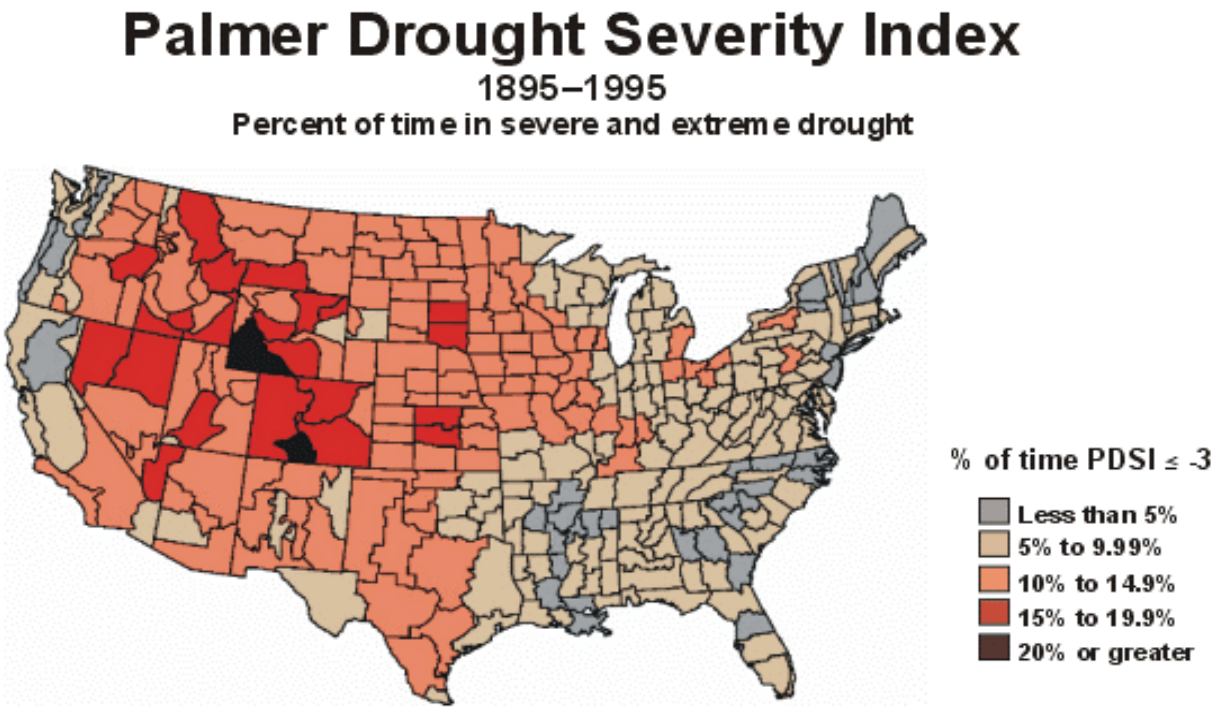
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, Federal Emergency Management Agency

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

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and range from -0.5 (incipient dry spell) to -4.0 and above (extreme drought). Evident in **Figure 5.2**, the Palmer Drought Severity Index Summary Map for the United Stated, drought affects most areas of the United States, but is less severe in the Eastern United States.

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



Source: National Drought Mitigation Center

5.3.2 Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index (**Figure 5.2**), Western North Carolina has a relatively low risk for drought hazard. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Furthermore, it is assumed that the Clay Macon 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 State Climate Office was used to ascertain historical drought events in the Clay Macon Region. The North Carolina State Climate Office reports PDSI data for North Carolina from 2000 to 2013. It classifies drought conditions by region on a scale of -6.00 to 6.00 where:

- 4.00 and above: Extremely Moist
- 3.00 to 3.99: Very Moist
- 2.00 to 2.99: Moderately Moist
- -1.99 to 1.99: Mid-Range
- -2.00 to -2.99: Moderate Drought

- -3.00 to -3.99: Severe Drought
- -4.00 and below: Extreme Drought

According to the North Carolina State Climate Office, the Southern Mountains Region, which includes the Clay Macon Region, experienced moderate to extreme conditions during 8 of the last 14 years (2000-2013). **Table 5.4** shows the most severe drought condition reported for each year in the Southern Mountains Region, according to PDSI classifications. In addition, **Table 5.5** presents a summary of this information. However, it should be noted that the most severe classification reported is based on monthly regional averages, and conditions in the Clay Macon Region may actually have been less or more severe than what is reported.

TABLE 5.4: HISTORICAL DROUGHT OCCURRENCES IN THE CLAY MACON REGION

extreme drought	severe drought	moderate drought	mid-range	moderately moist	very moist	extremely moist
-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

	Clay Macon Region	
2000	**-3.34**	**Severe Drought**
2001	**-3.62**	**Severe Drought**
2002	**-3.72**	**Severe Drought**
2003	**-0.05**	Mid-range
2004	**-1.76**	Mid-range
2005	**-1.07**	Mid-range
2006	**-2.20**	**Moderate Drought**
2007	**-4.30**	**Extreme Drought**
2008	**-4.23**	**Extreme Drought**
2009	**-3.34**	**Severe Drought**
2010	**-1.77**	Mid-range
2011	**-2.18**	**Moderate Drought**
2012	**-1.38**	Mid-range
2013	**1.34**	Mid-range

Source: North Carolina State Climate Office

TABLE 5.5: SUMMARY OF DROUGHT OCCURRENCES IN THE CLAY MACON REGION

Location	Number Years with Moderate to Severe Drought Occurrences	Number Years with Extreme Drought Occurrences
Clay Macon Region	8	2

Source: North Carolina State Climate Office

Data from the National Climatic Data Center (NCDC) was also reviewed to obtain additional information on historical drought events in the region, but no events were reported in the Clay Macon Region.

5.3.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the Clay Macon Region has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard

may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

5.4 EXTREME HEAT

5.4.1 Background

Extreme heat, like drought, poses little risk to property. However, extreme heat can have devastating effects on health. Extreme heat is often referred to as a "heat wave." According to the National Weather Service, there is no universal definition for a heat wave, but the standard U.S. definition is any event lasting at least three days where temperatures reach ninety degrees Fahrenheit or higher. However, it may also be defined as an event at least three days long where temperatures are ten degrees greater than the normal temperature for the affected area. Heat waves are typically accompanied by humidity but may also be very dry. These conditions can pose serious health threats causing an average of 1,500 deaths each summer in the United States.[1].

According to the National Oceanic and Atmospheric Administration, heat is the number one weather-related killer among natural hazards, followed by frigid winter temperatures[1]. The National Weather Service devised the Heat Index as a mechanism to better inform the public of heat dangers. The Heat Index Chart, shown in **Figure 5.3**, uses air temperature and humidity to determine the heat index or 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 5.3: HEAT INDEX CHART

Air Temp (in F)	Relative Humidity (in percent)																				
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
140	125																				
135	120	128																			
130	117	122	131																		
125	111	116	123	131	141																
120	107	111	116	123	130	139	148														
115	103	107	111	115	120	127	135	143	151												
110	99	102	105	108	112	117	123	130	137	143	150										
105	95	97	100	102	105	109	113	118	123	129	135	142	149								
100	91	93	95	97	99	101	104	107	110	115	120	126	132	138	144						
95	87	88	90	91	93	94	96	98	101	104	107	110	114	119	124	130	136				
90	83	84	85	86	87	88	90	91	93	95	96	98	100	102	106	109	113	117	122		
85	78	79	80	81	82	83	84	85	86	87	88	89	90	91	93	95	97	99	102	105	108
80	73	74	75	76	77	77	78	79	79	80	81	81	82	83	85	86	86	87	88	89	91
75	69	69	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78	78	79	79	80
70	64	64	65	65	66	66	67	67	68	68	69	69	70	70	70	70	71	71	71	71	72

Source: National Oceanic and Atmospheric Administration

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

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; National Oceanic and Atmospheric Administration

In addition, NOAA has seventeen metropolitan areas participating in the Heat HealthWatch/Warning System in order to better inform and warn the public of heat dangers. A Heat HealthWatch is issued when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A Heat Warning is issued when an excessive heat event is expected in the next 36 hours. Furthermore, a warning is issued when the conditions are occurring, imminent, or have a high likelihood of occurrence. Urban areas participate in the Heat Health Watch/Warning System because urban areas are at greater risk to heat affects. Stagnant atmospheric conditions trap pollutants, thus adding unhealthy air to excessively hot temperatures. In addition, the "urban heat island effect" can produce significantly higher nighttime temperatures because asphalt and concrete (which store heat longer) gradually release heat at night.

5.4.2 Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire Clay Macon Region is susceptible to extreme heat conditions.

5.4.3 Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in the Clay Macon Region. There were no events reported.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the region. Temperature information has been reported since 1872 in Macon County; however, no weather stations with data are located in Clay County. The recorded maximum for each county can be found below in **Table 5.7**.

TABLE 5.7: HIGHEST RECORDED TEMPERATURE IN THE CLAY MACON REGION

Location	Date	Temperature (°F)
Clay County	--	--
Macon County	7/29/1952	101
CLAY MACON REGION MAXIMUM	**--**	**101**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the region. The most centralized location is in Franklin (Macon County). **Table 5.8** shows the average maximum temperatures from 1971 to 2000 at the Franklin observation station which can be used as a general comparison for the region.

TABLE 5.8: AVERAGE MAXIMUM TEMPERATURE IN FRANKLIN, MACON COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	47.7	52.5	60.3	68.5	75.6	81.3	84.5	83.2	77.9	69.4	59.5	50.4

Source: State Climate Office of North Carolina

5.4.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the Clay Macon Region has a probability level of unlikely (less than 1 percent annual probability) for future extreme heat events to impact the region.

5.5 HAILSTORM

5.5.1 Background

Hailstorms are a potentially damaging outgrowth of severe thunderstorms (thunderstorms are discussed separately in Section 5.8). Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size.

5.5.2 Location and Spatial Extent

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

5.5.3 Historical Occurrences

According to the National Climatic Data Center, 84 recorded hailstorm events have affected Clay Macon Region since 1984.[2] **Table 5.9** is a summary of the hail events in the Clay Macon Region. Detailed

[2] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1955 through July 2014. It is likely that additional hail events have affected the Clay Macon Region. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

information about each event that occurred in the region is provided in the jurisdiction-specific annexes. In all, hail occurrences resulted in nearly $20,000 (2014 dollars) in property damages, most of which were reported in Clay County.[3] Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Furthermore, higher losses in Clay County indicate that Macon County may also be subject to additional, unreported losses. Therefore, it is likely that damages are greater than the reported value. Additionally, a single storm event may have affected both counties.

TABLE 5.9: SUMMARY OF HAIL OCCURRENCES IN THE CLAY MACON REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	**16**	**0/0**	**$13,232**
Hayesville	10	0/0	$13,232
Unincorporated Area	6	0/0	$0
Macon County	**68**	**0/0**	**$6,616**
Franklin	24	0/0	$0
Highlands	9	0/0	$0
Unincorporated Area	35	0/0	$6,616
CLAY MACON REGION TOTAL	**84**	**0/0**	**$19,848**

Source: National Climatic Data Center

5.5.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is likely (between 10 and 100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that the entire Clay Macon Region has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the region.

5.6 HURRICANE AND TROPICAL STORM

5.6.1 Background

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

[3] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

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

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

TABLE 5.10: SAFFIR-SIMPSON SCALE

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

Source: National Hurricane Center (2012)

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as "major" hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. **Table 5.11** describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

TABLE 5.11: HURRICANE DAMAGE CLASSIFICATIONS

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

Source: National Hurricane Center; Federal Emergency Management Agency

5.6.2 Location and Spatial Extent

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

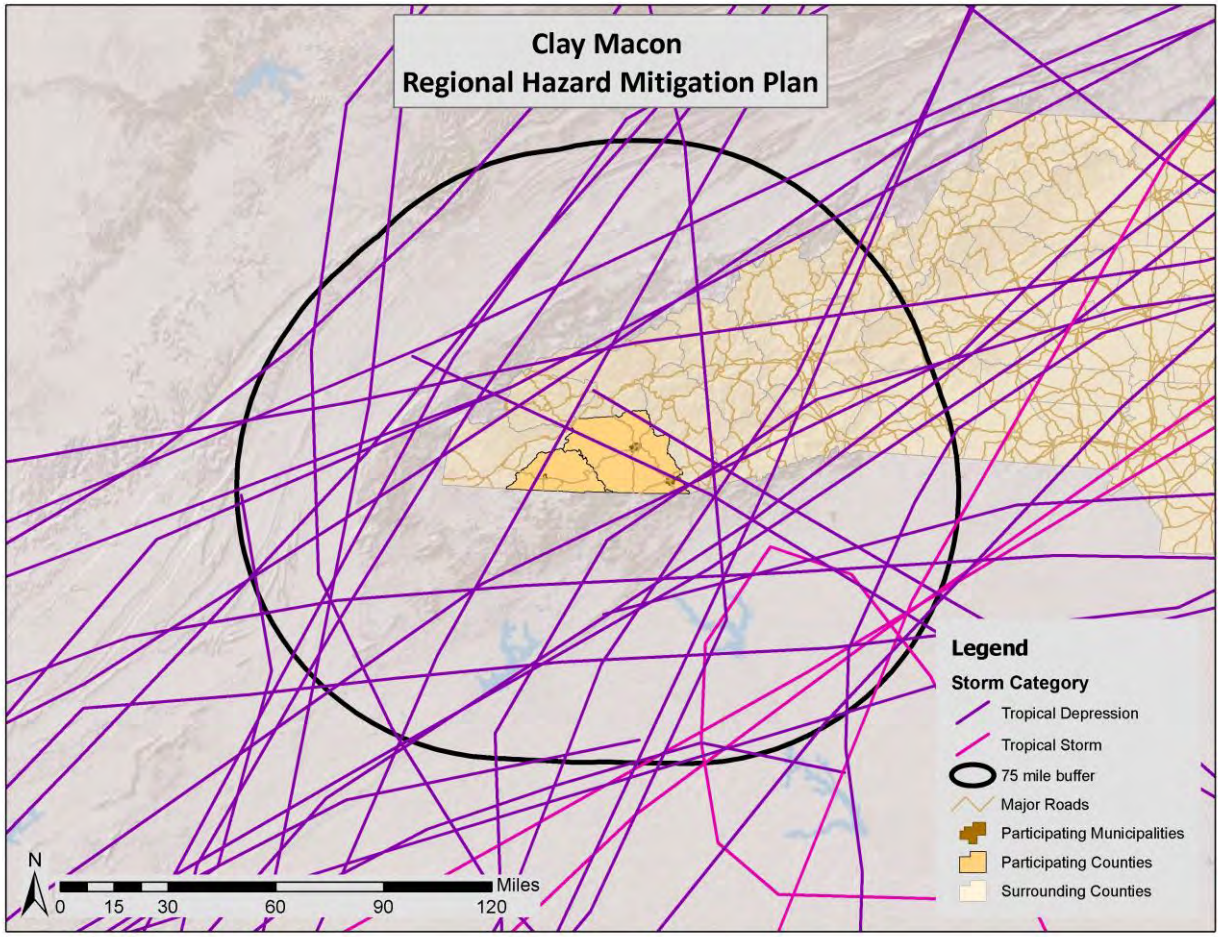
5.5.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 34 hurricane or tropical storm tracks have passed within 75 miles of the Clay Macon Region since 1859.[4] This includes 4 tropical storms and 30 tropical depressions.

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

[4] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

FIGURE 5.4: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CLAY MACON REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE 5.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CLAY MACON REGION (1850–2013)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/17/1859	NOT NAMED	35.2	Tropical Storm
9/11/1882	NOT NAMED	35.2	Tropical Storm
9/11/1882	NOT NAMED	35.2	Tropical Storm
7/8/1896	NOT NAMED	26.4	Tropical Depression
9/28/1901	NOT NAMED	30.8	Tropical Depression
9/15/1900	NOT NAMED	22.0	Tropical Depression
9/23/1907	NOT NAMED	30.8	Tropical Depression
10/11/1905	NOT NAMED	22.0	Tropical Depression
10/11/1902	NOT NAMED	30.8	Tropical Depression
9/16/1903	NOT NAMED	26.4	Tropical Depression
9/18/1906	NOT NAMED	26.4	Tropical Depression
9/4/1913	NOT NAMED	17.6	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/30/1911	NOT NAMED	26.4	Tropical Depression
7/15/1916	NOT NAMED	30.8	Tropical Depression
9/5/1915	NOT NAMED	26.4	Tropical Depression
8/15/1928	NOT NAMED	26.4	Tropical Depression
10/17/1932	NOT NAMED	17.6	Tropical Depression
8/13/1940	NOT NAMED	30.8	Tropical Depression
8/28/1949	NOT NAMED	35.2	Tropical Storm
6/8/1968	CELESTE	22.0	Tropical Depression
9/24/1975	ELOISE	26.4	Tropical Depression
9/8/1977	BABE	22.0	Tropical Depression
8/17/1985	ONE-C	26.4	Tropical Depression
8/28/1992	ANDREW	17.6	Tropical Depression
8/28/1992	IVAN	17.6	Tropical Depression
8/17/1994	BERYL	13.2	Tropical Depression
7/23/1997	DANNY	17.6	Tropical Depression
7/2/2003	DOLORES	17.6	Tropical Depression
9/28/2004	NOT NAMED	17.6	Tropical Depression
9/28/2004	JEANNE	17.6	Tropical Depression
9/8/2004	FRANCES	22.0	Tropical Depression
7/7/2005	CINDY	17.6	Tropical Depression
8/27/2008	FAY	13.2	Tropical Depression
9/6/2011	LEE	30.0	Tropical Depression

Source: National Hurricane Center

The National Climatic Data Center reported one event associated with a hurricane or tropical storm in the Clay Macon Region between 1996 and 2014.[5] This storm event occurred in Clay County on September 16, 2004 and was classified as a tropical storm (Ivan). Numerous trees and power lines were reported down across the county and $18,901 (2014 dollars) of property damage were reported.[6]

Federal records indicate that two disaster declarations were made in 2004 (Tropical Storm Frances and Hurricane Ivan) for the region.[7]

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

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

[5] These hurricane/tropical storm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014.
[6] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.
[7] Not all of the participating counties were declared disaster areas for these storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Identification*.

North Carolina Mountains with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph along the Appalachian Mountains and thousands of trees were downed. Trees fell on structures, vehicles, and power lines. Flooding also led to numerous landslides in the area which added to the damage of infrastructure and residential and commercial structures. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

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

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

5.6.4 Probability of Future Occurrences

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

5.7 LIGHTNING

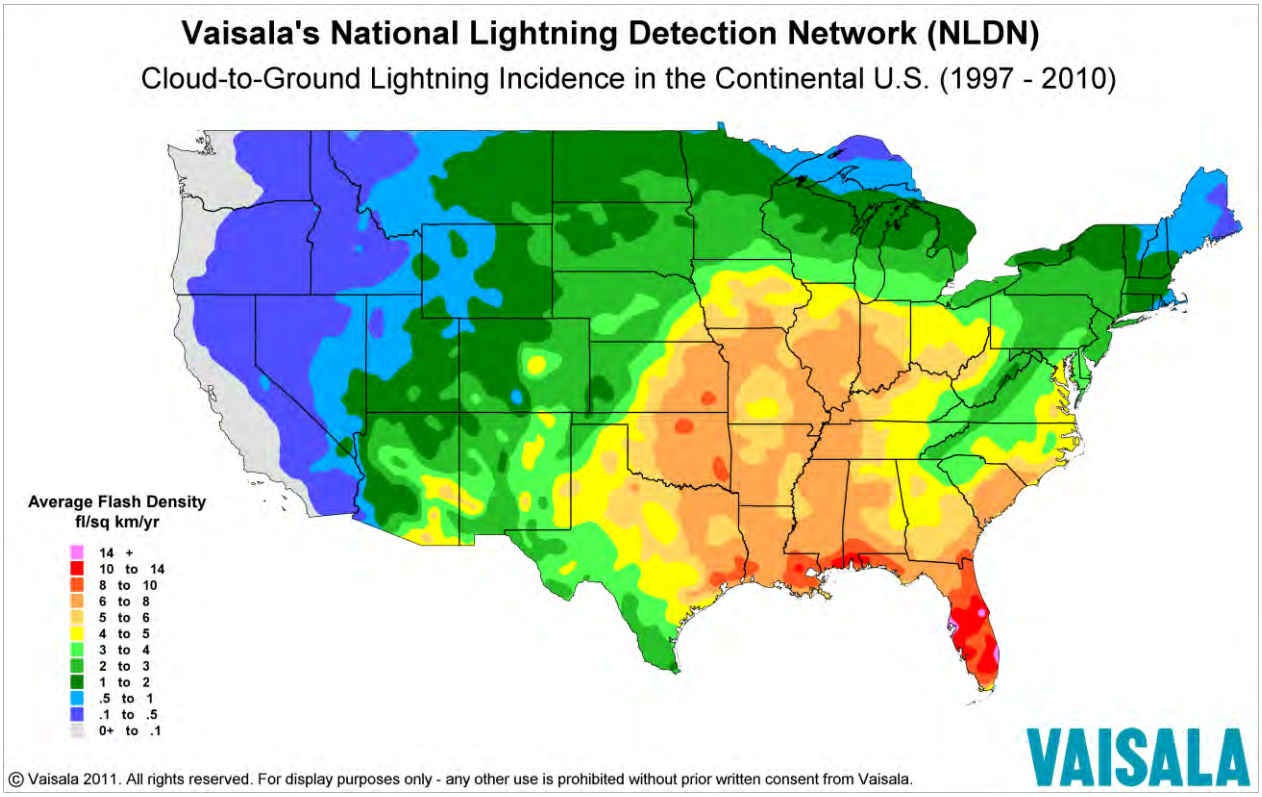
5.7.1 Background

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

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

Figure 5.5 shows a lightning flash density map for the years 1997-2010 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®).

FIGURE 5.5: LIGHTNING FLASH DENSITY IN THE UNITED STATES



Source: Vaisala's U.S. National Lightning Detection Network

5.7.2 Location and Spatial Extent

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of the Clay Macon Region is uniformly exposed to lightning.

5.7.3 Historical Occurrences

According to the National Climatic Data Center, there have been a total of 14 recorded lightning events in the Clay Macon Region since 1998.[8] These events resulted in almost $2.1 million (2014 dollars) in

[8] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is certain that additional lightning events have occurred in the Clay Macon Region. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

damages, as listed in summary **Table 5.13**.[9] Furthermore, lightning caused one injury in the Clay Macon Region. Detailed information on historical lightning events can be found in the jurisdiction-specific annexes.

It is certain that more than 14 events have impacted the region. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE 5.13: SUMMARY OF LIGHTNING OCCURRENCES IN THE CLAY MACON REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	**0**	**0**	**$0**
Hayesville	0	0	$0
Unincorporated Area	0	0	$0
Macon County	**14**	**0/1**	**$2,069,096**
Franklin	3	0/1	$236,681
Highlands	7	0/0	$1,360,489
Unincorporated Area	4	0/0	$471,926
CLAY MACON REGION TOTAL	**14**	**0/1**	**$2,069,096**

Source: National Climatic Data Center

5.7.4 Probability of Future Occurrences

Although there was not a high number of historical lightning events reported throughout the Clay Macon Region via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), the Clay Macon Region is located in an area of the country that experienced an average of 2 to 4 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region.

5.8 THUNDERSTORM WIND/HIGH WIND

5.8.1 Background

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning.[10] Although thunderstorms generally affect a small area, they are very dangerous and may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts,

[9] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.
[10] Lightning and hail hazards are discussed as separate hazards in this section.

sea breezes, mountains, or the sun's heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Furthermore, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) hail at least one inch in diameter, 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 Clay Macon Region. Therefore, high winds are also reported in this section.

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

Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the cloud becomes heavier than its surroundings. Thus, air rushes towards the ground in a destructive yet isolated manner. There are two types of downbursts. Downbursts less than 2.5 miles wide, duration less than 5 minutes, and winds up to 168 miles per hour are called "microbursts." Larger events greater than 2.5 miles at the surface and longer than 5 minutes with winds up to 130 miles per hour are referred to as "macrobursts."

5.8.2 Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, the Clay Macon Region typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that the Clay Macon Region has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

5.8.3 Historical Occurrences

Severe storms and high winds were at least partially responsible for three disaster declarations in the Clay Macon Region in 1973, 1995, and 2013.[11] According to NCDC, there have been 160 reported

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

thunderstorm wind and high wind events since 1970 in the Clay Macon Region.[12] These events caused nearly $2.0 million (2014 dollars) in damages.[13] There were also reports of two injuries. **Table 5.14** summarizes this information. Detailed thunderstorm wind and high wind event reports, including date, magnitude, and associated damages for each event, are presented in the jurisdiction-specific annexes.

TABLE 5.14: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN THE CLAY MACON REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	**58**	**0/0**	**$530,685**
Hayesville	33	0/0	$332,725
Unincorporated Area	25	0/0	$197,960
Macon County	**102**	**0/2**	**$1,421,794**
Franklin	26	0/1	$471,908
Highlands	7	0/0	$15,611
Unincorporated Area	69	0/1	$934,275
CLAY MACON REGION TOTAL	**160**	**0/2**	**$1,952,479**

Source: National Climatic Data Center

5.8.4 Probability of Future Occurrences

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire planning area.

5.9 TORNADO

5.9.1 Background

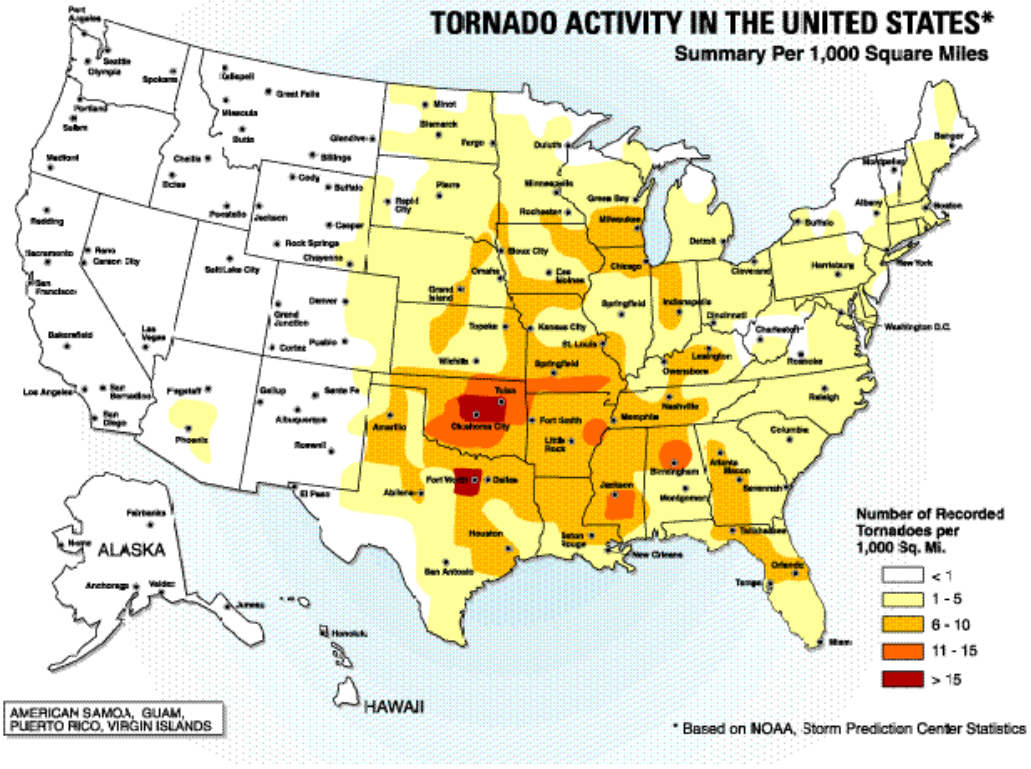
A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.[14] According to the NOAA Storm Prediction Center (SPC), the highest

[12] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1955 through July 2014 and these high wind events are only inclusive of those reported by NCDC from 1996 through July 2014. It is certain that additional thunderstorm and high wind events have occurred in Clay County. As additional local data becomes available, this hazard profile will be amended.
[13] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.
[14] NOAA, 2009.

concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas, and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of "tornado alley"), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). **Figure 5.6** shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

FIGURE 5.6: TORNADO ACTIVITY IN THE UNITED STATES



Source: Federal Emergency Management Agency

Tornadoes are more likely to occur during the months of March through May and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (**Table 5.15**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.16**).

TABLE 5.15: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

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

Source: National Weather Service

TABLE 5.16 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

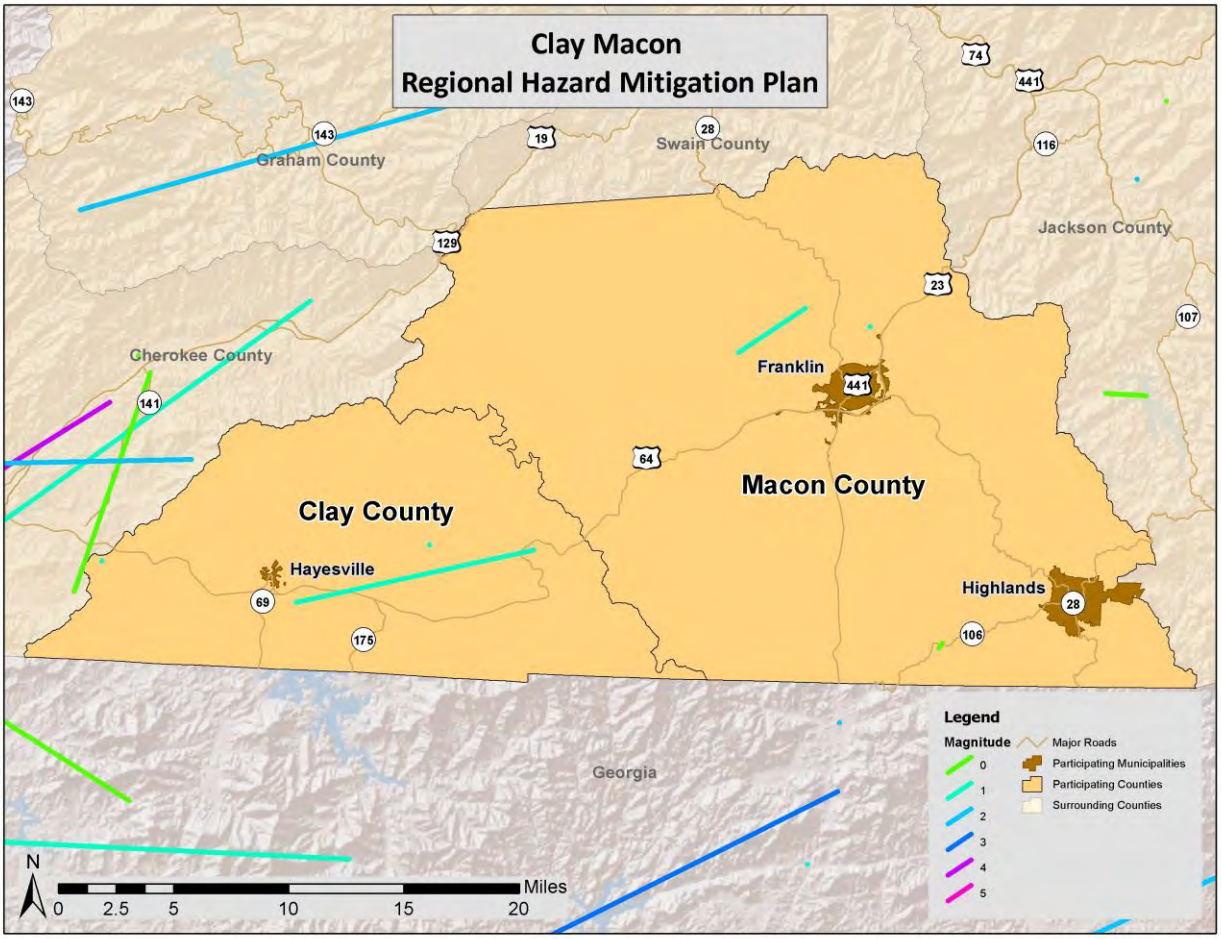
EF-SCALE NUMBER	INTENSITY PHRASE	3 SECOND GUST (MPH)	TYPE OF DAMAGE DONE
F0	GALE	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

5.9.2 Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in the Clay Macon 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 Clay Macon Region is uniformly exposed to this hazard. With that in mind, **Figure 5.7** shows tornado track data for many of the major tornado events that have impacted the region. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE 5.7: HISTORICAL TORNADO TRACKS IN THE CLAY MACON REGION



Source: National Weather Service Storm Prediction Center

5.9.3 Historical Occurrences

Tornadoes are a fairly rare occurrence in mountainous areas. However, they have and do occur in the Clay Macon Region. Tornadoes have not resulted in any disaster declaration in the Clay Macon.[15] According to the National Climatic Data Center, there have been a total of nine recorded tornado events in the Clay Macon Region since 1965 (**Table 5.17**), resulting in over $1.3 million (2014 dollars) in property damages.[16] [17] 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 past 64 years. Detailed information on historical tornado events can be found in the jurisdiction-specific annexes.

[15] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[16] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1950 through July 2014. It is likely that additional tornadoes have occurred in the Clay Macon Region. As additional local data becomes available, this hazard profile will be amended.
[17] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

TABLE 5.17: SUMMARY OF TORNADO OCCURRENCES IN CLAY MACON REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	**5**	**0/0**	**$282,855**
Hayesville	1	0/0	$21,832
Unincorporated Area	4	0/0	$261,023
Macon County	**4**	**0/0**	**$1,056,288**
Franklin	1	0/0	$0
Highlands	0	0/0	$0
Unincorporated Area	3	0/0	$1,056,288
CLAY MACON REGION TOTAL	**9**	**0/0**	**$1,339,143**

Source: National Climatic Data Center

5.9.4 Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the region. Furthermore, the mountainous terrain of the region makes tornadoes a rare occurrence. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should the Clay Macon Region experience a direct tornado strike. The probability of future tornado occurrences affecting the Clay Macon Region is possible (1 to 10 percent annual probability).

5.10 WINTER STORM AND FREEZE

5.10.1 Background

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings.

All winter storm events have the potential to present dangerous conditions to the affected area. Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 of more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least 3 hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm. Such freeze events are particularly hazardous as they create treacherous surfaces.

Ice storms are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the

latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces. All of the winter storm elements – snow, low temperatures, sleet, ice, etcetera – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions. Furthermore, communication and power may be disrupted for days.

5.10.2 Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. The Clay Macon 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.

5.10.3 Historical Occurrences

Winter weather has resulted in one disaster declaration in the Clay Macon Region. This includes the Blizzard of 1996.[18] According to the National Climatic Data Center, there have been a total of 155 recorded winter storm events in the Clay Macon Region since 1996 (**Table 5.18**).[19] No damages associated with these events were recorded in the region. Detailed information on the recorded winter storm events can be found in the jurisdiction-specific annexes.

TABLE 5.18: SUMMARY OF WINTER STORM EVENTS IN THE CLAY MACON REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	20	0/0	$0
Macon County	135	0/0	$0
CLAY MACON REGION TOTAL	**155**	**0/0**	**$0**

Source: National Climatic Data Center

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

[18] 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*.

[19] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is likely that additional winter storm conditions have affected the Clay Macon Region. In addition, the 701 are reported by county, so many of these storms likely affected all of the counties.

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

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

5.10.4 Probability of Future Occurrences

Winter storm events will remain a regular occurrence in the Clay Macon Region due to location and elevation. According to historical information, the Clay Macon Region generally experiences multiple winter storm events each year. Therefore, the annual probability is highly likely (100 percent).

Geologic Hazards

5.11 EARTHQUAKE

5.11.1 Background

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

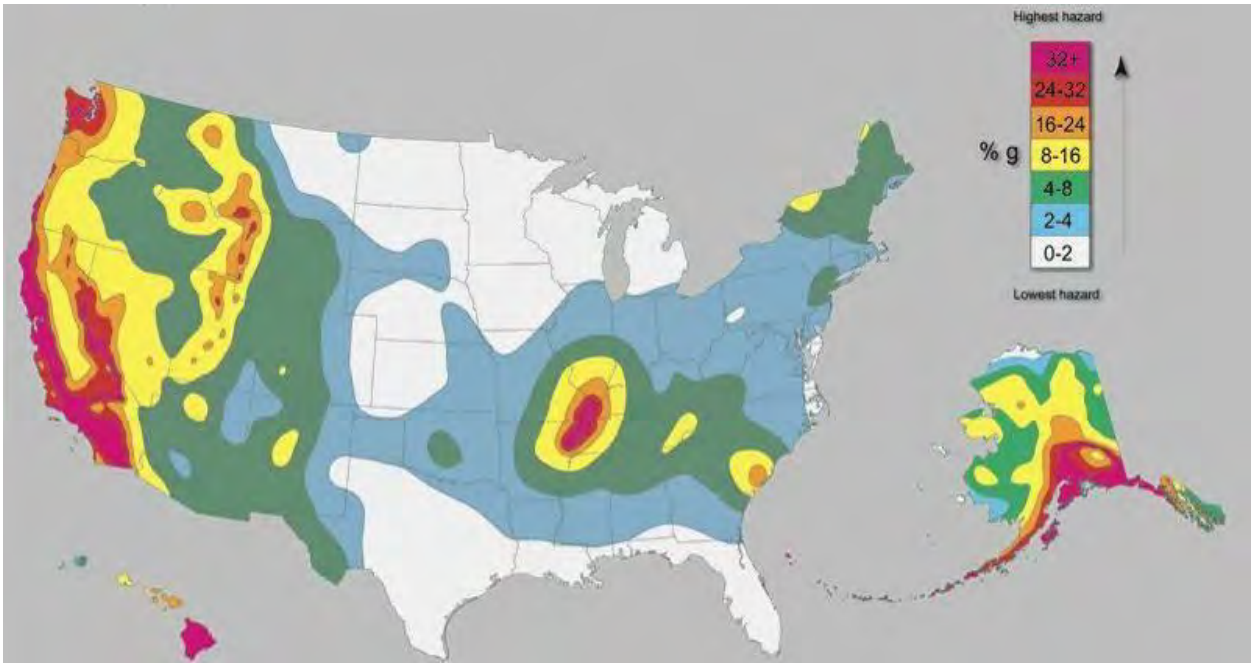
Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology.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

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

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate

risk to less frequent, less intense earthquake events. **Figure 5.8** shows relative seismic risk for the United States.

FIGURE 5.8: UNITED STATES EARTHQUAKE HAZARD MAP



Source: United States Geological Survey

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (**Table 5.19**). Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 5.20**.

TABLE 5.19: RICHTER SCALE

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

Source: Federal Emergency Management Agency

TABLE 5.20: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

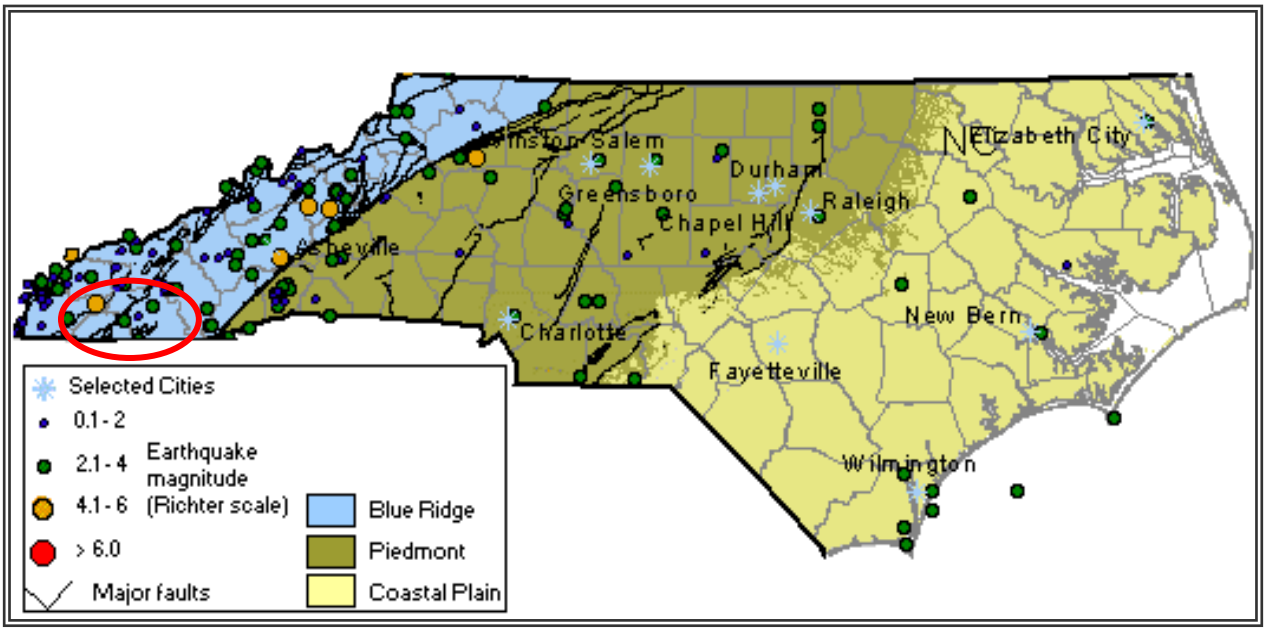
SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: Federal Emergency Management Agency

5.11.2 Location and Spatial Extent

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

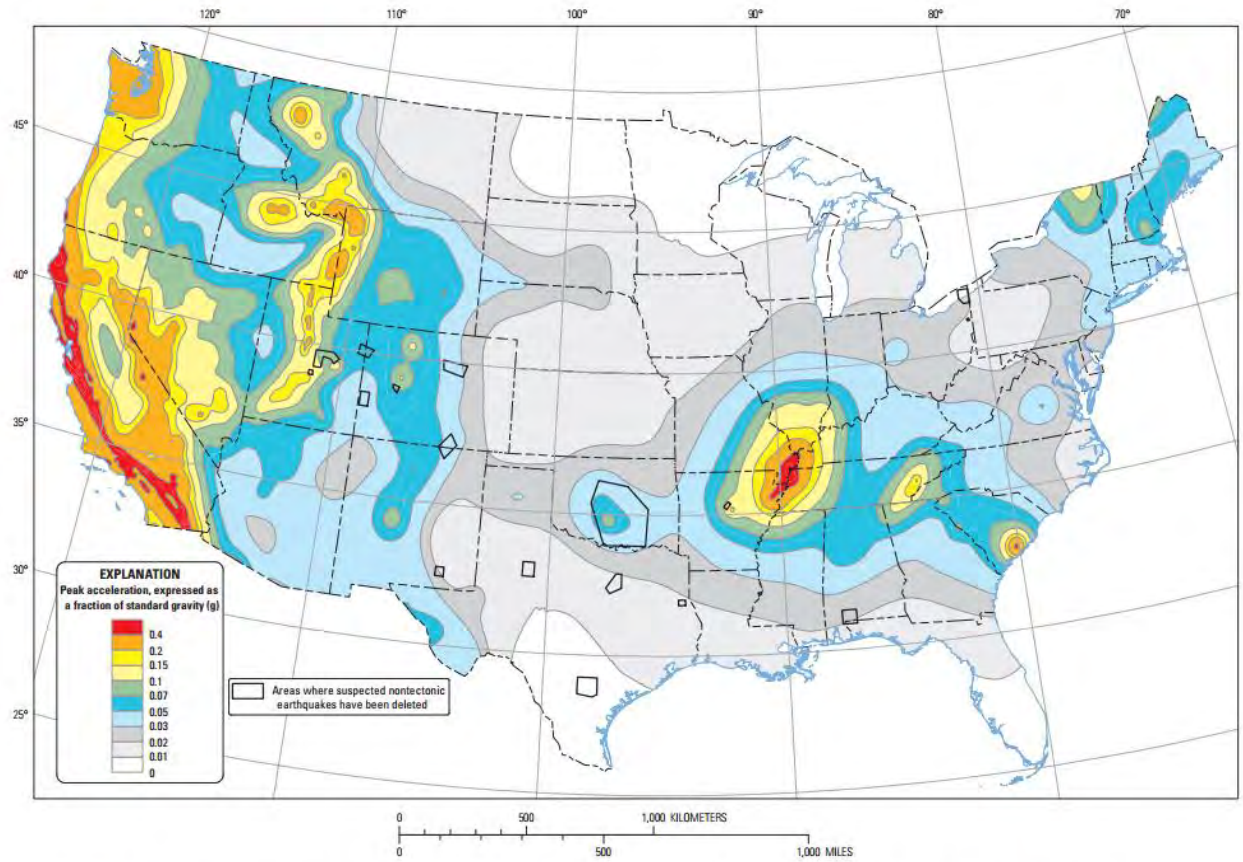
FIGURE 5.9: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.10 shows the intensity level associated with the Clay Macon Region, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, the Clay Macon Region lies within an approximate zone of ".07" to ".10" ground acceleration. This indicates that the region as a whole exists within an area of moderate seismic risk.

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



Ten-percent probability of exceedance in 50 years map of peak ground acceleration

Source: United States Geological Survey, 2014

5.11.3 Historical Occurrences

At least 46 earthquakes are known to have affected the Clay Macon Region since 1913. The strongest of these measured a V on the Modified Mercalli Intensity (MMI) scale. **Table 5.21** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in the jurisdiction-specific annexes.[20]

TABLE 5.21: SUMMARY OF SEISMIC ACTIVITY IN THE CLAY MACON REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Clay County	**14**	**V**	**< 4.8**
Hayesville	7	V	< 4.8
Unincorporated Area	7	V	< 4.8

[20] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Macon County	**32**	**V**	**< 4.8**
Franklin	12	V	< 4.8
Highlands	4	V	< 4.8
Unincorporated Area	16	V	< 4.8
CLAY MACON REGION TOTAL	**46**	**V**	**< 4.8**

Source: National Geophysical Data Center

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

TABLE 5.22: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

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

*This event is accounted for in the Clay Macon Region occurrences.

** Conflicting reports on this event, intensity in North Carolina could have been either V or VI

Source: This information compiled by Dr. Kenneth B. Taylor and provided by Tiawana Ramsey of NCEM. Information was compiled from the National Earthquake Center, Earthquakes of the US by Carl von Hake (1983), and a compilation of newspaper reports in the Eastern Tennessee Seismic Zone compiled by Arch Johnston, CERI, Memphis State University (1983).

5.11.4 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the Clay Macon Region is unlikely. However, it is likely that future earthquakes resulting in light to moderate perceived shaking and

damages ranging from none to very light will affect the region. The annual probability level for the region is estimated between 10 and 100 percent (likely).

5.12 LANDSLIDE

5.12.1 Background

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation, which is driven by gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, volcanic eruptions, and changes in groundwater levels.

There are several types of landslides: rock falls, rock topple, slides, and flows. Rock falls are rapid movements of bedrock, which result in bouncing or rolling. A topple is a section or block of rock that rotates or tilts before falling to the slope below. Slides are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material. Mudflows, sometimes referred to as mudslides, mudflows, lahars or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits.

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

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

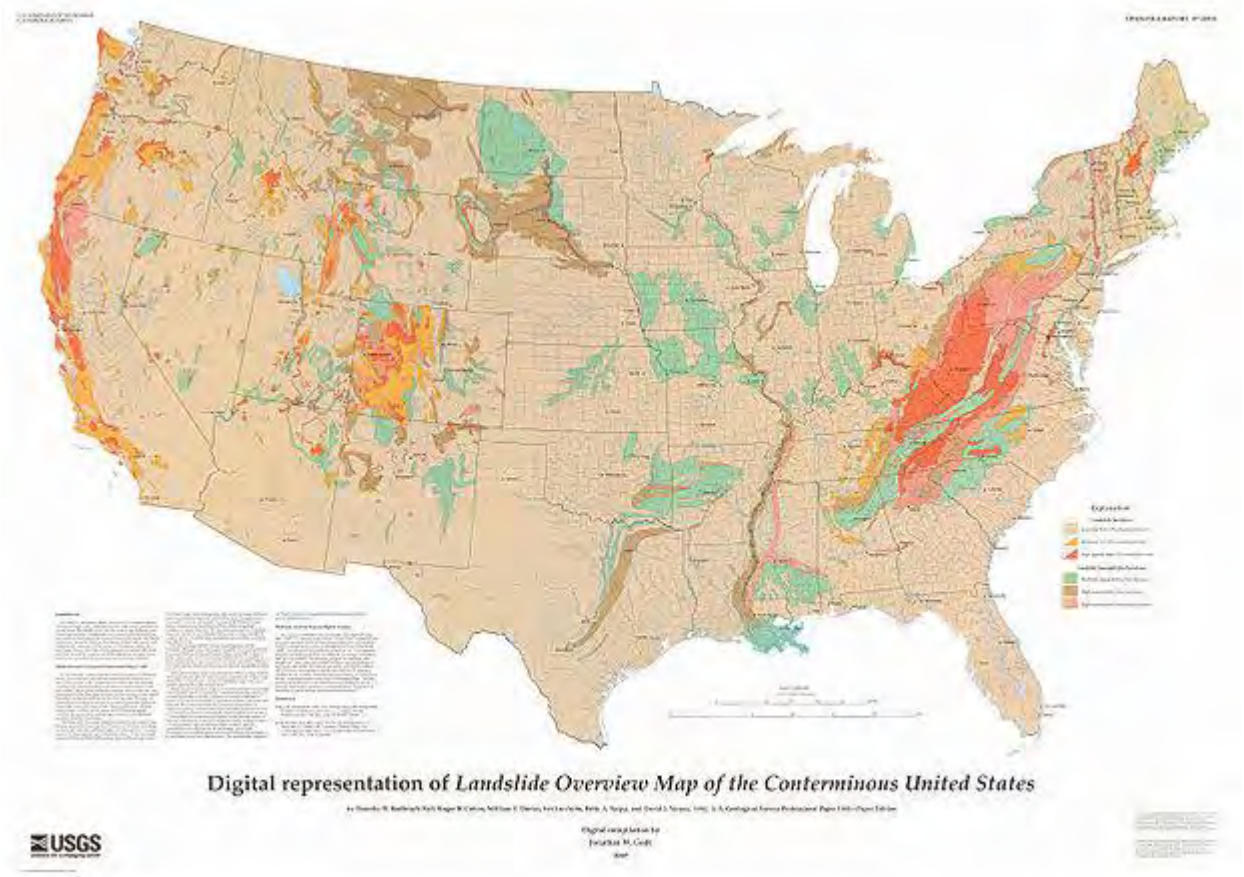
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved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

According to the United States Geological Survey, each year landslides cause $5.1 billion (2009 dollars) in damage and between 25 and 50 deaths in the United States.[21] **Figure 5.11** delineates areas where

[21] 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 landsliding in the conterminous United States.[22]

FIGURE 5.11: LANDSLIDE OVERVIEW MAP OF THE CONTERMINOUS UNITED STATES[23]



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

Source: United States Geological Survey

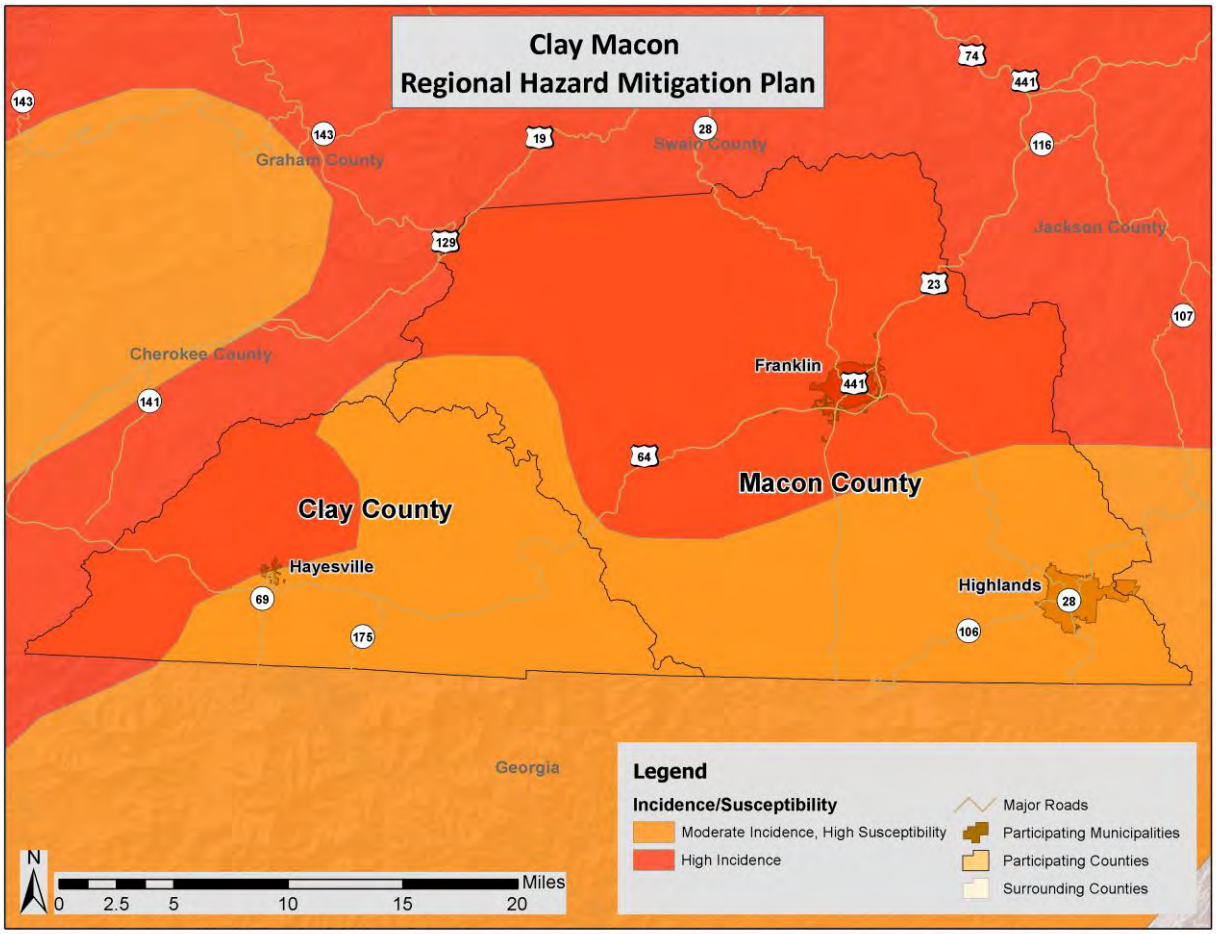
[22] This map layer is provided in the U.S. Geological Survey Professional Paper 1183, Landslide Overview Map of the Conterminous United States, available online at: http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html.
[23] Susceptibility not indicated where same or lower than incidence. Susceptibility to landsliding was defined as the probable degree of response of [the areal] rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landsliding. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated.

5.12.2 Location and Spatial Extent

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

According to **Figure 5.12** below, approximately half of the region has high landslide activity. The remaining half of the region has a moderate incidence occurrence rate. There is also high landslide susceptibility throughout the entire region.

FIGURE 5.12: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF THE CLAY MACON REGION



Source: United States Geological Survey

5.12.3 Historical Occurrences

Steep topography throughout the Clay Macon Region makes the planning area susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. **Table 5.23** presents a summary of the landslide occurrence

events as provided by the North Carolina Geological Survey.[24] The locations of the landslide events presented in the aforementioned tables are presented in **Figure 5.13**. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Clay County.

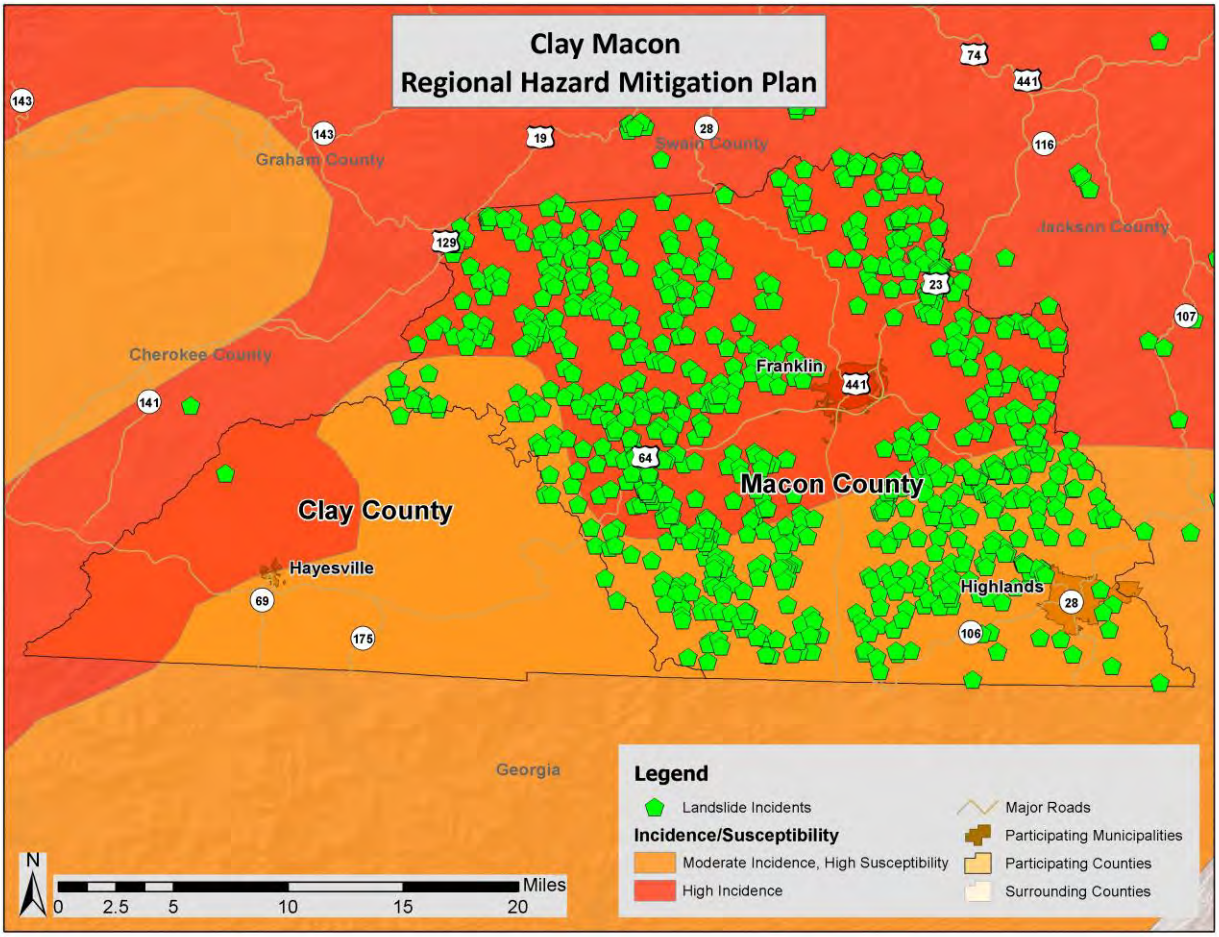
TABLE 5.23: SUMMARY OF LANDSLIDE ACTIVITY IN THE CLAY MACON REGION

Location	Number of Occurrences
Clay County	**1**
Hayesville	0
Unincorporated Area	1
Macon County	**810**
Franklin	0
Highlands	1
Unincorporated Area	809
CLAY MACON REGION TOTAL	**811**

Source: North Carolina Geological Survey

[24] It should be noted that the North Carolina Geological Survey (NCGS) emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

FIGURE 5.13: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN THE CLAY MACON REGION



Source: North Carolina Geological Survey

Landslides and mudslides were at least partially responsible for one disaster declaration in the Clay Macon Region in 2013.[25] The National Climatic Data Center also reported two landslide events in the Clay Macon Region.

Macon County — September 16, 2004
Following the moderate to heavy rainfall associated with the remnants of Hurricane Ivan, a landslide (debris flow) began at the top of Fishhawk Mountain and flower through the Peeks Creek valley. The slide, consisting of water, boulders, trees, mud, and other debris, destroyed or severely damaged 20 to 30 homes and mobile homes and resulted in $2,016,144 (2014 dollars) in property damage.[26] Four people and an unborn child were killed and nine people were injured as their homes were overwhelmed by the debris. This landslide is often referred to as the Peeks Creek disaster and it is the largest landslide in North Carolina state history.

[25] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[26] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

Brendletown, Macon County — January 15, 2013
Over a four-day period, rainfall amounts ranged from 4 to 10 inches across the southern Appalachians. The prolonged heavy rain resulted in several landslides across the North Carolina mountains, including a landslide that heavily damaged a garage at a residence in Brendletown near the Jackson County line. This resulted in $10,218 (2014 dollars) in property damage.[27]

There was no additional historical information reported in either of the previous hazard mitigation plans.

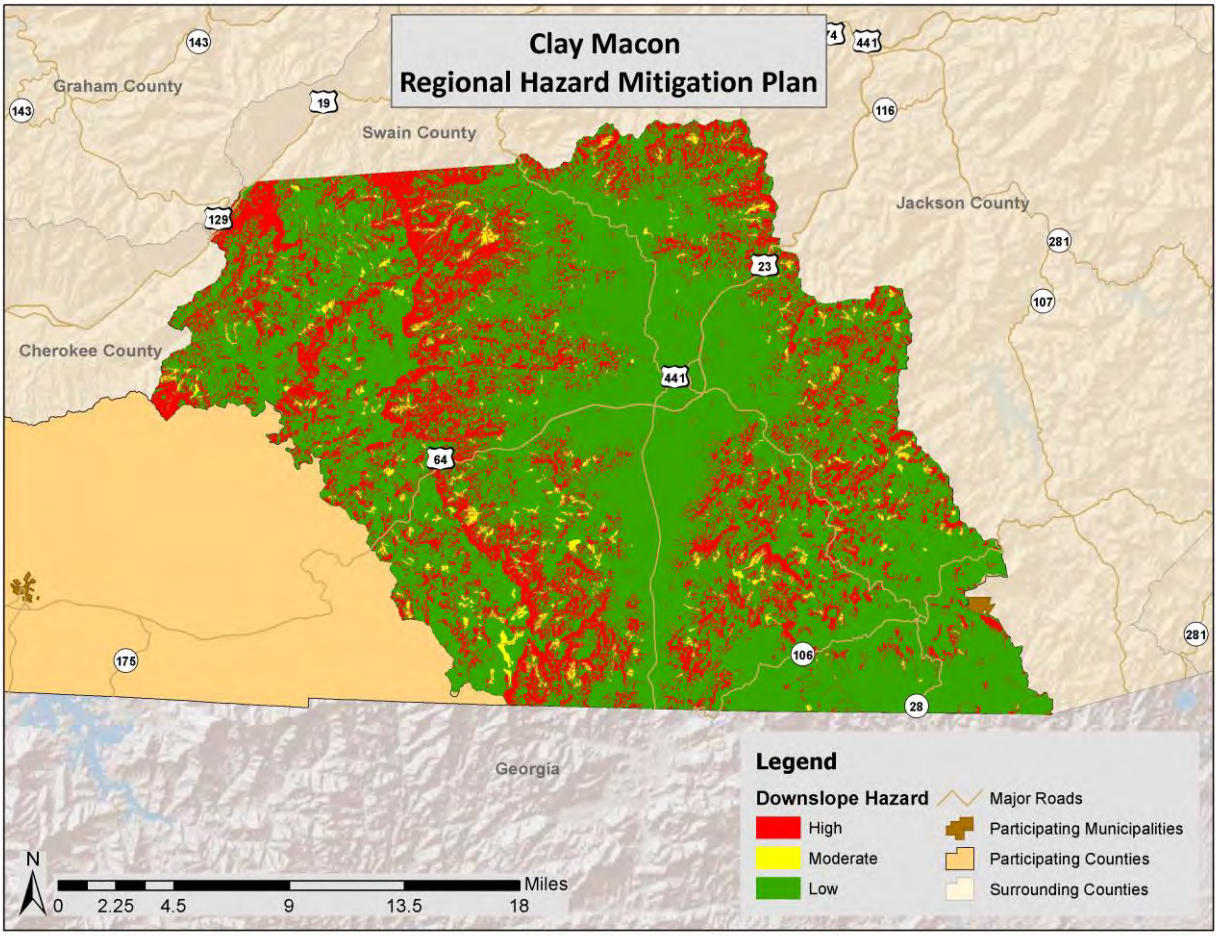
5.12.4 Probability of Future Occurrences

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 heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in the Clay Macon Region have greater risk than others given factors such as steepness on slope and modification of slopes.

Some additional predictive modeling of the landslide hazard was carried out in Macon County specifically which was intended to identify the risk of areas to shallow, translational slope movements (i.e. debris/earth slides and flows). **Figure 5.14** shows three levels of risk to this hazard (high, moderate, low). In areas of high risk, it is recommended that additional analysis be carried out prior to ground disturbing activities.

[27] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

FIGURE 5.14: DOWNSLOPE HAZARD RISK FOR MACON COUNTY



Source: North Carolina Department of Natural Resources

Hydrologic Hazards

5.13 DAM AND LEVEE FAILURE

5.13.1 Background

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

There are approximately 80,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream. If a levee breaks, scores of properties may become submerged in floodwaters and residents may become trapped by rapidly rising water. The failure of dams and levees has the potential to place large numbers of people and great amounts of property in harm's way.

5.13.2 Location and Spatial Extent

The North Carolina Division of Land Resources provides information on dams, including a hazard potential classification. There are three hazard classifications—high, intermediate, and low—that correspond to qualitative descriptions and quantitative guidelines. **Table 5.24** explains these classifications.

TABLE 5.24: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

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

Source: North Carolina Division of Land Resources

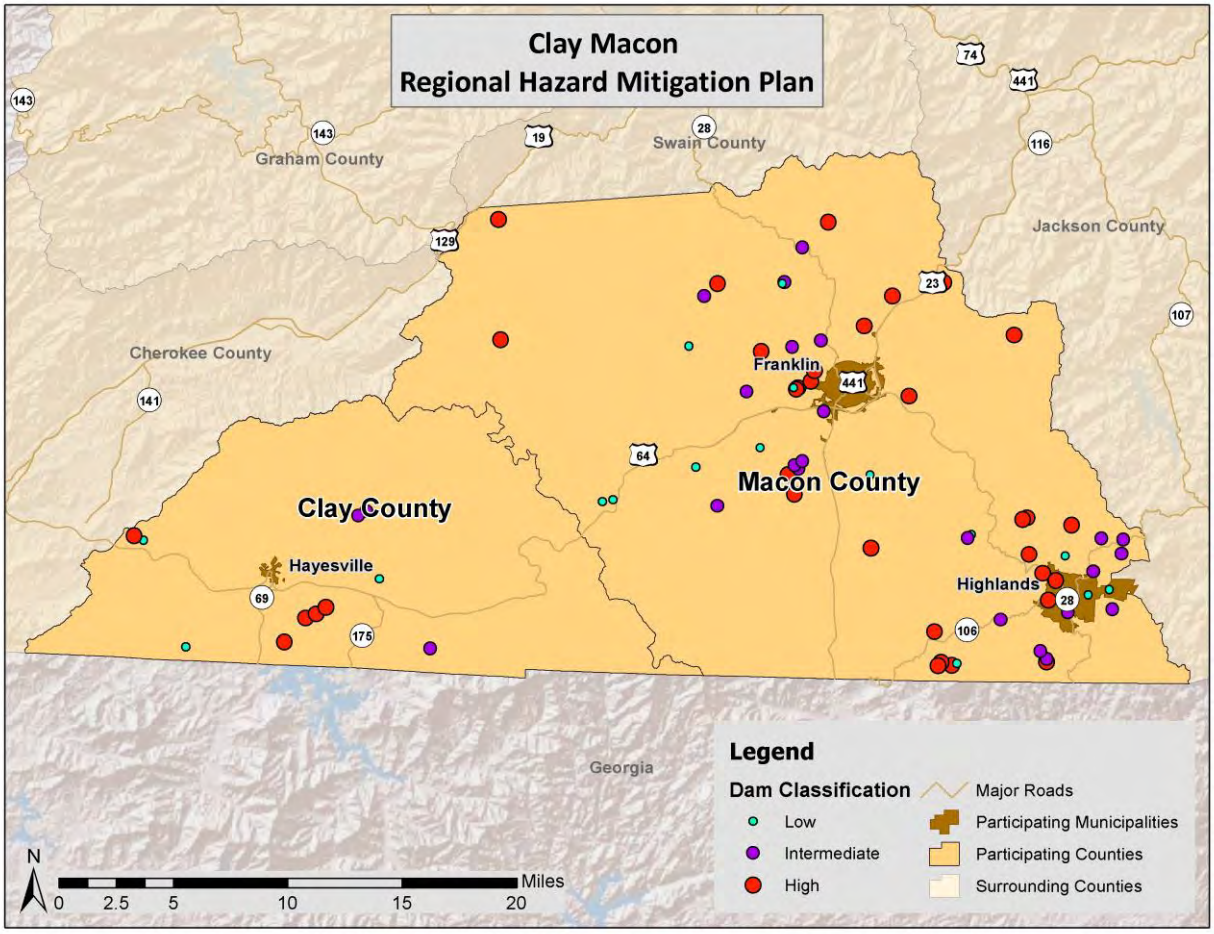
According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 76 dams in the Clay Macon Region.[28] **Figure 5.15** shows the dam location and the corresponding hazard ranking for each. Of these dams, 34 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.25** and more detailed information for each dam is listed in the jurisdiction-specific annexes.

TABLE 5.25: SUMMARY OF HIGH HAZARD DAM LOCATION

Location	Number High Hazard Dams
Clay County	5
Macon County	29
CLAY MACON REGION TOTAL	**34**

[28] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

FIGURE 5.15: CLAY MACON REGION DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources, 2013

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

5.13.3 Historical Occurrences

There have been a total of two dam breaches reported in the Clay Macon Region, but there is no record of property damage, injuries, or fatalities associated with the events. However, it should be noted that several breach scenarios in the region could be catastrophic.

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

Clay County
There is no information provided on historical dam failure events in the previous hazard mitigation plan.

Macon County
There have been two dam breaches in Macon County: the Echo Valley Pond dam on Coon Creek and the Balfour Lake Lower Dam on Stephens Creek. There is no record of damage to property, deaths, or injuries due to dam failure in Macon County's recent history.

5.13.4 Probability of Future Occurrence

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events. No further analysis will be completed in Section 6: *Vulnerability Assessment* as more sophisticated dam breach plans (typically completed by the U.S. Army Corp of Engineers) have been completed for dams of concern in the region.

5.14 EROSION

5.14.1 Background

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion can occur over land or in streams and channels. Water erosion that takes place over land may result from raindrops, shallow sheets of water flowing off the land, or shallow surface flow, which becomes concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms, such hurricanes in coastal areas, may cause significant erosion by combining high winds with heavy surf and storm surge to significantly impact the shoreline.

An area's potential for erosion is determined by four factors: soil characteristics, vegetative cover, topography climate or rainfall, and topography. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the clay and organic content of these soils increases, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion. Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with harmful chemicals run-off due to wind or water events. The increase in government regulatory programs and public concern has resulted

in a wide range of erosion control products, techniques, and analytical methodologies in the United States. The preferred method of erosion control in recent years has been the restoration of vegetation.

5.14.2 Location and Spatial Extent

Erosion in the Clay Macon Region is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Clay Macon soils have much greater organic matter content. Furthermore, extensive vegetation also helps to prevent erosion in the area. Erosion occurs in the Clay Macon 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 team.

5.14.3 Historical Occurrences

Several sources were vetted to identify areas of erosion in the Clay Macon Region. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Little information could be found beyond the hazard mitigation plans.

Erosion was only addressed in one of the previous Clay Macon Region hazard mitigation plans; however, a detailed risk assessment was not completed due to the lower level of risk and/or vulnerability to this hazard within the area as a whole compared with other hazards. The information below identifies historical information presented in the plans.

Clay County
Erosion is not addressed in the previous hazard mitigation plan.

Macon County
Erosion could take place along steep slopes in the area, but no significant historical erosion evidence exists in Macon County and the county has not been mapped to show erosion risk. Since meaningful historical data was limited, annualized potential losses for erosion is assumed to be negligible.

5.14.4 Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for the Clay Macon Region, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent). However, given the lack of historical events, location, data, and threat to life or property, no further analysis will be done in Section 6: *Vulnerability Assessment*.

5.15 FLOOD

5.15.1 Background

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

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

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash flooding events may also occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall or from a sudden release of water held by a retention basin or other stormwater control facility. Although flash flooding occurs most often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces.

The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as a floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. Flood frequencies, such as the 100-year flood, are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year and the 500-year flood has a 0.2 percent chance of occurring in any given year.

5.15.2 Location and Spatial Extent

There are areas in the Clay Macon Region that are susceptible to flood events. Special flood hazard areas in the Clay Macon Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[29] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 740 square miles that make up the Clay Macon Region, there are 26.0 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year

[29] The county-level DFIRM data used for the Clay County was updated in 2009 and the Macon County data was updated in 2010.

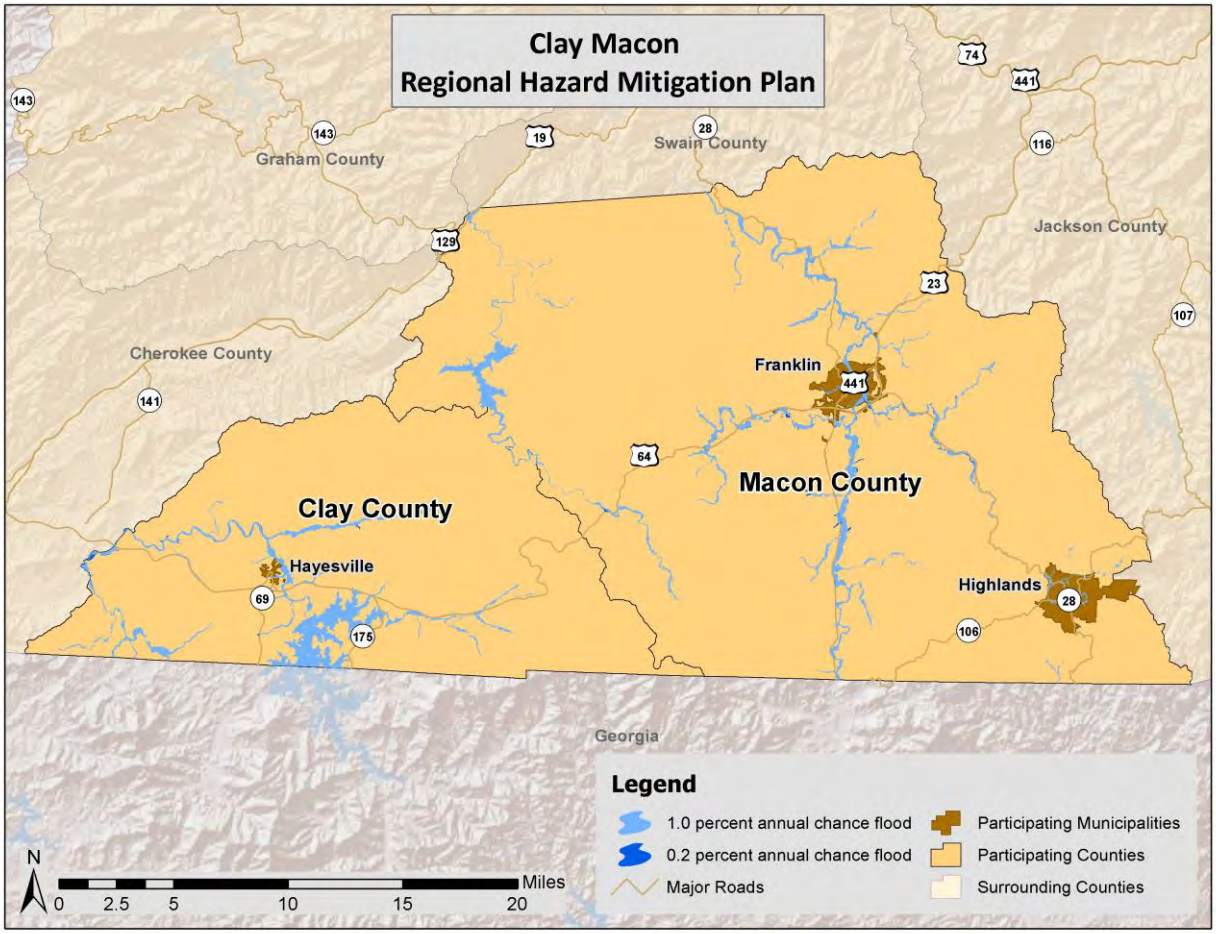
floodplain) and 0.8 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.26**.

TABLE 5.26: SUMMARY OF FLOODPLAIN AREAS IN THE CLAY MACON REGION

Location	100-year area (square miles)	500-year area (square miles)
Clay County	12.3	0.2
Macon County	13.7	0.6
CLAY MACON REGION TOTAL	**26.0**	**0.8**

These flood zone values account for 3.6 percent of the total land area in the Clay Macon Region. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure 5.16** illustrates the location and extent of currently mapped special flood hazard areas for the Clay Macon Region based on best available FEMA DFIRM data.

FIGURE 5.16: SPECIAL FLOOD HAZARD AREAS IN THE CLAY MACON REGION



Source: Federal Emergency Management Agency

Additional, more detailed county-level and jurisdiction-level maps can be found in the jurisdiction-specific annexes.

5.15.3 Historical Occurrences

Flooding was at least partially responsible for three disaster declarations in the Clay Macon Region in 1973, 1995, and 2013.[30] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 35 events throughout the Clay Macon Region since 1996.[31] A summary of these events is presented in **Table 5.27**. These events accounted for almost $6.5 million (2014 dollars) in property damage throughout the region.[32] Specific information on flood events for each county, including date, type of flooding, and deaths and injuries, can be found in the jurisdiction-specific annexes.

TABLE 5.27: SUMMARY OF FLOOD OCCURRENCES IN THE CLAY MACON REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	**5**	**0/0**	**$1,234,139**
Hayesville	0	0/0	$0
Unincorporated Area	5	0/0	$1,234,139
Macon County	**30**	**0/0**	**$5,221,648**
Franklin	5	0/0	$57,401
Highlands	2	0/0	$0
Unincorporated Area	23	0/0	$5,164,247
CLAY MACON REGION TOTAL	**35**	**0/0**	**$6,455,787**

Source: National Climatic Data Center

5.15.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of September 2014, there have been 41 flood losses reported in the Clay Macon Region through the National Flood Insurance Program (NFIP) since 1978, totaling over $947,000 in claims payments. A summary of these figures for each Clay Macon county is provided in **Table 5.28**. 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 Clay Macon Region were either uninsured, denied claims payment, or not reported.

TABLE 5.28: SUMMARY OF INSURED FLOOD LOSSES IN THE CLAY MACON REGION

Location	Number of Policies	Flood Losses	Claims Payments
Clay County	**131**	**13**	**$74,129**
Hayesville	6	0	$0

[30] 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*.
[31] These flood events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is likely that additional occurrences have occurred and have gone unreported.
[32] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

Location	Number of Policies	Flood Losses	Claims Payments
Unincorporated Area	125	13	$74,129
Macon County	**166**	**28**	**$872,997**
Franklin*	--	--	--
Highlands	0	0	$0
Unincorporated Area	166	28	$872,997
CLAY MACON REGION TOTAL	**297**	**41**	**$947,126**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: Federal Emergency Management Agency; National Flood Insurance Program

5.15.5 Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

Currently (as of July 2014), there are 3 non-mitigated repetitive loss properties located in the Clay Macon Region, which accounted for 6 losses and more than $250,000 in claims payments under the NFIP. The average claim amount for these properties is $44,468. All three of the properties are single-family residential structures. Without mitigation these properties will likely continue to experience flood losses. **Table 5.29** presents a summary of these figures for the Clay Macon Region. Detailed information on repetitive loss properties and NFIP claims and policies can be found in the jurisdiction-specific annexes.

TABLE 5.29: SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE CLAY MACON REGION

Location	Number of Properties	Number of Losses	Total Payments
Clay County	**0**	**0**	**$0**
Hayesville	0	0	$0
Unincorporated Area	0	0	$0
Macon County	**3**	**6**	**$266,806**
Franklin*	--	--	--
Highlands	0	0	$0
Unincorporated Area	3	6	$266,806
CLAY MACON REGION TOTAL	**3**	**6**	**$266,806**

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

5.15.6 Probability of Future Occurrences

Flood events will remain a threat in the Clay Macon Region, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the Clay Macon Region. For example, Franklin has more floodplain and thus a higher risk of flood than the other municipalities. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

Other Hazards

5.16 HAZARDOUS MATERIALS INCIDENTS

5.16.1 Background

Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway, and FEMA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways, and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents, and 266 are due to other causes.[33] In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

HAZMAT incidents can also occur as a result of or in tandem with natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes, which in addition to causing incidents can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread toxological concern.

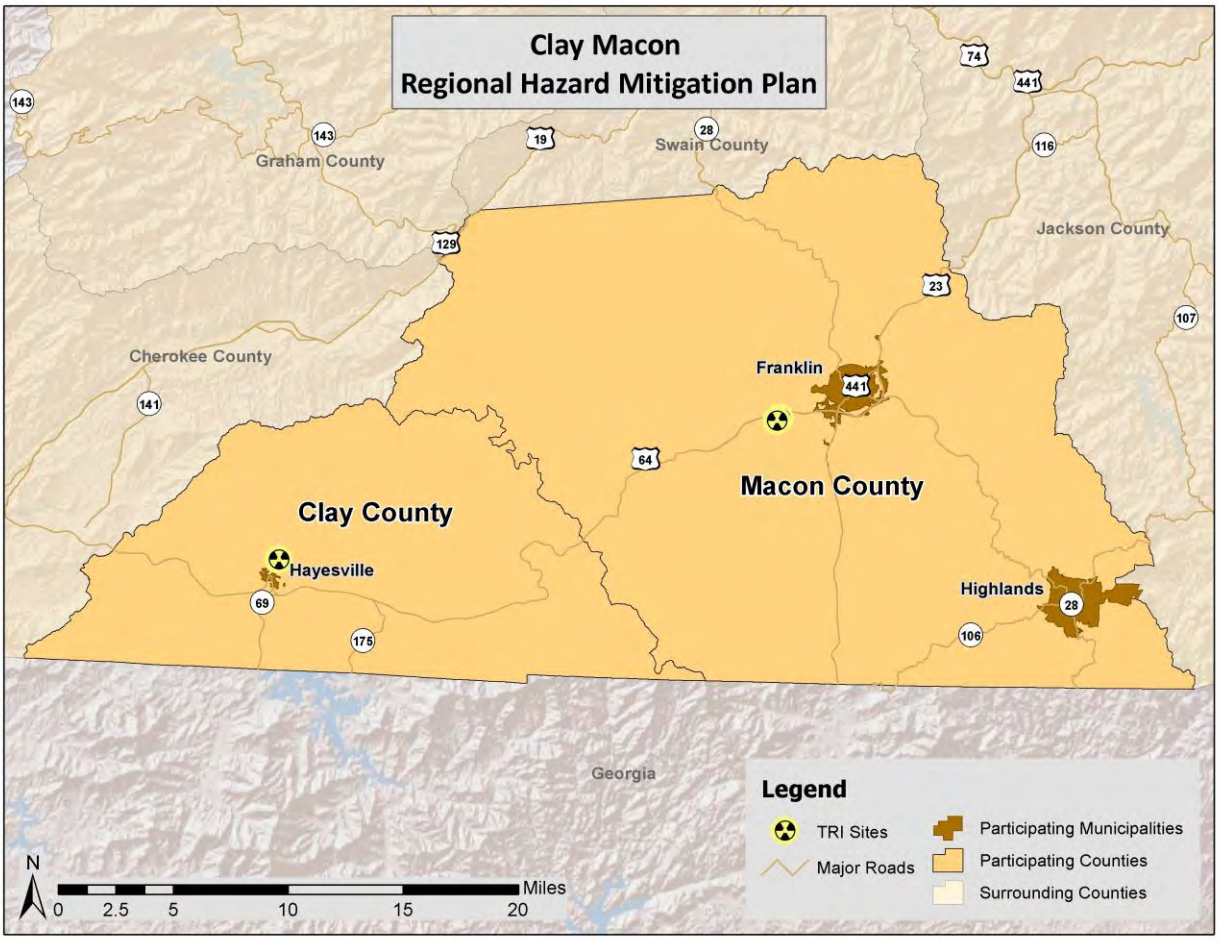
Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

[33] FEMA, 1997.

5.16.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency provides public information on hazardous materials. One facet of this program is to collect information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. The Clay Macon Region has three TRI sites. These sites are shown in **Figure 5.17.**

FIGURE 5.17: TOXIC RELEASE INVENTORY (TRI) SITES IN THE CLAY MACON REGION



Source: Environmental Protection Agency

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

5.16.3 Historical Occurrences

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

- a fatality or major injury caused by the release of a hazardous material,
- the evacuation of 25 or more persons as a result of release of a hazardous material or exposure to fire,
- a release or exposure to fire which results in the closure of a major transportation artery,
- the alteration of an aircraft flight plan or operation,
- the release of radioactive materials from Type B packaging,
- the release of over 11.9 galls or 88.2 pounds of a severe marine pollutant, or
- the release of a bulk quantity (over 199 gallons or 882 pounds) of a hazardous material.

However, prior to 2002, a hazardous materials "serious incident" was defined as follows:

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

There have been a total of 10 recorded HAZMAT incidents in the Clay Macon Region since 1979. These events resulted in more than $4,000 (2014 dollars) in property damages.[34] **Table 5.30** summarizes the HAZMAT incidents reported in the Clay Macon Region. Detailed information on these events is presented in the jurisdiction-specific annexes.

TABLE 5.30: SUMMARY OF HAZMAT INCIDENTS IN THE CLAY MACON REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	**0**	**0/0**	**$0**
Hayesville	0	0/0	$0
Unincorporated Area	0	0/0	$0
Macon County	**10**	**0/0**	**$4,306**
Franklin	6	0/0	$0
Highlands	0	0/0	$0
Unincorporated Area	4	0/0	$4,306
CLAY MACON REGION TOTAL	**10**	**0/0**	**$4,306**

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

5.16.4 Probability of Future Occurrence

Given the location of three toxic release inventory sites in the Clay Macon Region and prior roadway incidents, it is possible that a hazardous material incident may occur in the region (between 1 and 10

[34] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

percent annual probability). County and municipal officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

5.17 WILDFIRE

5.17.1 Background

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed.[35] Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors.

Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning. In North Carolina, a majority of fires are caused by debris burning.

There are three classes of wildland fires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildfires are usually signaled by dense smoke that fills the area for miles around.

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (such as tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings.

Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses, and industries are located within high wildfire hazard areas. Furthermore, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends, and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses as well. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices and sometimes jobs are lost. The high cost of responding to and recovering from wildfires can deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns.

State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks, and fuel management can be designed as part of an overall fire defense system to aid in fire control. Fuel management, prescribed burning, and cooperative land management planning can also be encouraged to reduce fire hazards.

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

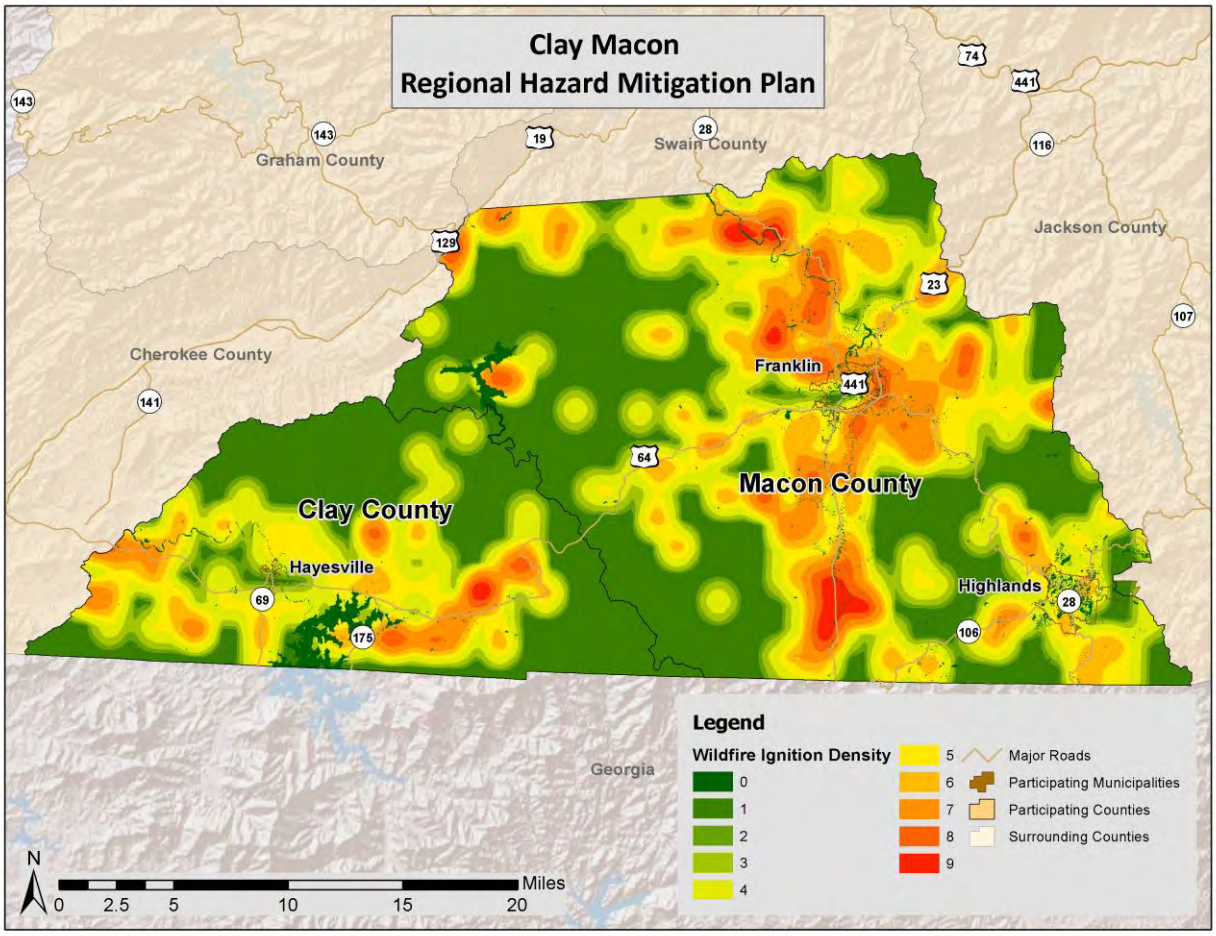
5.17.2 Location and Spatial Extent

The entire region is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Wildfire Ignition Density shown in the figure below gives an indication of historic location.

5.17.3 Historical Occurrences

Figure 5.18 shows the Wildfire Ignition Density in the Clay Macon Region based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.[36]

FIGURE 5.18: WILDFIRE IGNITION DENSITY IN THE CLAY MACON REGION



Source: Southern Wildfire Risk Assessment

[36] Southern Wildfire Risk Assessment, 2014.

Based on data from the North Carolina Division of Forest Resources from 2004 to 2013, the Clay Macon Region experienced an average of 56 wildfires annually which burn a combined 249 acres, on average. The data indicates that most of these fires are small, averaging about four acres per fire. **Table 5.31** provides a summary table for wildfire occurrences in the Clay Macon Region. The number of reported wildfire occurrences in the participating counties between the years 2004 and 2013 is listed in the jurisdiction-specific annexes.

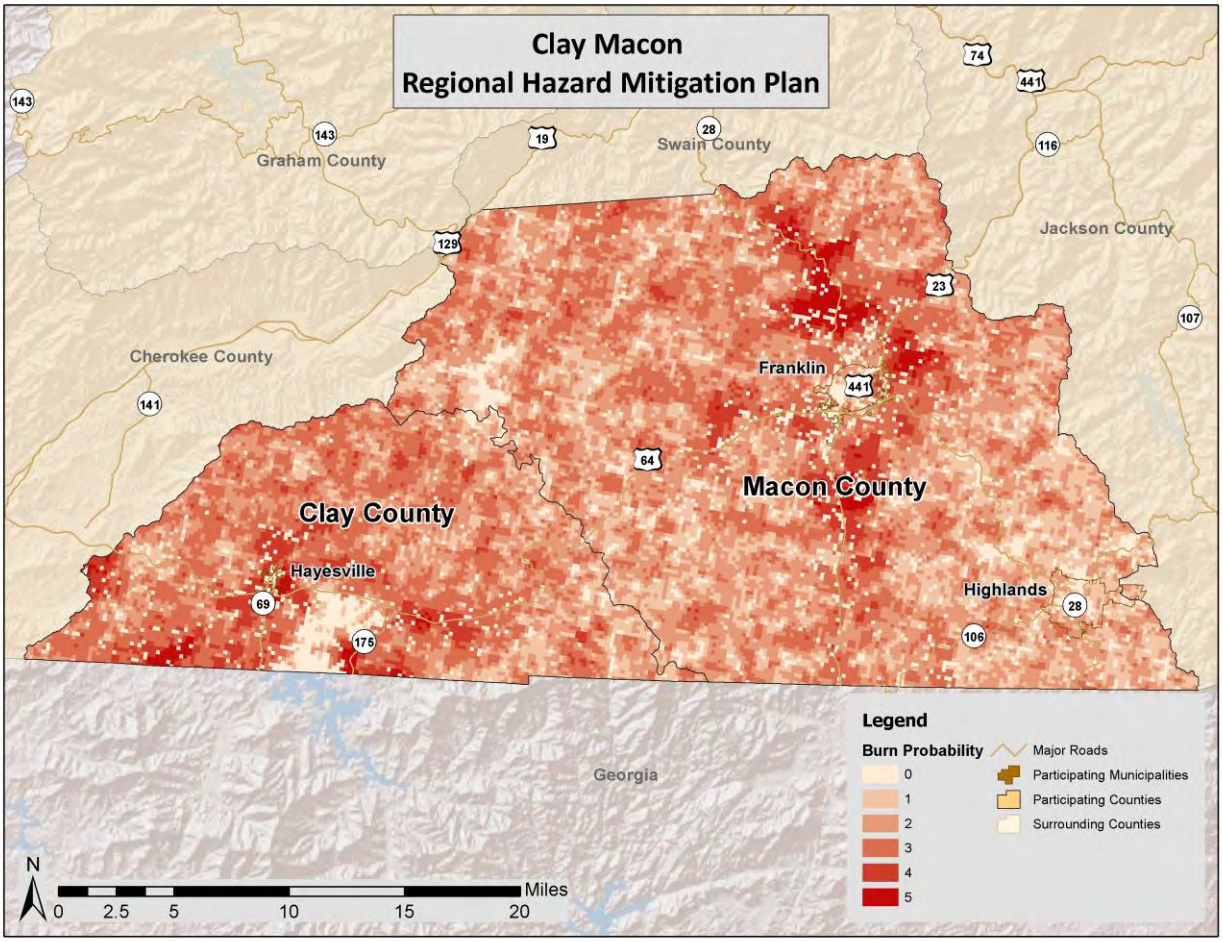
TABLE 5.31: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2004-2013)*

	Clay County	Macon County	Clay Macon Region
Average Number of Fires per year	19	37	56
Average Number of Acres Burned per year	83	165	248
Average Number of Acres Burned per fire	4	4	4

5.17.4 Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in the Clay Macon Region. **Figure 5.19** shows that there is some probability a wildfire will occur throughout the region. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to the Clay Macon Region for future wildfire events is likely (10 to 100 percent annual probability).

FIGURE 5.19: BURN PROBABILITY IN THE CLAY MACON REGION



Source: Southern Wildfire Risk Assessment

5.18 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.

5.18.1 Hazard Extent

Table 5.32 describes the extent of each natural hazard identified for the Clay Macon Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.32: EXTENT OF CLAY MACON REGION HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by PDSI classifications which include Extremely Moist, Very Moist, Mid-Range, Moderate Drought, Severe Drought, and Extreme Drought classifications (pages 5:5-5:6). According to the PDSI classifications, the most severe drought condition is Extreme. The Clay Macon Region has received this ranking twice over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in the Clay Macon Region was 101 degrees Fahrenheit (reported on July 29, 1952). • Clay County: N/A • Macon County: 101°F
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the Clay Macon Region was 2.75 inches (reported on March 28, 1984). It should be noted that future events may exceed this. • Clay County: 1.75 inches • Macon County: 2.75 inches
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through the Clay Macon Region was an unnamed storm in 1916 which carried tropical depression force winds of 31 knots (approximately 36 mph) upon arrival in the region. The following lists the greatest extent of hurricane winds to pass through the area, though it should be noted that stronger storms could impact the region without a direct hit: • Clay County: Hurricane Frances, Tropical Depression (22 knots) • Macon County: Unnamed 1916 Strom, Tropical Depression (31 knots)
Lightning	According to the Vaisala flash density map (Figure 5.5), the Clay Macon Region is located in an area that experiences 2 to 4 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 59-year history from the National Climatic Data Center, the strongest recorded wind event in the Clay Macon Region was reported on April 15, 2007 at 70 knots (approximately 81 mph). It should be noted that future events may exceed these historical occurrences. • Clay County: 65 knots • Macon County: 70 knots
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.15 and 5.16). The greatest magnitude reported in the region was an F1 (last reported on April 27, 2011). • Clay County: F1 • Macon County: F1

Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in the region was 25.5 inches reported on March 3, 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. • Clay County: N/A • Macon County: 25.5 inches
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from the Clay Macon Region. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the region was V (slightly strong) with a correlating Richter Scale measurement of approximately 4.8 (last reported on November 30, 1973). The epicenter of this earthquake was located 84.0 km away. • Clay County: V; 84.0 km to epicenter • Macon County: V; 72.0 km to epicenter
Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is moderate across half the region and high across the other half of the region. There is also high susceptibility throughout the region.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 76 dams in the Clay Macon Region, 34 are classified as high-hazard. • Clay County: 5 high hazard dams • Macon County: 29 high hazard dams
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records available for the Clay Macon Region.

Flood

Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 3.6 percent of the total land area in the Clay Macon Region. It should also be noted that local officials recall flooding depths of at least 1 foot in some historic events and this is corroborated by NCDC narrative records.

Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist within each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the region was reported on August 30, 1940. Water reached a discharge of 19,600 cubic feet per second and the maximum stream crest height was recorded at 13.50 feet. Additional peak discharge readings and maximum stream crest heights are in the table below.

Location/Jurisdiction	Date	Peak Discharge (cfs)	Maximum Stream Crest Height (ft)
Clay County			
Hayesville			
Hiwassee River below Hayesville	10/3/1898	17,000	16.10
Unincorporated Area			
Brasstown Creek at Brasstown	5/7/2003	4,570	14.94
Macon County			
Franklin			
Little Tennessee River at Franklin	6/4/1909	7,950	10.00
Highlands			
Cullasaja River at SR 1620 near Highlands	9/17/2004	5,300	16.15
Unincorporated Area			
Little Tennessee River at Iotla	8/30/1940	19,600	13.50

Other Hazards

Hazardous Materials Incident

According to USDOT PHMSA, the largest hazardous materials incident reported in the region was 8,000 LGA released on the highway on December 27, 1979. It should be noted that larger events are possible.

- Clay County: N/A
- Macon County: 8,000 LGA

Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2004-2013. Analyzing the data by county indicates the following wildfire hazard extent for each county. ***Clay County*** • The greatest number of fires to occur in any year was 29 in 2008. • The greatest number of acres to burn in a single year occurred in 2008 when 276 acres were burned. ***Macon County*** • The greatest number of fires to occur in any year was 55 in 2008. • The greatest number of acres to burn in a single year occurred in 2009 when 498 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the region.

5.18.2 Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for the Clay Macon 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 Clay Macon Region as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes, and more specifically, the identification of hazard mitigation opportunities for the jurisdictions in the Clay Macon Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the Clay Macon 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 Clay Macon Regional Hazard Mitigation Planning Team in gaining consensus on the determination of those hazards that pose the most significant threat to the Clay Macon counties based on a variety of factors. The PRI is not scientifically based, but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in the Clay Macon 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, as summarized in **Table 5.33**.[37] To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

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

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

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for the Clay Macon Region, the highest PRI value is 3.3 (winter storm and freeze hazard). Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the Regional Hazard Mitigation Planning Team.

TABLE 5.33: PRIORITY RISK INDEX FOR THE CLAY MACON REGION

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

5.18.3 Priority Risk Index Results

Table 5.34 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE 5.34: SUMMARY OF PRI RESULTS FOR THE CLAY MACON REGION

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Unlikely	Minor	Large	More than 24 hours	Less than 1 week	**1.8**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Possible	Limited	Large	More than 24 hours	Less than 24 hours	**2.3**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm / High Wind	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	**3.1**
Tornado	Possible	Critical	Small	Less than 6 hours	Less than 6 hours	**2.4**
Winter Storm and Freeze	Highly Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.3**
Geologic Hazards						
Earthquake	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Landslide	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**3.0**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Erosion	Likely	Minor	Small	More than 24 hours	More than 1 week	**2.1**
Flood	Likely	Critical	Small	6 to 12 hours	Less than 1 week	**2.8**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.3**

5.19 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the Clay Macon Region, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table 5.35**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of the Clay Macon 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 5.35: CONCLUSIONS ON HAZARD RISK FOR THE CLAY MACON REGION

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

SECTION 6
VULNERABILITY ASSESSMENT

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

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

6.1 OVERVIEW

This section builds upon the information provided in Section 4: *Hazard Identification and* Section 5*: Hazard Profiles* by identifying and characterizing an inventory of assets in the Clay Macon Region. In addition, the potential impact and expected amount of damages caused to these assets by each identified hazard event is assessed. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, the Clay Macon counties and their participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the asset inventory as compiled for jurisdictions in the Clay Macon Region. The remainder of this section focuses on the results of the assessment conducted.

6.2 METHODOLOGY

This vulnerability assessment was conducted using three distinct methodologies: (1) A stochastic risk assessment; (2) a geographic information system (GIS)-based analysis; and (3) a risk modeling software analysis. Each approach provides estimates for the potential impact of hazards by using a common,

systematic framework for evaluation, including historical occurrence information provided in the *Hazard Identification* and *Hazard Profiles* sections. A brief description of the three different approaches is provided on the following pages.

6.2.1 Stochastic Risk Assessment

The stochastic risk assessment methodology was applied to analyze hazards of concern that were outside the scope of hazard risk models and the GIS-based risk assessment. This involves the consideration of annualized loss estimates and impacts of current and future buildings and populations. Annualized loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction or county). This methodology is applied primarily to hazards that do not have geographically-definable boundaries and are therefore excluded from spatial analysis through GIS. A stochastic risk methodology was used for the following hazards:

- Dam Failure
- Drought
- Erosion
- Extreme Heat
- Hailstorm
- Lightning
- Severe Thunderstorm Wind
- Tornado
- Winter Storm and Freeze

With the exception of Dam Failure and Erosion, the hazards listed above are considered atmospheric and have the potential to affect all current and future buildings and all populations. **Table 6.1** provides information about all improved property in the Clay Macon region that is vulnerable to these hazards. For all hazards annualized loss estimates were determined using the best available data on historical losses from sources including NOAA's National Climatic Data Center records, Clay Macon Region county hazard mitigation plans, and local knowledge. Annualized loss estimates were generated by totaling the amount of property damage over the period of time for which records were available, and calculating the average annual loss. Given the standard weighting analysis, losses can be readily compared across hazards providing an objective approach for evaluating mitigation alternatives.

For the dam failure[1], drought, and erosion, no data with historical property damages was available. Therefore a detailed vulnerability assessment could not be completed for these hazards at this time.

The results for these hazards are found at the end of this section in **Table 6.14**.

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

6.2.2 GIS-Based Analysis

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

- Flood
- Hazardous Material Incident
- Landslide
- Wildfire

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the Clay Macon Region using best available geospatial data. Digital data was collected from local, regional, state, and national sources for hazards and buildings. This included local tax assessor records for individual parcels and buildings and geo-referenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.) when available. ESRI® ArcGIS™ 10.0 was used to assess hazard vulnerability utilizing digital hazard data, as well as local building data. Using these data layers, hazard vulnerability can be quantified by estimating the assessed building value for parcels and/or buildings determined to be located in identified hazard areas. To estimate vulnerable populations in hazard areas, digital Census 2010 data by census tract was obtained. This was intersected with hazard areas to determine exposed population counts. The results of the analysis provided an estimate of the number of people and critical facilities, as well as the assessed value of parcels and improvements, determined to be potentially at risk to those hazards with delineable geographic hazard boundaries.

6.2.3 Risk Modeling Software Analysis

A risk modeling software was used for the following hazards:

- Earthquake
- Hurricane and Tropical Storm

There are several models that exist to model hazards. Hazus-MH was used in this vulnerability assessment to address the aforementioned hazards.

Hazus-MH

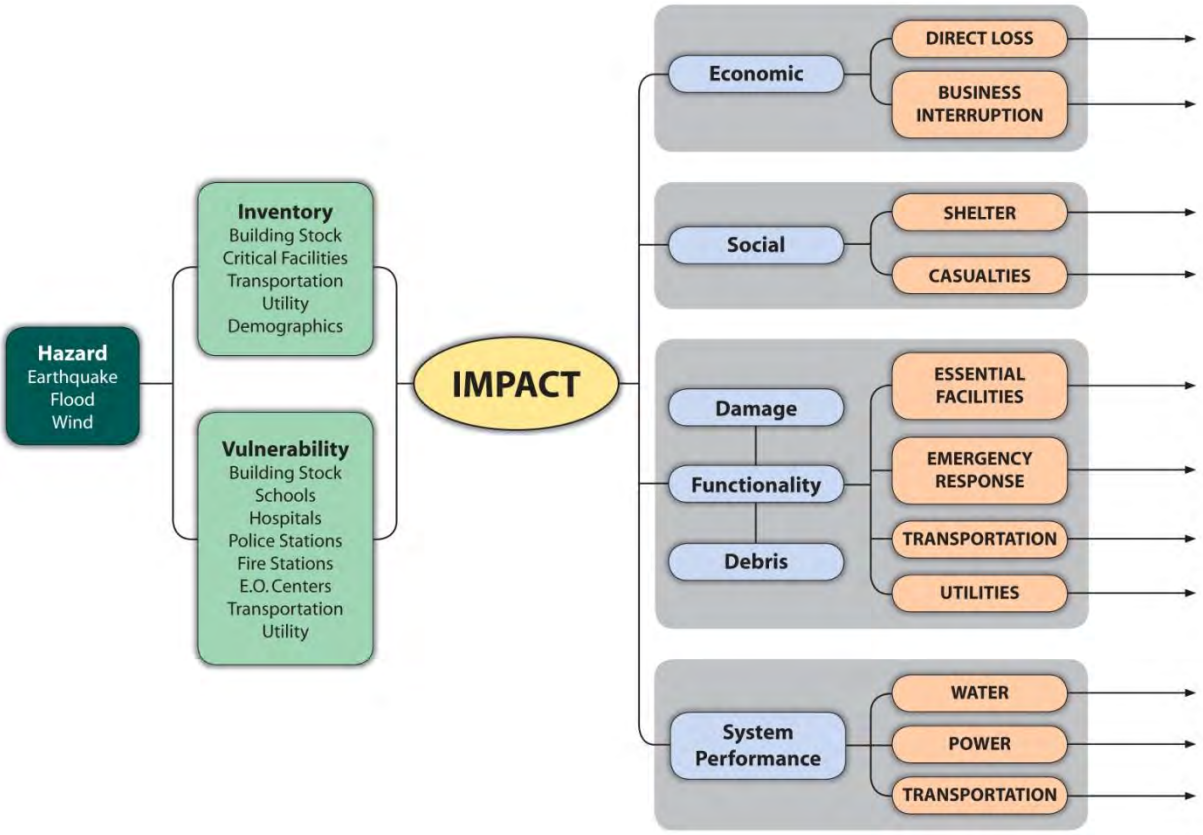
Hazus-MH ("Hazus") is a standardized loss estimation software program developed by FEMA. It is built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure-by-structure basis). The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) can be modeled using the software to determine the impact (i.e., damages and losses) on the built environment.

The Clay Macon Regional Risk Assessment utilized Hazus-MH to produce hazard damage loss estimations for hazards for the planning area. At the time this

analysis was completed, Hazus-MH 2.1 was used to estimate potential damages from hurricane winds earthquake hazards using Hazus-MH methodology. Although the program can also model losses for flood and storm surge, it was not used in this Risk Assessment.

Figure 6.1 illustrates the conceptual model of the Hazus-MH methodology.

FIGURE 6.1: CONCEPTUAL MODEL OF HAZUS-MH METHODOLOGY



Hazus-MH is capable of providing a variety of loss estimation results. In order to be consistent with other hazard assessments, annualized losses are presented when possible. Some additional results based on location-specific scenarios may also be presented to provide a complete picture of hazard vulnerability.

Loss estimates provided in this vulnerability assessment are based on best available data and methodologies. The results are an approximation of risk. These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, non-specific locations, demographics, or economic parameters).

All conclusions are presented in “Conclusions on Hazard Vulnerability” at the end of this section.

6.3 EXPLANATION OF DATA SOURCES

Earthquake

Hazus-MH 2.1 (as described above) was used to assess earthquake vulnerability. A level 1, probabilistic scenario to estimate annualized loss was utilized. In this scenario, several return periods (events of varying intensities) are run to determine annualized loss. Default Hazus earthquake damage functions and methodology were used to determine the probability of damage for 100-, 250- 500-, 750-, 1,000-, 1,500-, and 2,500-year frequency events (also known as a return period), which were then used to determine an annualized loss figure. Results are calculated at the 2000 U.S. Census tract level in Hazus and presented at the county level.

Flood

FEMA Digital Flood Insurance Rate Maps (DFIRMs) were used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes and, they identify several features including floodplain boundaries and base flood elevations. Identified areas on the DFIRM represent some features of a Flood Insurance Rate Maps including the 100-year flood areas (1.0-percent annual chance flood), and the 500-year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local parcel data and critical facilities were overlaid on the 100-year floodplain areas and 500-year floodplain areas. It should be noted that such an analysis does not account for building elevation.

Hurricane and Tropical Storm Wind

Hazus-MH 2.1 (as described above) was used to assess wind vulnerability. For the hurricane wind analysis, a probabilistic scenario was created to estimate the annualized loss damage and probable peak wind speeds in the Clay Macon Region. Default Hazus wind speed data, damage functions, and methodology were used in to determine the probability of damage for 50-, 100-, 500-, and 1,000-year frequency events (also known as return periods) in the scenario. Results are calculated in Hazus at the 2000 U.S. Census tract level and presented at the county level.

Hazardous Materials Incident

For the fixed hazardous materials incident analysis, Toxic Release Inventory (TRI) data was used. The Toxics Release Inventory is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to their state or tribal entity. A facility must report if it meets the following three criteria:

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage, and disposal (TSD) facilities; and solvent recovery services;
- Has 10 or more full-time employee equivalents; and
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bioaccumulative, and toxic

(PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds, or 0.1 grams depending on the chemical.

For the mobile hazardous materials incident analysis, transportation data including major highways and railroads were obtained from the North Carolina Department of Transportation. This data is ArcGIS compatible, lending itself to buffer analysis to determine risk.

Landslide

The USGS Landslide Susceptibility Index was used to determine vulnerability to landslides. The risk levels of low, moderate, and high correspond to the Landslide Susceptibility Index where "Low" indicates a zone of Low Incidence/High Susceptibility, "Mod" indicates a zone of Moderate Incidence/High Susceptibility, and "High" indicates a zone of High Landslide Incidence/High Susceptibility. For the vulnerability assessment, local parcel data and critical facilities were overlaid on the moderate and high incidence areas.

Wildfire

The data used to determine vulnerability to wildfire in the Clay Macon Region is based on GIS data called the Southern Wildfire Risk Assessment (SWRA). It is available online and is produced by the Southern Group of State Foresters. A specific layer, known as Wildland Urban Interface Risk Index (WUIRI) was used to determine vulnerability of people and property. The WUIRI was used to determine vulnerability of people and property and is presented on a scale of 0 to -9. It combines data on housing density with the data on the impact and likelihood of a wildfire occurring in a specific area. The primary purpose of the data is to highlight areas of concern that may be conducive to mitigation actions. Due to the assumptions made, it is not a true probability. However, it does provide a comparison of risk throughout the region.

6.4 ASSET INVENTORY

An inventory of geo-referenced assets within the Clay Macon counties and jurisdictions was compiled in order to identify and characterize those properties potentially at risk to the identified hazards[2]. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Under this assessment, two categories of physical assets were created and then further assessed through GIS analysis. Additionally, social assets are addressed to determine population at risk to the identified hazards. These are presented below in Section 6.4.2.

6.4.1 Physical and Improved Assets

The two categories of physical assets consist of:

1. Improved Property: Includes all improved properties in the Clay Macon Region according to local building footprint and parcel data provided by counties. The information has been expressed in terms of the number of buildings, parcels, and total assessed value of improvements (buildings) that may be exposed to the identified hazards.

[2] While potentially not all-inclusive for the jurisdictions in the Smoky Mountain region, "georeferenced" assets include those assets for which specific location data is readily available for connecting the asset to a specific geographic location for purposes of GIS analysis.

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

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

Table 6.1 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for participating areas of the Clay Macon Region (study area of vulnerability assessment).[3]

TABLE 6.1: IMPROVED PROPERTY IN THE CLAY MACON REGION

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings[4]	Total Assessed Value of Improvements
Clay County	**16,920**	**$2,264,267,900**	**9,365**	**$996,548,265**
Hayesville	256	$33,188,000	250	$23,563,213
Unincorporated Area	16,664	$2,231,079,900	9,115	$972,985,052
Macon County	**44,384**	**$10,507,624,838**	**27,941**	**$5,290,581,130**
Franklin	2,496	$665,125,250	2,228	$439,412,670
Highlands	2,897	$1,814,159,140	1,765	$934,478,420
Unincorporated Area	38,991	$8,028,340,448	23,948	$3,916,690,040
CLAY MACON REGION TOTAL	**61,304**	**$12,771,892,738**	**37,306**	**$6,287,129,395**

Table 6.2 lists the fire stations, EMS stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in the Clay Macon Region. Local county GIS departments supplied the critical facility data, though other local officials contributed information as well. It should be noted that some counties did not have digital data available for some of the critical facility categories. Therefore, information provided may be incomplete. In addition, **Figure 6.2** shows the locations of essential facilities in the Clay Macon Region. **Table 6.16**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the counties.

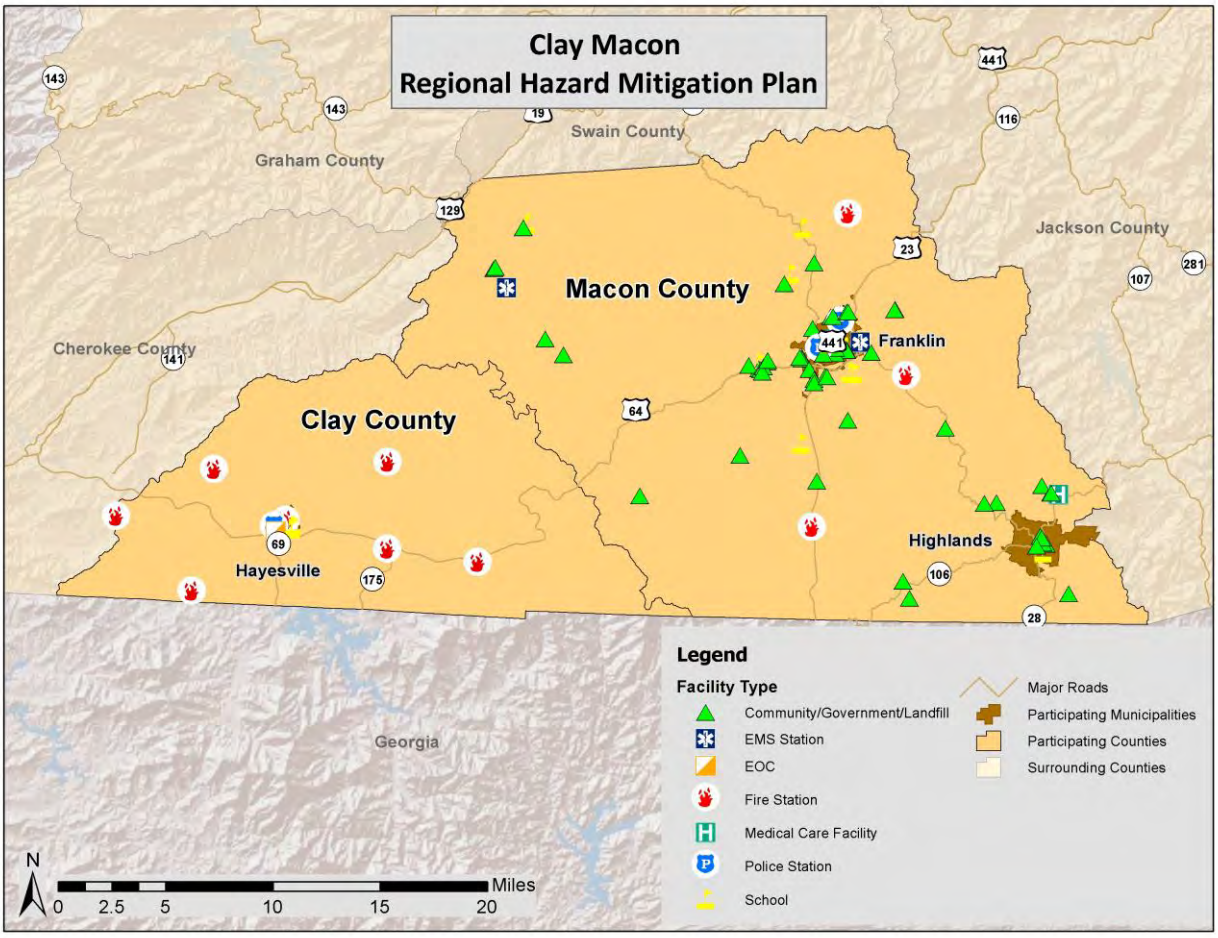
[3] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.
[4] Number of buildings for each county is based on the number of parcels with an improved building value greater than zero.

TABLE 6.2: CRITICAL FACILITY INVENTORY IN THE CLAY MACON REGION

Location	Fire Stations	EMS Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Clay County	**7**	**1**	**1**	**0**	**1**	**3**	**0**
Hayesville	1	0	0	0	0	3	0
Unincorporated Area	6	1	1	0	0	0	0
Macon County	**3**	**3**	**2**	**2**	**1**	**11**	**66**
Franklin	2	0	1	1	0	2	18
Highlands	0	0	0	0	0	1	5
Unincorporated Area	1	3	1	1	0	8	43
CLAY MACON REGION TOTAL	**10**	**4**	**3**	**2**	**2**	**14**	**66**

Source: Local Government GIS Departments

FIGURE 6.2: CRITICAL FACILITY LOCATIONS IN THE CLAY MACON REGION



Source: Local Government GIS Departments

6.4.2 Social Vulnerability

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

Table 6.3 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in the Clay Macon Region according to Census data is 44,509 persons. Additional population estimates are presented in Section 3: *Community Profile*.

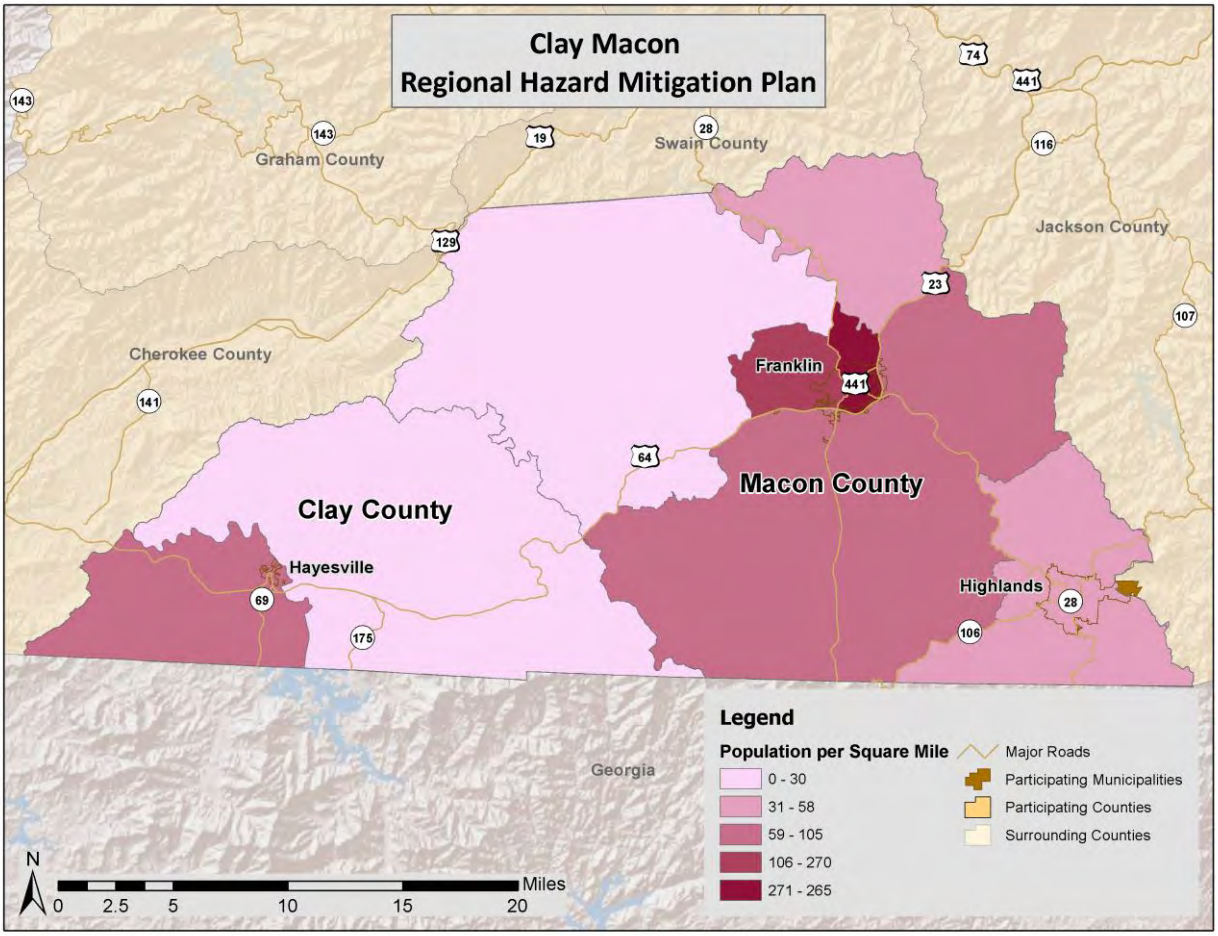
TABLE 6.3: TOTAL POPULATION IN THE CLAY MACON REGION

Location	Total 2010 Population
Clay County	10,587
Macon County	33,922
CLAY MACON REGION TOTAL	**44,509**

Source: United States Census 2010

In addition, **Figure 6.3** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE 6.3: POPULATION DENSITY IN THE CLAY MACON REGION



Source: United States Census Bureau, 2010

6.4.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans were approved (in 2012), the Clay Macon Region has experienced limited growth and development. **Table 6.4** shows the number of building units constructed since 2010 according to the US Census American Community Survey.

Table 6.4: BUILDING COUNTS FOR THE CLAY MACON REGION

Jurisdiction	Total Housing Units (2013)	Units Built 2010 or later	% Building Stock Built Post-2010
Clay County	**7,144**	**6**	**0.1%**
Hayesville	207	6	2.9%
Unincorporated Area	6,963	0	0.0%
Macon County	**25,195**	**56**	**0.2%**
Franklin	2,391	15	0.6%
Highlands	2,085	0	0.0%

Jurisdiction	Total Housing Units (2013)	Units Built 2010 or later	% Building Stock Built Post-2010
Unincorporated Area	20,719	41	0.2%
CLAY MACON REGION TOTAL	**32,339**	**62**	**0.2%**

Source: United States Census Bureau

Table 6.5 shows population growth estimates for the region from 2010 to 2013 based on the US Census Annual Estimates of Resident Population.

Table 6.5: Population Growth for the Clay Macon Region

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Clay County	**10,418**	**10,506**	**10,575**	**10,599**	**1.7%**
Hayesville	681	482	414	338	-50.4%
Unincorporated Area	9,737	10,024	10,161	10,261	5.4%
Macon County	**33,453**	**33,719**	**33,815**	**33,859**	**1.2%**
Franklin	3,848	3,864	3,883	3,897	1.3%
Highlands	984	1,016	1,041	1,085	10.3%
Unincorporated Area	28,621	28,839	28,891	28,877	0.9%
CLAY MACON REGION TOTAL	**43,871**	**44,225**	**44,390**	**44,458**	**1.3%**

Source: United States Census Bureau

Based on the data above, there has been a low rate of residential development and population growth in the region since 2010. Therefore, changes in development have not significantly impacted the region's vulnerability since the previous county hazard mitigation plans were approved and there has been little change in the overall vulnerability. However, it is important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, high and moderate landside susceptibility areas, primary and secondary TRI site buffers, or high wildfire risk areas.

6.5 VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (erosion, dam and levee failure). The total region exposure, and thus risk, was presented in **Table 6.1**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table 6.15.**

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

6.5.1 Hurricane and Tropical Storm

Historical evidence indicates that the Clay Macon Region has some risk to the hurricane and tropical storm hazard. There have been two disaster declarations due to hurricanes (Hurricane Ivan and Tropical Storm Frances) in the region. Several tracks have come near or traversed through the Clay Macon Region, as shown and discussed in Section 5: *Hazard Profiles*.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the region as shown below in **Table 6.6**. Only losses to buildings are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE 6.6: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Clay County	$9,000
Macon County	$40,000
CLAY MACON REGION TOTAL	**$49,000**

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table 6.7.**

TABLE 6.7: PROBABLE PEAK HURRICANE/TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Clay County	**50.4**	**59.6**	**77.6**	**85.5**
Hayesville	50.4	59.6	77.6	84.1
Unincorporated Area	50.4	59.6	77.6	85.5
Macon County	**51.6**	**61.2**	**79.0**	**86.2**
Franklin	51.3	60.6	78.3	85.8
Highlands	51.6	61.2	79.0	86.2
Unincorporated Area	51.6	61.2	79.0	86.2
MAXIMUM WIND SPEED REPORTED	**51.6**	**61.2**	**79.0**	**86.2**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the entire Clay Macon Region, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across the Clay Macon Region, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and

age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table 6.16** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in the Clay Macon Region. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

6.5.2 Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for the region. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table 6.8** summarizes the findings.

TABLE 6.8: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Clay County	$40,000
Macon County	$177,000
CLAY MACON REGION TOTAL	**$217,000**

Source: Hazus-MH 2.1

Social Vulnerability

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

Critical Facilities

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table 6.16**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in the Clay Macon Region. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

6.5.3 Landslide

In order to complete the vulnerability assessment for landslides in the Clay Macon Region, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section 5: *Hazard Profiles*), county level tax parcel data,

and GIS analysis. **Table 6.9** presents the potential at-risk property where available. All of the Clay Macon Region is identified as either moderate or high incidence areas by the USGS landslide data and all areas of the counties are also areas of high landslide susceptibility. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE 6.9: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk		Number of Improvements At Risk		Total Value of Improvements At Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Clay County	**10,643**	**6,447**	**6,012**	**3,377**	**$688,613,350**	**$323,035,952**
Hayesville	158	112	139	117	$17,394,328	$7,350,002
Unincorporated Area	10,485	6,335	5,873	3,260	$671,219,022	$315,685,950
Macon County	**16,037**	**28,541**	**9,194**	**18,756**	**$2,962,920,880**	**$2,342,839,910**
Franklin	0	2,496	0	2,228	$0	$439,412,670
Highlands	2,897	0	1,765	0	$934,478,420	$0
Unincorporated Area	13,140	26,045	7,429	16,528	$2,028,442,460	$1,903,427,240
CLAY MACON REGION TOTAL	**26,680**	**34,988**	**$ 15,206**	**22,133**	**3,651,534,230**	**$2,665,875,862**

Source: United States Geological Survey

Social Vulnerability

Given high susceptibility across the entire Clay Macon Region, it is assumed that the total population is at least at some risk.

Critical Facilities

All critical facilities are located in a high susceptibility area. Seventy-three critical facilities are located in a high incidence area. All remaining facilities are located within a moderate incidence area. In Clay County, three fire stations are located in the high incidence area. In Macon County, 5 community buildings, 3 EMS stations, 1 EOC, 2 fire stations, 36 government facilities, 9 landfill/convenience centers, 2 police stations, and 10 schools are in the high incidence area. A list of specific critical facilities and their associated risk can be found in **Table 6.16** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in the Clay Macon Region, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for Clay Macon assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

6.5.4 Flood

Historical evidence indicates that the Clay Macon Region is susceptible to flood events. A total of 35 flood events have been reported by the National Climatic Data Center resulting in roughly $6.5 million dollars in damages and thirteen injuries. On an annualized level, these damages amounted to just over $350,000 for the Clay Macon Region.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for each of the Clay Macon counties. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table 6.10** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE 6.10: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

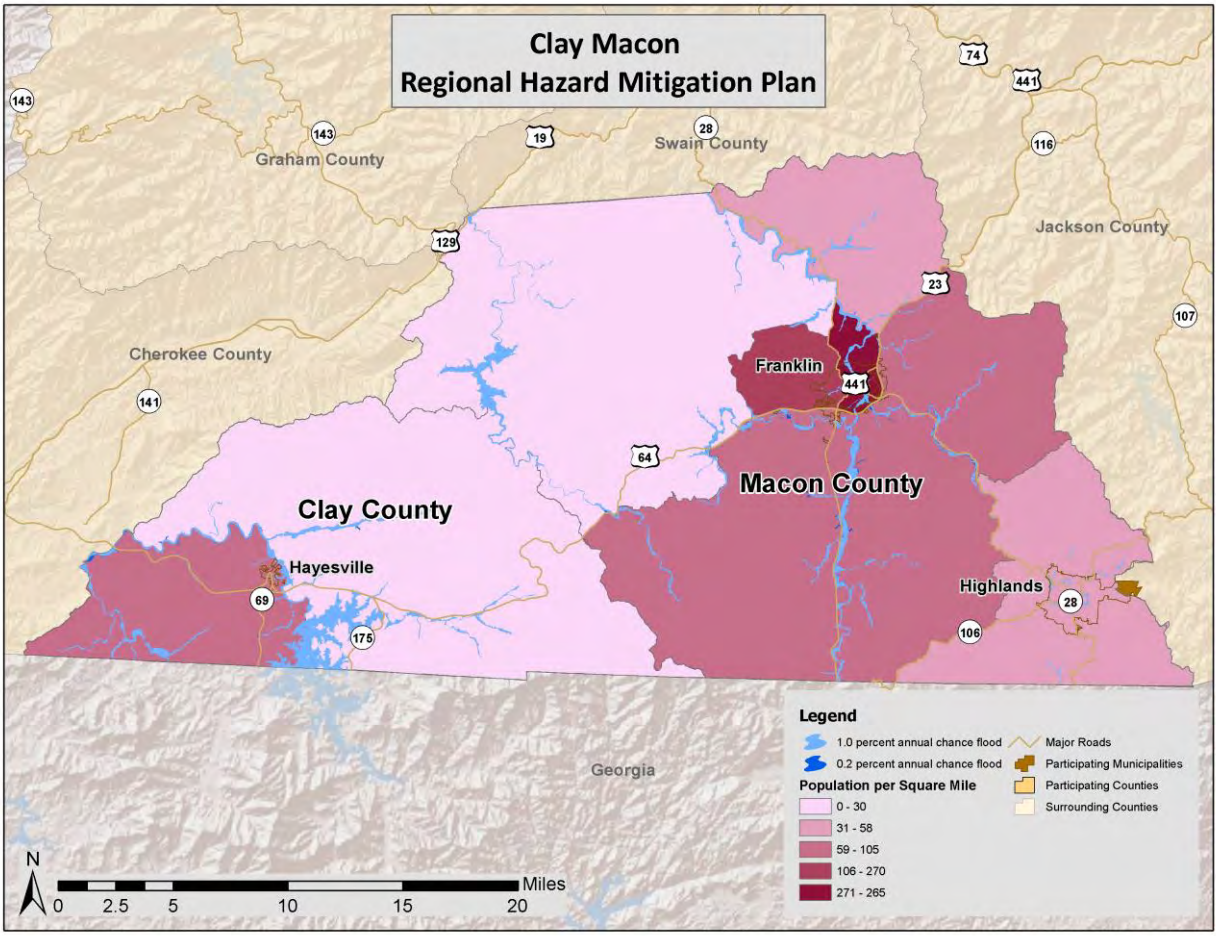
	1.0-percent ACF			0.2-percent ACF		
Location	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Clay County	**2,581**	**480**	**$171,391,363**	**264**	**39**	**$21,229,327**
Hayesville	14	5	$497,007	0	0	$0
Unincorporated Area	2,567	475	$170,894,356	264	39	$21,229,327
Macon County	**3,577**	**676**	**$531,796,690**	**1,143**	**254**	**$166,531,910**
Franklin	301	136	$66,573,470	200	69	$41,081,990
Highlands	354	59	$123,553,400	56	14	$14,275,230
Unincorporated Area	2,922	481	$341,669,820	887	171	$111,174,690
CLAY MACON REGION TOTAL	**6,158**	**1,156**	**$703,188,053**	**1,407**	**293**	**$187,761,237**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability

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

FIGURE 6.4: POPULATION DENSITY NEAR FLOODPLAINS



Source: Federal Emergency Management Agency DFIRM, United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are a total of seven critical facilities located in the Clay Macon Region 1.0-percent annual chance floodplain and 0.2-percent annual chance floodplain based on FEMA DFIRM boundaries and GIS analysis. (As previously noted, this analysis does not consider building elevation, which may negate risk.) There is one critical facility in the 1.0 percent annual chance floodplain in Clay County, a fire station. In Macon County, the analysis indicates 2 government facilities, 2 landfill/convenience centers, and 1 police station in the 100 year floodplain. There is also 1 government facility in the 0.2 percent annual chance floodplain. A list of specific critical facilities and their associated risk can be found in **Table 6.16** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in the Clay Macon Region, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

6.5.5 Hazardous Materials Incident

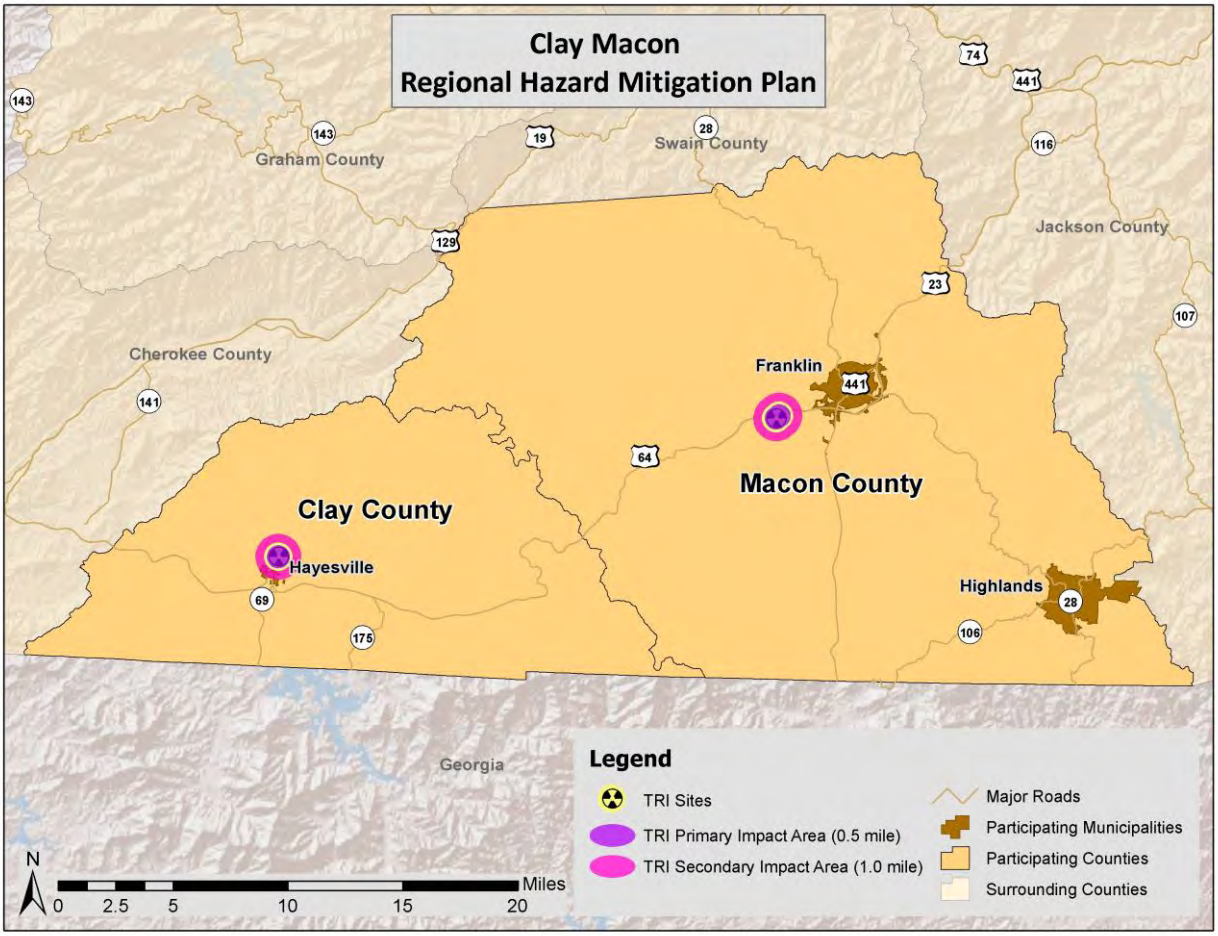
Historical evidence indicates that the Clay Macon Region is susceptible to hazardous materials events. A total of 10 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $4,306 (2014 dollars) in property damage. On an annualized level, these damages amount to $615 for the Clay Macon Region.

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

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[5] In both scenarios, two sizes of buffers—0.5 and 1.0 miles—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in the Clay Macon Region, along with buffers, were used for analysis as shown in **Figure 6.5.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure 6.6** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.11** (fixed sites), **Table 6.12** (mobile road sites) and **Table 6.13** (mobile railroad sites).[6]

[5] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an actual event).
[6] Note that parcels included in the 0.5-mile analysis are also included in the 1.0-mile analysis.

FIGURE 6.5: TRI SITES WITH BUFFERS IN THE CLAY MACON REGION



Source: Environmental Protection Agency

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

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Clay County	**253**	**177**	**$19,308,530**	**904**	**578**	**$90,618,870**
Hayesville	49	51	$2,941,934	239	218	$20,923,820
Unincorporated Area	204	126	$16,366,596	665	360	$69,695,050
Macon County	**331**	**199**	**$45,751,690**	**1,027**	**693**	**$107,940,020**
Franklin	2	5	$284,480	2	5	$284,480
Highlands	0	0	$0	0	0	$0
Unincorporated Area	329	194	$45,467,210	1,025	688	$107,655,540
CLAY MACON REGION TOTAL	**584**	**376**	**$65,060,220**	**1,931**	**1,271**	**$198,558,890**

FIGURE 6.6: MOBILE HAZMAT BUFFERS IN THE CLAY MACON REGION

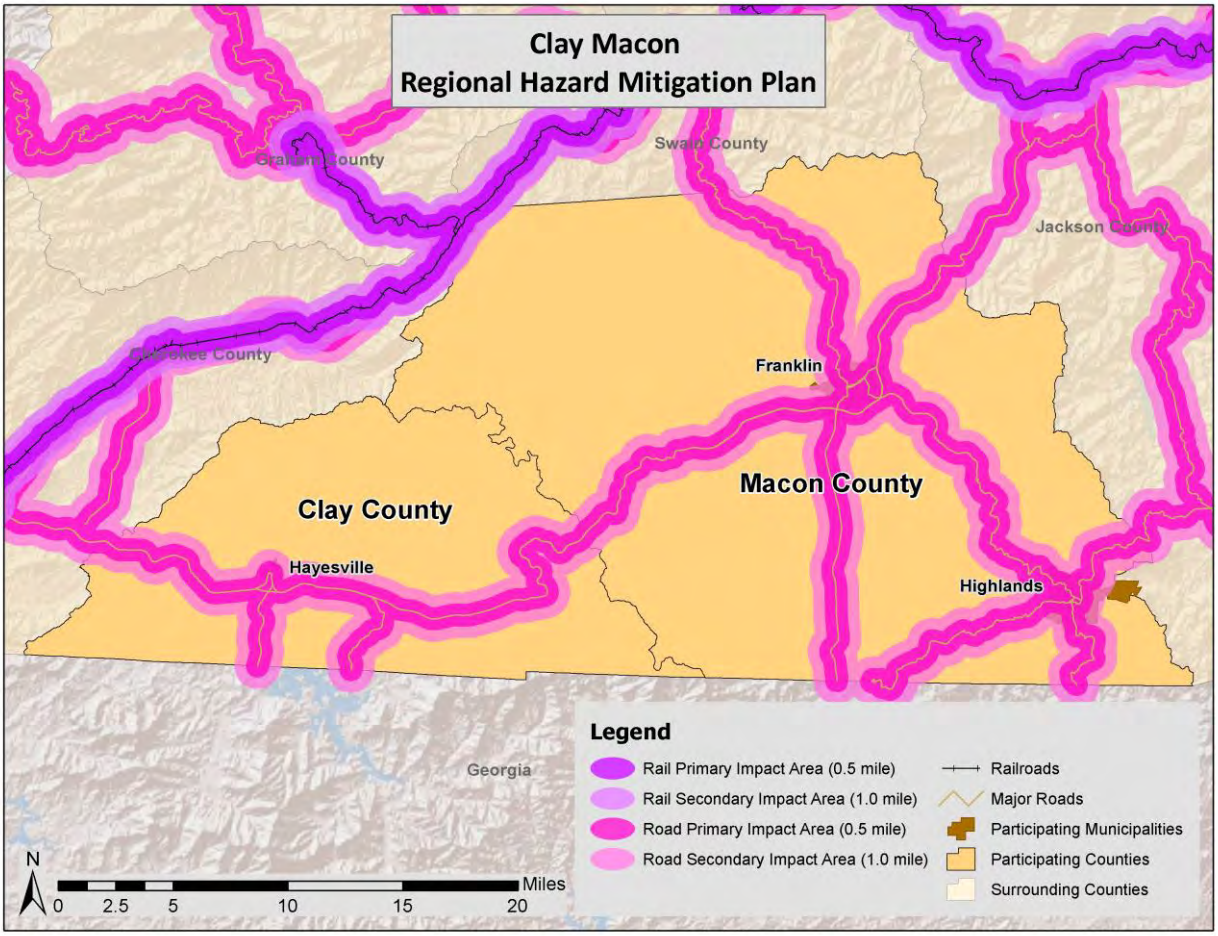


TABLE 6.12: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Clay County	**6,025**	**3,708**	**$441,176,164**	**9,337**	**5,460**	**$640,033,423**
Hayesville	251	240	$23,002,067	256	250	$23,563,213
Unincorporated Area	5,774	3,468	$418,174,097	9,081	5,210	$616,470,210
Macon County	**18,691**	**13,123**	**$2,966,623,380**	**27,690**	**18,729**	**$4,108,209,090**
Franklin	2,225	1,528	$400,103,980	2,492	2,217	$438,153,440
Highlands	2,556	1,973	$778,991,990	2,831	1,709	$896,298,360
Unincorporated Area	13,910	9,622	$1,787,527,410	22,367	14,803	$2,773,757,290
CLAY MACON REGION TOTAL	**24,716**	**16,831**	**$3,407,799,544**	**37,027**	**24,189**	**$4,748,242,513**

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

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Clay County	**16,920**	**9,365**	**$996,548,265**	**16,920**	**9,365**	**$996,548,265**
Hayesville	256	250	$23,563,213	256	250	$23,563,213
Unincorporated Area	16,664	9,115	$972,985,052	16,664	9,115	$972,985,052
Macon County	**91**	**83**	**$7,903,630**	**168**	**90**	**$9,606,510**
Franklin	0	0	$0	0	0	$0
Highlands	0	0	$0	0	0	$0
Unincorporated Area	91	83	$7,903,630	168	90	$9,606,510
CLAY MACON REGION TOTAL	**17,011**	**9,448**	**$1,004,451,895**	**17,088**	**9,455**	**$1,006,154,775**

Social Vulnerability

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

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are eight facilities located in a HAZMAT risk zone. All the identified facilities are located in Macon County, with five facilities located in the primary impact area including four government facilities and one school. Additionally, the secondary, 1.0-mile zone includes one community building and two landfill/convenience centers. A list of specific critical facilities and their associated risk can be found in **Table 6.16** at the end of this section.

Mobile Analysis:
The critical facility analysis for road and railroad transportation corridors revealed that there are 83 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and no critical facilities located in the railroad HAZMAT buffer areas. The 1.0-mile road buffer area (worst case scenario modeled) includes the following critical facilities in Macon County: 4 community buildings, 2 EMS stations, 1 EOC, 2 fire stations, 39 government facilities, 12 landfill/convenience centers, 2 medical care facilities, 2 police stations, and 10 schools. In Clay County, there are 3 fire stations, 1 EMS station, 1 EOC, 1 police station, and 3 schools in the 1.0-mile road buffer area. It should be noted that many of the facilities located in the buffer areas for road are also located in the buffer areas for the fixed site analysis. A list of specific critical facilities and their associated risk can be found in **Table 6.16** at the end of this section.

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

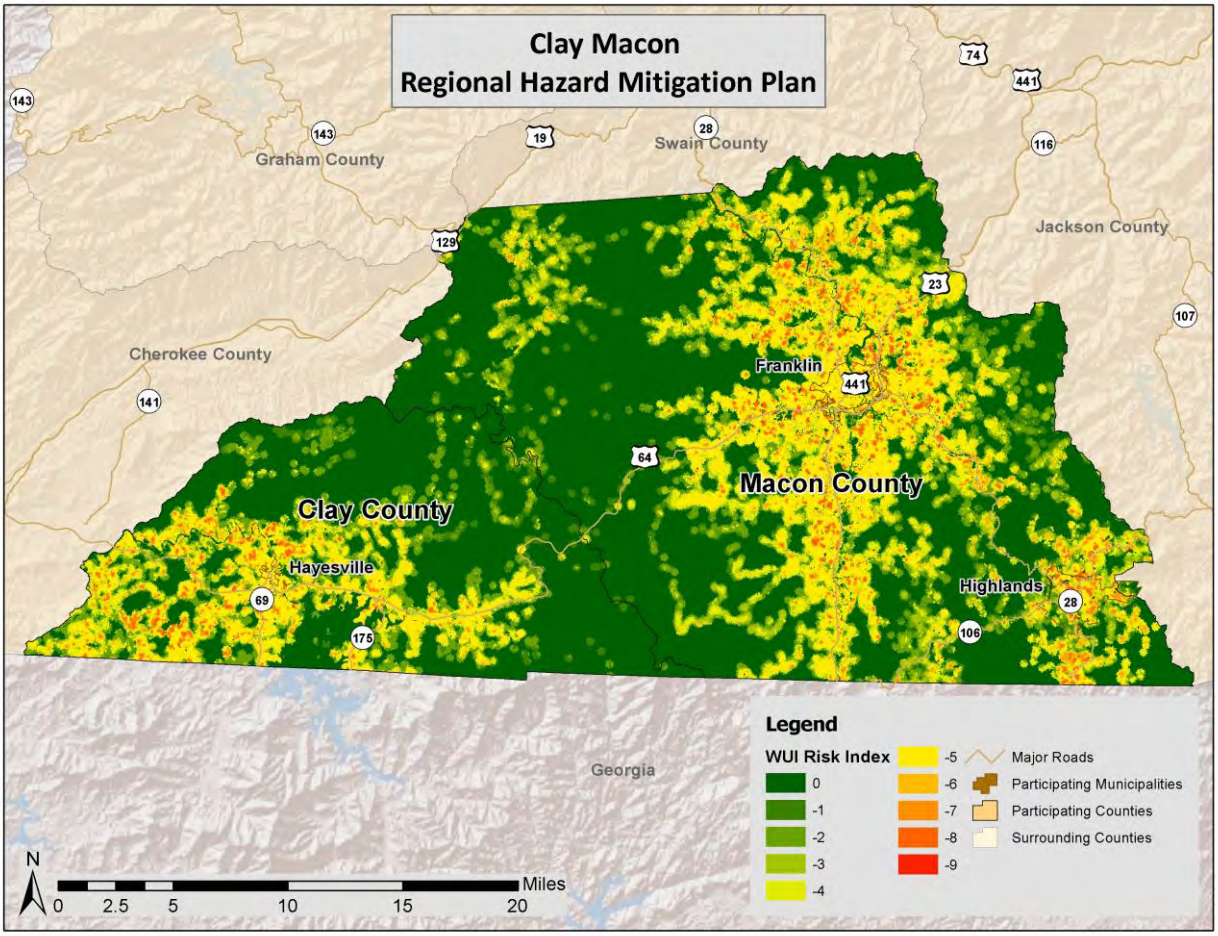
6.5.6 Wildfire

Although historical evidence indicates that the Clay Macon Region is susceptible to wildfire events, there are few reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible, though it should be noted that a single event could result in significant damages throughout the region.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure 6.7** shows the Wildland Urban Interface Risk Index (WUIRI) data which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the Wildland Urban Interface and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to -9 with lower values being most severe (as noted previously, this is only a measure of relative risk). **Figure 6.8** shows the areas of analysis where any grid cell is less than -5. Areas with a value below -5 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

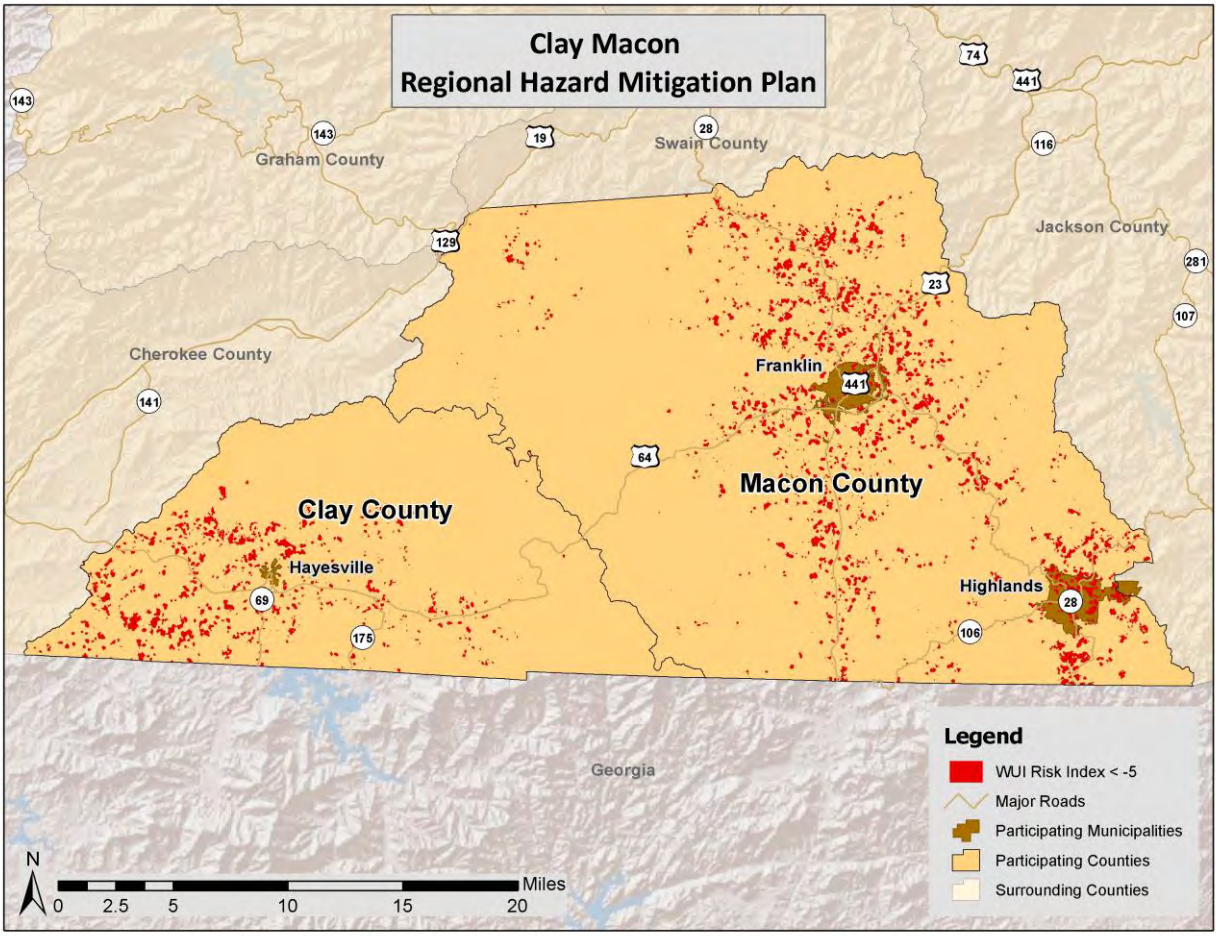
Table 6.14 shows the results of the analysis.

FIGURE 6.7: WUI RISK INDEX AREAS IN THE CLAY MACON REGION



Source: Southern Wildfire Risk Assessment Data

FIGURE 6.8: WILDFIRE RISK AREAS IN THE CLAY MACON REGION



Source: Southern Wildfire Risk Assessment Data

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

	HIGH WILDFIRE RISK AREA		
Location	**Approx. Number of Parcels**	**Approx. Number of Buildings**	**Approx. Improved Value**
Clay County	**4,508**	**1,393**	**$279,466,068**
Hayesville	7	6	$289,584
Unincorporated Area	4501	1387	$279,176,484
Macon County	**11,749**	**4,415**	**$1,627,108,640**
Franklin	388	242	$89,193,200
Highlands	1,124	489	$332,958,450
Unincorporated Area	10,237	3,684	$1,204,956,990
CLAY MACON REGION TOTAL	**16,257**	**5,808**	**$1,906,574,708**

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire Clay Macon Region. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are eight facilities located in the wildfire areas of concern. All of these facilities are located in Macon County including 3 government facilities, 3 landfill/convenience centers, 1 police station, and 1 medical care facility. It should be noted, however, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table 6.16** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in the Clay Macon Region.

6.6 CONCLUSIONS ON HAZARD VULNERABILITY

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

- Improving our understanding of the risk associated with the natural hazards in the Clay Macon 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 Clay Macon 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 Clay Macon Region. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to the Clay Macon counties.

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

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

Table 6.15 presents a summary of annualized loss for each hazard in the Clay Macon Region. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

TABLE 6.15: ANNUALIZED LOSS FOR THE CLAY MACON REGION

Event	Clay County	Macon County	Region Total
Atmospheric Hazards			
Drought	Negligible	Negligible	Negligible
Extreme Heat	Negligible	Negligible	Negligible
Hailstorm	$1,103	$221	$1,323
Hurricane & Tropical Storm	$9,000	$40,000	$49,000
Lightning	Negligible	$138,194	$138,194
Severe Thunderstorm / High Wind	$22,670	$49,911	$72,581
Tornado	$10,785	$27,797	$38,582
Winter Storm & Freeze	Negligible	Negligible	Negligible
Geologic Hazards			
Earthquake	$40,000	$177,000	$217,000
Landslide	Negligible	$202,636	$202,636
Hydrologic Hazards			
Dam Failure	Negligible	Negligible	Negligible
Erosion	Negligible	Negligible	Negligible
Flood	$77,134	$290,279	$367,413
Other Hazards			
HAZMAT Incident	Negligible	$615	$615
Wildfire	Negligible	Negligible	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme heat, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.16** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE 6.16: AT-RISK CRITICAL FACILITIES IN THE CLAY MACON REGION

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
CLAY COUNTY																				
Clay County EMS / Dispatch	EMS Station	X	X	X	X	X	X	X	X		X					X	X			
Clay County EOC	EOC	X	X	X	X	X	X	X	X		X					X	X			
Brasstown Fire Station	Fire Station	X	X	X	X	X	X	X	X	X		X			X					
Elf Fire Station	Fire Station	X	X	X	X	X	X	X	X		X					X	X			
Fires Creek Fire Station	Fire Station	X	X	X	X	X	X	X	X	X										
Hayesville Central Fire Station	Fire Station	X	X	X	X	X	X	X	X		X					X	X			
Shooting Creek Fire Station	Fire Station	X	X	X	X	X	X	X	X		X				X	X	X			
Tusquitte Fire Station	Fire Station	X	X	X	X	X	X	X	X		X				X					
Warne Fire Station	Fire Station	X	X	X	X	X	X	X	X	X					X					
Clay County Sherriff Department	Police Station	X	X	X	X	X	X	X	X		X				X	X	X			
Hayesville Elementary	School	X	X	X	X	X	X	X	X							X	X			
Hayesville High	School	X	X	X	X	X	X	X	X							X	X			
Hayesville Middle	School	X	X	X	X	X	X	X	X							X	X			
MACON COUNTY																				
Clarks Chapel Community Center	Community Building	X	X	X	X	X	X	X	X	X										
Macon County Rec Park	Community Building	X	X	X	X	X	X	X	X	X						X	X			
Carson Community Center	Community Building	X	X	X	X	X	X	X	X	X					X	X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Holly Springs Community Center	Community Building	X	X	X	X	X	X	X	X	X										
Pine Grove Community Center/Pine Grove School	Community Building	X	X	X	X	X	X	X	X		X					X	X			
Scaly Mtn Community Center	Community Building	X	X	X	X	X	X	X	X		X					X	X			
Upper Cartoogechaye Community Ctr/Gillespie Chapel	Community Building	X	X	X	X	X	X	X	X	X										
EMS/911 Dispatch	EMS Station	X	X	X	X	X	X	X	X	X						X	X			
Future EMS Base	EMS Station	X	X	X	X	X	X	X	X	X						X	X			
Nantahala EMS Base	EMS Station	X	X	X	X	X	X	X	X	X										
Macon County EOC	EOC	X	X	X	X	X	X	X	X	X						X	X			
Cowee Fire Dept.	Fire Station	X	X	X	X	X	X	X	X	X										
Cullasaja Gorge Fire Dept.	Fire Station	X	X	X	X	X	X	X	X	X						X	X			
Otto Fire Dept.	Fire Station	X	X	X	X	X	X	X	X		X					X	X			
Airport	Government Facility	X	X	X	X	X	X	X	X	X										
Animal Control	Government Facility	X	X	X	X	X	X	X	X	X							X			
Annex	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Buck Creek Park	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Chamber of Commerce	Government Facility	X	X	X	X	X	X	X	X	X						X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Cliffside Lake Rec Area	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Courthouse	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Dirty John Shooting Range	Government Facility	X	X	X	X	X	X	X	X	X										
Driving Range	Government Facility	X	X	X	X	X	X	X	X	X		X		X	X	X	X			
Driving Range	Government Facility	X	X	X	X	X	X	X	X	X				X	X	X	X			
Enviromental Resource Center	Government Facility	X	X	X	X	X	X	X	X	X							X			
Health Dept./Building Insp.	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Highlands Library	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Highlands Post Office	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Highlands Rec. Park	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Highlands Town Hall	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Humane Society	Government Facility	X	X	X	X	X	X	X	X	X						X	X			X
Incubator Building	Government Facility	X	X	X	X	X	X	X	X	X				X	X	X	X			
Industrial Park	Government Facility	X	X	X	X	X	X	X	X	X		X		X	X	X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Landfill Office	Government Facility	X	X	X	X	X	X	X	X	X							X			
Library	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Macon County Fairgrounds	Government Facility	X	X	X	X	X	X	X	X	X			X			X	X			
Macon County Garage	Government Facility	X	X	X	X	X	X	X	X	X							X			
Macon County Horse Club Camp	Government Facility	X	X	X	X	X	X	X	X	X										
Macon County Transit	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Macon County Veterans Memorial & Recreation Park	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Macon Housing/ Old Bus Garage	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
MCH	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
MPP	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Nantahala Rec. Park	Government Facility	X	X	X	X	X	X	X	X	X										
NC Coor. Extension	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
NC State Maintenance Dept.	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
New Town Hall	Government Facility	X	X	X	X	X	X	X	X	X						X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Old Town Hall	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Post Office	Government Facility	X	X	X	X	X	X	X	X	X						X	X			X
SCC	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
School Board	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
School Bus Garage	Government Facility	X	X	X	X	X	X	X	X	X						X	X			X
Senior Services	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Soil & Water	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Standing Indian Campground	Government Facility	X	X	X	X	X	X	X	X		X									
Vanhook Glade Campground	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Veteran's Clinic	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Wesley's Park	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Behind Garage	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X							X			
Buck Creek Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X						X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Carson Community Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X					X	X	X			
Driving Range	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X					X	X	X			
Foreman Rd.	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X					X	X			X
Highlands RD. Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X						X	X			
Highlands Soccer Field	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X					X	X			
Highlands Transfer Station	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X						X			
Holly Springs Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X										
Iotla Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X		X				X	X			X
Junaluska Rd Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X		X								

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Landfill	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X							X			
Otto Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X					X	X			X
Scaly Mountain Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X						X			
Wayah Rd Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X										
Angel Medical Center	Medical Care Facility	X	X	X	X	X	X	X	X	X						X	X			
Highlands/Cashiers Hospital	Medical Care Facility	X	X	X	X	X	X	X	X		X					X	X			X
Franklin Police	Police Station	X	X	X	X	X	X	X	X	X		X				X	X			
Sheriff's Office/Jail	Police Station	X	X	X	X	X	X	X	X	X						X	X			X
Cartoogechaye Elem.	School	X	X	X	X	X	X	X	X	X				X	X	X	X			
Cowee School	School	X	X	X	X	X	X	X	X	X						X	X			
Cullasaja Elem.	School	X	X	X	X	X	X	X	X	X						X	X			
East Franklin Elem	School	X	X	X	X	X	X	X	X	X						X	X			
Franklin High	School	X	X	X	X	X	X	X	X	X						X	X			
Highlands School	School	X	X	X	X	X	X	X	X		X					X	X			
Iotla Elem.	School	X	X	X	X	X	X	X	X	X							X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Macon 5-6 School	School	X	X	X	X	X	X	X	X	X						X	X			
Macon Middle School	School	X	X	X	X	X	X	X	X	X							X			
Nantahala School	School	X	X	X	X	X	X	X	X	X										
South Macon Elem.	School	X	X	X	X	X	X	X	X	X							X			

SECTION 7
CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of the communities in the Clay Macon Region to implement hazard mitigation activities. It consists of the following four subsections:

7.1 WHAT IS A CAPABILITY ASSESSMENT

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects.[1] As in any planning process, it is important to try to establish which goals, objectives, and/or actions are feasible based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical, and likely to be implemented over time, given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, or programs already in place and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for the Clay Macon Region serves as a critical planning step and an integral part of the foundation for designing an effective hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. It not only helps establish the goals and objectives for the region to pursue under this Plan, but it also ensures that those goals and objectives are realistically achievable under given local conditions.

[1] While the Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step in developing a mitigation strategy that meets the needs of the region while taking into account their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c)(3)).

7.2 CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities within the Clay Macon counties, a detailed Capability Assessment Survey was completed for each of the participating jurisdictions based on the information found in existing hazard mitigation plans and local government websites. The survey questionnaire compiled information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the region's ability to implement hazard mitigation actions. Other indicators included information related to the communities' fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. The current political climate, an important consideration for any local planning or decision making process, was also evaluated with respect to hazard mitigation.

At a minimum, survey results provide an extensive inventory of existing local plans, ordinances, programs, and resources that are in place or under development in addition to their overall effect on hazard loss reduction. However, the survey instrument can also serve to identify gaps, weaknesses, or conflicts that counties and local jurisdictions can recast as opportunities for specific actions to be proposed as part of the hazard mitigation strategy.

The information collected in the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology was then applied to quantify each jurisdiction's overall capability.[2] According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation.

Using this scoring methodology, a total score and an overall capability rating of "high," "moderate," or "limited" could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. The results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

7.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the relevant capacity of the jurisdictions in the Clay Macon Region to implement hazard mitigation activities. All information is based upon the review of existing hazard mitigation plans and local government websites through the Capability Assessment Survey and input provided by local government officials during meetings of the Clay Macon Regional Hazard Mitigation Planning Team.

7.3.1 Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning; the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built; as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives

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

generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools and programs that are in place or under development for the jurisdictions in the Clay Macon Region along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses, or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Table 7.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the jurisdictions in the Clay Macon Region. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Clay Macon Regional Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning / Regulatory Tool	CLAY COUNTY	Hayesville	MACON COUNTY	Franklin	Highlands
Hazard Mitigation Plan	✓	✓	✓	✓	✓
Comprehensive Land Use Plan	✓	✓	✓	✓	✓
Floodplain Management Plan	✓	✓			
Open Space Management Plan (Parks & Rec/Greenway Plan)	✓	✓	✓		✓
Stormwater Management Plan/Ordinance				✓	✓
Natural Resource Protection Plan					
Flood Response Plan					
Emergency Operations Plan	✓	✓	✓	✓	✓
Continuity of Operations Plan			✓	✓	✓
Evacuation Plan					
Disaster Recovery Plan					
Capital Improvements Plan	✓	✓	✓	✓	✓
Economic Development Plan			✓		
Historic Preservation Plan					

Planning / Regulatory Tool	CLAY COUNTY	Hayesville	MACON COUNTY	Franklin	Highlands
Flood Damage Prevention Ordinance	✓	✓	✓	✓	✓
Zoning Ordinance		✓		✓	✓
Subdivision Ordinance	✓	✓	✓	✓	✓
Unified Development Ordinance				✓	✓
Post-Disaster Redevelopment Ordinance					
Building Code	✓	✓	✓	✓	✓
Fire Code	✓	✓	✓	✓	✓
National Flood Insurance Program (NFIP)	✓	✓	✓		✓
NFIP Community Rating System					

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

7.3.2 Emergency Management

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

FIGURE 7.1: THE FOUR PHASES OF EMERGENCY MANAGEMENT

Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As a result, the Capability Assessment Survey asked several questions across a range of emergency management plans in order to assess the Clay Macon 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 a hazard mitigation plan. Each participating municipality was included in their respective county's plan.

Disaster Recovery Plan: A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

- None of the participating jurisdictions have adopted a disaster recovery plan. The jurisdictions should consider developing a plan to guide the recovery and reconstruction process following a disaster.

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

- The Clay County Emergency Management Office maintains emergency operational guidelines which define the responsibility of every person and organization involved in the response and recovery of an emergency in the county.
- The Macon County Emergency Management Office maintains a countywide emergency operations plan for the county and its incorporated 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.

- None of the participating jurisdictions have adopted a continuity of operations plan. However, Macon County addresses continuity of operations in its emergency operations plan.

7.3.3 General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, 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 Clay Macon 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.

- Clay County has adopted a comprehensive plan intended to help county government leaders and citizens guide short- and long-range change, growth, and development. This plan includes the unincorporated area of Clay County as well as the incorporated Town of Hayesville and its extraterritorial jurisdiction.
- Macon County, the Town of Franklin, and the Town of Highlands have each adopted a comprehensive land use plan. Each jurisdiction's plan is intended to help guide short- and long-range change, growth, and development.

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.

- Clay County included a 20-year capital improvement plan in the county Water and Sewer System Master Plan update that summarizes the capital improvements recommended in the plan.
- In Macon County, each department in the county has developed a 6-year capital improvements plan. The Town of Franklin has also implemented a 20-year water capital improvement plan and the Town of Highlands has developed a wastewater collection system capital improvement plan.

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.

- Clay County has not adopted a zoning ordinance in the unincorporated areas of the county. However, the Town of Hayesville has adopted a zoning ordinance.
- Macon County does not have a zoning ordinance. However, the Towns of Franklin and Highlands include zoning regulations as part of their local unified development 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.

- Clay County and the Town of Hayesville have each adopted and enforce subdivision regulations.
- Macon County has adopted subdivision regulations. The Towns of Franklin and Highlands include subdivision regulations as part of their local unified development 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.
- Clay County provides building code enforcement for the unincorporated county as well as the Town of Hayesville.
- Macon County enforces the building code and performs inspections in the county and both the Towns of Franklin and Highlands.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services

Office, Inc. (ISO).[3] In North Carolina, the North Carolina Department of Insurance assesses the building codes in effect in a particular community and how the community enforces its building codes *with special emphasis on mitigation of losses from natural hazards*. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The concept is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses and, as a result, should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education as well as the number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10 with a BCEGS grade of 1 representing exemplary commitment to building code enforcement and a grade of 10 indicating less than minimum recognized protection.

7.3.4 Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the *National Flood Insurance Program* (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

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

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

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

[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.

TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
CLAY COUNTY†	04/01/99	05/04/09	125	$31,311,700	13	$74,129
Hayesville	12/11/08	05/04/09	6	$871,500	0	$0
MACON COUNTY†	06/01/01	04/19/10	167	$41,359,100	28	$872,997
Franklin*	--	--	--	--	--	--
Highlands	10/28/09	04/19/10	26	$7,367,000	0	$0

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
Source: NFIP Community Status information as of 12/9/14; NFIP claims and policy information as of 9/30/14

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

The Town of Franklin does not participate in the NFIP due to lack of available funding and political support. The community was suspended from the program in 1978.

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%

CRS Class	Premium Reduction
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.

- None of the jurisdictions currently participate in the CRS. Participation in the CRS program should be considered as a mitigation action by the counties and other municipalities. The program would be most beneficial to Macon County and Clay County, which have 167 and 125 NFIP policies, respectively.

Flood Damage Prevention Ordinance: A flood damage prevention ordinance establishes minimum building standards in the floodplain with the intent to minimize public and private losses due to flood conditions.

- All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. All counties and municipalities participating in this hazard mitigation plan, with the exception of the Town of Franklin, also participate in the NFIP and they all have adopted flood damage prevention regulations.
- Although the Town of Franklin does not participate in the NFIP, the town has adopted a floodways ordinance which regulates artificial obstructions in floodways.

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.

- Clay County has a floodplain management plan that contains provisions for elevating structures in the floodplain and structural measures like rebuilding and retrofitting but as only Zone A flood maps are available, the requirements are not specific.

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.

- Clay County has a system-wide comprehensive parks and recreation plan that describes existing facilities, rationale for the decisions in improvements, maintenance, and acquisition.
- Macon County has adopted a parks and recreation master plan and the Town of Highlands has adopted a greenway 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.

- None of the participating jurisdictions have stormwater management plans in place; however, the Towns of Franklin and Highlands have adopted stormwater management regulations through their respective unified development ordinances. Clay County, the Town of Hayesville, and Macon County also include some regulations related to stormwater management in various local ordinances.

7.3.5 Administrative and Technical Capability

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

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

Table 7.4 provides a summary of the capability assessment results for the Clay Macon 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	CLAY COUNTY	Hayesville	MACON COUNTY	Franklin	Highlands
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	✓	✓	✓	✓	✓

Staff / Personnel Resource	CLAY COUNTY	Hayesville	MACON COUNTY	Franklin	Highlands
Floodplain Manager	✓	✓	✓		✓
Land Surveyors					
Scientists familiar with the hazards of the community	✓	✓	✓	✓	✓
Staff with education or expertise to assess the community's vulnerability to hazards	✓	✓	✓	✓	✓
Personnel skilled in GIS and/or Hazus	✓	✓	✓	✓	✓
Resource development staff or grant writers					

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

7.3.6 Fiscal Capability

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

The Capability Assessment Survey was used to capture information on the region's fiscal capability through the identification of locally available financial resources.

Table 7.5 provides a summary of the results for the Clay Macon 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	CLAY COUNTY	Hayesville	MACON COUNTY	Franklin	Highlands
Capital Improvement Programming	✓	✓	✓	✓	✓
Community Development Block Grants (CDBG)	✓	✓	✓	✓	✓
Special Purpose Taxes (or taxing districts)	✓	✓	✓	✓	✓
Gas / Electric Utility Fees					
Water / Sewer Fees					
Stormwater Utility Fees					
Development Impact Fees					
General Obligation, Revenue, and/or Special Tax Bonds					
Partnering Arrangements or Intergovernmental Agreements	✓		✓	✓	✓
Other: HMGP, FMAP, PDM, and other federal, state, local and non-governmental funding sources, etc.	✓	✓	✓	✓	✓

7.3.7 Political Capability

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

The Capability Assessment Survey was used to capture information on political capability of the Clay Macon Region. Previous county-level hazard mitigation plans were reviewed for general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (i.e., building codes, floodplain management, etc.).

- The previous county hazard mitigation plans identified existing ordinances that address natural hazards or are related to hazard mitigation such as emergency management, flood damage prevention, watershed protection, soil erosion and sedimentation control, zoning, and subdivision.

- As with any local jurisdiction, the receptivity of the citizens to new policies and programs is directly related to the immediate impact to the individual. With this in mind, any proposed initiatives must be preceded by public education and involvement. As citizens become more aware of the rationale for proposed changes, it is more likely that the will show support. Over the past few years, Hayesville has made several ordinance revisions. In 2002, a system-wide comprehensive parks and recreation plan was adopted and a zoning ordinance was implemented in 2000. In Clay County, as with many municipalities, major changes will likely be met with resistance. However, incremental changes stand a better chance of success over the long term. In terms of changes to hazard mitigation there are numerous opportunities for Clay County, however, public education and progressive steps are essential for the success of any new initiatives. If the public supportive of proposed changes, the elected officials who are responsible for adopting them are more likely to show their support. Building a disaster resistant community depends primarily on involving the pubic and achieving participation. As required by FEMA for the local hazard mitigation plan, public participation is a must and, to make it true, the political climate out to be suitable.
- Macon County has completed numerous projects across the county, mainly targeting stormwater flooding hazards. These include channel excavations and improvements to local creeks and drainage ditches, roadway and culvert improvements, and the creation of detention basins. Additionally, the county is currently a participant in the NFIP and has adopted the required flood damage prevention ordinance. Macon County has also adopted Watershed Protection, Soil Erosion and Sedimentation Control, and Subdivision Ordinances. All of this demonstrates to some extent both favorable political support and willingness to adopted hazard mitigation efforts in an active manner.

7.4 CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to results of the Capability Assessment Survey. This methodology, further described in Appendix B, attempts to assess the overall level of capability of the Clay Macon Region to implement hazard mitigation actions.

The overall capability to implement hazard mitigation actions varies among the participating jurisdictions. For planning and regulatory capability, all of the jurisdictions are in the moderate range. There is 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 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 32.2, which falls into the moderate capability ranking.

TABLE 7.6: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
CLAY COUNTY	36	Moderate
Hayesville	24	Moderate
MACON COUNTY	38	Moderate
Franklin	28	Moderate
Highlands	35	Moderate

As previously discussed, one of the reasons for conducting a Capability Assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified for each jurisdiction in the tables found throughout this section. The participating jurisdictions used the Capability Assessment as part of the basis for the Mitigation Actions that are identified in Section 9; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their Mitigation Actions.

7.4.1 Linking the Capability Assessment with the Risk Assessment and the Mitigation Strategy

The conclusions of the Risk Assessment and Capability Assessment serve as the foundation for the development of a meaningful hazard mitigation strategy. During the process of identifying specific mitigation actions to pursue, the Regional Hazard Mitigation Planning Team considered not only each jurisdiction's level of hazard risk, but also their existing capability to minimize or eliminate that risk.

SECTION 8
MITIGATION STRATEGY

This section of the Plan provides the blueprint for the participating jurisdictions in the Clay Macon Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Clay Macon Regional Hazard Mitigation Planning Team and the findings and conclusions of the *Capability Assessment* and *Risk Assessment*. It consists of the following five subsections:

8.1 INTRODUCTION

The intent of the Mitigation Strategy is to provide the Clay Macon 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 Clay Macon Region (provided separately in Section 9: *Mitigation Action Plan*). Each county and participating jurisdiction has its own Mitigation Action Plan (MAP) that reflects the needs and concerns of that jurisdiction. The MAP represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

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

In preparing each Mitigation Action Plan for the Clay Macon Region, officials considered the overall hazard risk and capability to mitigate the effects of hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted mitigation goals and unique needs of the community.

8.1.1 Mitigation Action Prioritization

In the previous versions of the participating jurisdictions' hazard mitigation plans, not all actions were prioritized. In addition, there needed to be consistency among the counties and jurisdiction regarding how they prioritized their actions. Therefore, for the 2015 Clay Macon Regional plan, the Regional Hazard Mitigation Planning Team members were tasked with establishing a priority for each action at the second Planning Team meeting. Prioritization of the proposed mitigation actions was based on the following six factors:

- Effect on overall risk to life and property
- Ease of implementation
- Political and community support
- A general economic cost/benefit review[1]
- Funding availability
- Continued compliance with the NFIP

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

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

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

8.2 MITIGATION GOALS

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

The primary goal of all local governments is to promote the public health, safety, and welfare of its citizens. In keeping with this standard, the Cay Macon counties and the participating municipalities have developed goal statements for local hazard mitigation planning in the region. In developing these goals, the previous two county hazard mitigation plans were reviewed to determine areas of consistency. The project consultant reviewed the goals from each of the four existing plans that were combined to form this regional plan. Many of the goals were similar and regional goals were formulated based on commonalities found between the goals in each plan. These proposed regional goals and their corresponding goals or objectives from the previous plans are presented in **Table 8.1**.

The proposed regional goals were presented, reviewed, voted on, and accepted by the Planning Team at the second Regional Hazard Mitigation Planning Team meeting. This process of combining goals from the previous plans served to highlight the planning process that had occurred in each county prior to joining this regional planning effort. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. The Clay Macon Regional Mitigation Goals are presented in **Table 8.2**. Consistent implementation of actions over time will ensure that community goals are achieved.

TABLE 8.1: PROPOSED MITIGATION GOALS

	Proposed Goal	Former Plan Reference	
		Clay County	Macon County
Goal #1	Prevent or lessen the negative impacts caused by natural disasters and/or technological and manmade incidents.	Goal 1	Goal 1
Goal #2	Increase the response capability in the region, especially to unexpected emergencies that have never experienced before.	Goal 2	
Goal #3	Protect public and private property and other assets from the damage that results from hazard events.	Goal 3	Goal 2

	Proposed Goal	Former Plan Reference	
		Clay County	Macon County
Goal #4	Increase public awareness of natural and technological/manmade hazards.	Goal 4	
Goal #5	Reduce the impact of hazards by preserving or restoring the function of natural systems.		Goal 3
Goal #6	Lessen the impact of hazards by responsibly modifying the environment, hardening existing or proposed structures, and implementing projects that have a positive effect on reducing the negative impact of hazards.		Goal 4, Goal 5

TABLE 8.2: CLAY MACON REGIONAL MITIGATION GOALS

	Goal
Goal #1	Prevent or lessen the negative impacts caused by natural disasters and/or technological and manmade incidents.
Goal #2	Increase the response capability in the region, especially to unexpected emergencies that have never experienced before.
Goal #3	Protect public and private property and other assets from the damage that results from hazard events.
Goal #4	Increase public awareness of natural and technological/manmade hazards.
Goal #5	Reduce the impact of hazards by preserving or restoring the function of natural systems.
Goal #6	Lessen the impact of hazards by responsibly modifying the environment, hardening existing or proposed structures, and implementing projects that have a positive effect on reducing the negative impact of hazards.

8.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

44 CFR Requirement
44 CFR Part 201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating the Mitigation Strategy for the Clay Macon 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 Clay Macon Regional Hazard Mitigation Planning Team meetings. In general, all activities considered by the Regional Hazard Mitigation Planning Team can be classified under one of the following six broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

8.3.1 Prevention

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

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

8.3.2 Property Protection

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

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

8.3.3 Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection
- Watershed management
- Riparian buffers
- Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Erosion and sediment control

- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

8.3.4 Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams / levees / dikes / floodwalls
- Diversions / detention / retention
- Channel modification
- Storm sewers

8.3.5 Emergency Services

Although not typically considered a "mitigation" technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

8.3.6 Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard expositions

8.4 SELECTION OF MITIGATION TECHNIQUES FOR THE CLAY MACON REGION

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

8.5 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous Clay Macon Region county plans were evaluated to determine their 2015 implementation status. Updates on the implementation status of each action are provided. The mitigation actions provided in Section 9: *Mitigation Action Plan* include the mitigation actions from the previous plans as well as any new mitigation actions proposed through the 2015 planning process.

SECTION 9
MITIGATION ACTION PLAN

This section includes the listing of the mitigation actions proposed by the participating jurisdictions in the Clay Macon Region. It consists of the following two subsections:

- 9.1 Overview
- 9.2 Mitigation Action Plans

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44 CFR Requirement
44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

9.1 OVERVIEW

As described in the previous section, the Mitigation Action Plan, or MAP, provides a functional plan of action for each jurisdiction. It is designed to achieve the mitigation goals established in Section 8: *Mitigation Strategy* and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: *Plan Maintenance*.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk for the Clay Macon Region. Each action is listed in the MAP in conjunction with background information such as hazard(s) addressed and relative priority. Other information provided in the MAP includes potential funding sources to implement the action should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out as well as a timeframe for its completion. These implementation mechanisms ensure that the Clay Macon 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 (2015)—Indication of completion, progress, deferment, or no change since the previous plan. If the action is new, that will be noted here. (Many of the previous actions were not clear in terms of purpose, and during this update, revisions were made to make their intent more specific. However, the actions themselves still correlate to the previous actions and have been marked as "reworded and deferred.")

9.2 MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in 5 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
Clay County	**9:3**	**37**
Hayesville	9:11	37
Macon County	**9:19**	**18**
Franklin	9:25	19
Highlands	9:29	12

Clay County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Implement projects that promote Sustainable Development and Smart Growth	All	Moderate	Clay County Board of Commissioners	Local	2020	Reworded and deferred. Although the county has worked towards implementing projects that support sustainable development and Smart Growth, there will continue to be a need to focus on these types of projects in the future so this action will remain in the plan.
P-2	Enforce Zoning and Subdivision regulations that reduce risk	All	High	Clay County Planning	Local	2020	Reworded and deferred. The county has attempted to enforce zoning and subdivision regulations that drive growth away from high hazard areas. However, these regulations require continual maintenance to ensure property is not put at risk.
P-3	Encourage Open Space Preservation throughout the county	All	Moderate	Clay County Planning	Local	2020	Reworded and deferred. The county has recognized the need to promote open space preservation and has many areas that are designated as open space including parks and forest land. Looking forward, the county will continue to identify areas that can be preserved as open space that will help reduce risk to hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-4	Enforce Floodplain Management Regulations	Flood	High	Clay County Planning	Local	2020	Reworded and deferred. The county enforces floodplain management regulations in accordance with the NFIP and will continue to enforce these regulations going forward so this action will remain in place.
P-5	Develop a Transportation and Evacuation Plan	All	Moderate	Clay County Transportation; Clay County EMS	Local	2020	Reworded and deferred. Although an official transportation and evacuation plan has not been developed, the county has made strides to define evacuation routes and identify major transportation corridors
P-6	Set Government Expenditure Limitation in High Hazard Areas	All	High	Clay County Board of Commissioners; Clay County Planning	Local	2020	Reworded and deferred. In the past, the county has limited expenditures in high hazard areas, but as the county continues to grow and development takes place, it will be important for the county to continue to work on limiting expenditures on construction in known high risk areas.
P-7	Create a Business and Industry Plan to promote disaster planning	All	High	Clay County Planning; Clay County Chamber of Commerce	Local	2020	Reworded and deferred. County officials have a strong relationship with businesses and industry and have worked to help business leaders with becoming safer and better prepared for disasters. Nevertheless, there is still significant work to be done to prepare all local businesses for a major disaster.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-8	Develop an Inclement Weather Plan	All	Moderate	Clay County Planning; Clay County Emergency Management; Clay County Public Works	Local	2020	Reworded and deferred. Although the county has plans in place for what to do in the event of inclement weather, developing an official inclement weather plan has not taken place yet.
P-9	Update Comprehensive Plan	All	High	Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	2020	Reworded and deferred. The county has adopted a comprehensive plan that runs through 2021. This plan will likely need to be updated roughly within the next hazard mitigation plan update cycle.
P-10	Develop Stormwater Management Plan	Flood	Moderate	NC DENR; NRCS	Federal, State, Private	2020	Reworded and deferred. In conjunction with the state, the county has implemented some stormwater management planning and will continue to work on improving stormwater management going forward.
P-11	Develop a Capital Improvement Plan (CIP) to guide the major capital expenditures over a given period	All	High	Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The county has implemented a number of projects that have reduced risk in the past, but the county will continue to work on including projects in the CIP in the future.
P-12	Update the Emergency Operation Guideline	All	High	Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. The county has developed an Emergency Operation Guideline for action to be taken in an emergency. This plan will likely need to be updated in the next cycle of the HMP.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-13	Smart Growth	All		Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	Deleted	Deleted. This action was combined with Action P-1 and is reflected as such.
Property Protection							
PP-1	Require storm shelters in Mobile Home Parks	All	Low	Clay County Planning; Clay County Board of Commissioners	Local	2020	Reworded and deferred. The county has encouraged the installation of storm shelters in Mobile Home Parks, but there is no regulation requiring these. The county will continue to evaluate implementing such regulations
PP-2	Mandate Tie-downs for mobile homes and propane tanks	All	Low	Clay County Planning; Clay County Board of Commissioners	Local	2020	Reworded and deferred. The county has implemented tie-down mandates to prevent tanks and mobile homes from being lifted by floodwaters or winds and becoming ballistic hazards
PP-3	Update Development Regulations	All	Moderate	Clay County Planning	Local	2020	Reworded and deferred. The county has updated its development regulations to help guide future development away from high hazard areas, but additional updates may be required to keep regulations up to date and appropriate.
PP-4	Implement Critical Facility Protection	All	High	Clay County Engineering; Clay County EMS; Utility Companies; Hospital; NCDOT	Federal, State, Private	2020	Reworded and deferred. The county has taken steps to protect critical facilities but there are many additional steps that could be taken to reduce potential risk many critical facilities in the county.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-5	Utilize Acquisition to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	Reworded and deferred. The county has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the county would look into acquisition of homes.
PP-6	Utilize Relocation to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	Reworded and deferred. The county has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the county would look into relocation of homes.
PP-7	Provide advanced training to Building Inspectors	All	Moderate	Clay County Fire Department; Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The county has a strong network of building inspectors, but additional training on the most up to date techniques is constantly required.
PP-8	Utilize Windproofing to protect structures	All	Moderate	Clay County Engineering; FEMA; Clay County Planning	Federal, State, Private	2020	Reworded and deferred. The county has encouraged the use of windproofing techniques in the past and will continue to try to implement these techniques into future designs and structures.
Natural Resource Protection							
NRP-1	Preserve and Expand Parks	All	High	Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	Reworded and deferred. The county has recognized the need to promote open space preservation and has many parks that are designated as open space. Looking forward, the county will continue to identify areas that can be preserved as parks/open space that will help reduce risk to hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
NRP-2	Wetland Preservation	Flood	Moderate	Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	Deferred. The county has recognized the need to preserve wetlands and their natural functions as water retainers. Looking forward, the county will continue to identify areas that can be preserved to help reduce risk to hazards.
NRP-3	Develop Natural Resource Protection Plan	All	Moderate	Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	Reworded and deferred. The county works in conjunction with the forest service on fire protection procedures, but it would like to integrate more fully into that process via a natural resource protection plan.
NRP-4	Tree Limb Removal Maintenance Plan	All	Moderate	Clay County Environment, Health & Natural Resources; Clay County Fire Department	Federal, State, Private	2020	Reworded and deferred. The county routinely clears hanging tree limbs from the right of way to prevent damage to utilities. It will continue to provide this service going forward so this action will remain in the plan.
Structural Projects							
SP-1	Raise Bridges	All	Low	Clay County Engineering; FEMA; NCDOT	Federal, State, Private	2020	Reworded and deferred. The county has not taken on any bridge raising projects on its own, but DOT has implemented such projects and the county will continue to support projects that raise bridges out of harm's way.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
SP-2	Stormwater Drain Maintenance	All	Moderate	Clay County Public Works; Clay County Environment, Health & Natural Resources	Federal, State, Private	2020	Reworded and deferred. The county routinely cleans and repairs storm drains, but a more comprehensive system of drain maintenance would be useful so the county will continue to evaluate.
Emergency Services							
ES-1	Equipment Buyout	All	Moderate	Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Local	2020	Deferred. In the past, the county has purchased equipment to help reduce risk to future disaster events. The county will continue to look into purchases of equipment that make sense especially when grants are available.
ES-2	Form Local coordinators and Communication Network	All	High	Clay County Emergency Management; Clay County Board of Commissioners	Local	2020	Reworded and deferred. The county has worked to improve communication between local coordinators to improve response in smaller communities that may not have fire/police. This coordination has been successful, but will need to be maintained and improved going forward.
ES-3	Integrate Information and Communication Technology	All	High	Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The county has made significant progress in integrating information and communication technology among all of its departments. However, this is a constantly evolving field and there will be a need to update and re-evaluate fairly consistently.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
ES-4	Use Citizens in Emergency Management Functions	All	Moderate	Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. The county has initiated several programs such as Volunteers in Police Service Program and Medical Reserve Corps. However, there will need to be additional steps taken to more fluently integrate citizens in Emergency Management functions.
ES-5	Improve Emergency Transportation	All	Moderate	Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. Although there are systems in place for emergency transportation, the county would like to develop emergency thoroughfares for medical transportation in case of a disaster.
ES-6	Mass Casualty Training	All	Moderate	Clay County Emergency Management	Federal, State, Private	2020	Deferred. The county has some experience in mass casualty incidents, but it would like to have additional trainings available to improve this capability.
Public Education and Awareness							
PEA-1	Install Disaster Warning Systems	All	High	Clay County Emergency Management; Clay County Planning	Federal, State, Local	2020	Reworded and deferred. The county has some disaster warning systems in place, but as these technologies have improved, the county has identified this as an area that needs improvement going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-2	Designate Assembly Points	All	High	Clay County Emergency Management; Clay County Planning	Local	2020	Reworded and deferred. The county has designated assembly points that can be easily reached by a number of people in a short amount of time. The county will continue to evaluate these points and make changes as necessary.
PEA-3	Implement Community Awareness Program	All	High	Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The county has implemented a community awareness program to provide outreach to citizens on potential hazards. The materials and forms of this outreach will need to be updated and evaluated going forward.
PEA-4	Establish Emergency Shelters	All	High	Clay County Planning; Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. The county has established emergency shelters in a number of locations, but would like to find ways to strengthen those facilities and improve communication to citizens of their availability during disaster events.

Town of Hayesville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Implement projects that promote Sustainable Development and Smart Growth	All	Moderate	Town of Hayesville and Clay County Board of Commissioners	Local	2020	Reworded and deferred. Although the town has worked towards implementing projects that support sustainable development and Smart Growth, there will continue to be a need to focus on these types of projects in the future so this action will remain in the plan.
P-2	Enforce Zoning and Subdivision regulations that reduce risk	All	High	Town of Hayesville and Clay County Planning	Local	2020	Reworded and deferred. The town has attempted to enforce zoning and subdivision regulations that drive growth away from high hazard areas. However, these regulations require continual maintenance to ensure property is not put at risk.
P-3	Encourage Open Space Preservation	All	Moderate	Town of Hayesville and Clay County Planning	Local	2020	Reworded and deferred. The town has recognized the need to promote open space preservation and has many areas that are designated as open space including parks and forest land. Looking forward, the town will continue to identify areas that can be preserved as open space that will help reduce risk to hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-4	Enforce Floodplain Management Regulations	Flood	High	Town of Hayesville and Clay County Planning	Local	2020	Reworded and deferred. The town enforces floodplain management regulations in accordance with the NFIP and will continue to enforce these regulations going forward so this action will remain in place.
P-5	Develop a Transportation and Evacuation Plan	All	Moderate	Town of Hayesville and Clay County Transportation; Clay Conty EMS	Local	2020	Reworded and deferred. Although an official transportation and evacuation plan has not been developed, the town has made strides to define evacuation routes and identify major transportation corridors
P-6	Set Government Expenditure Limitation in High Hazard Areas	All	High	Town of Hayesville and Clay County Board of Commissioners; Clay County Planning	Local	2020	Reworded and deferred. In the past, the town has limited expenditures in high hazard areas, but as the town continues to grow and development takes place, it will be important for the town to continue to work on limiting expenditures on construction in known high risk areas.
P-7	Create a Business and Industry Plan to promote disaster planning	All	High	Town of Hayesville and Clay County Planning; Clay County Chamber of Commerce	Local	2020	Reworded and deferred. Town officials have a strong relationship with businesses and industry and have worked to help business leaders with becoming safer and better prepared for disasters. Nevertheless, there is still significant work to be done to prepare all local businesses for a major disaster.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-8	Develop an Inclement Weather Plan	All	Moderate	Town of Hayesville and Clay County Planning; Clay County Emergency Management; Clay County Public Works	Local	2020	Reworded and deferred. Although the town has plans in place for what to do in the event of inclement weather, developing an official inclement weather plan has not taken place yet.
P-9	Update Comprehensive Plan	All	High	Town of Hayesville and Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	2020	Reworded and deferred. The town has adopted a comprehensive plan that runs through 2021. This plan will likely need to be updated roughly within the next hazard mitigation plan update cycle.
P-10	Develop Stormwater Management Plan	Flood	Moderate	NC DENR; NRCS	Federal, State, Private	2020	Reworded and deferred. In conjunction with the state, the town has implemented some stormwater management planning and will continue to work on improving stormwater management going forward.
P-11	Develop a Capital Improvement Plan (CIP) to guide the major capital expenditures over a given period	All	High	Town of Hayesville and Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The town has implemented a number of projects that have reduced risk in the past, but the town will continue to work on including projects in the CIP in the future.
P-12	Update the Emergency Operation Guideline	All	High	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. The town has developed an Emergency Operation Guideline for action to be taken in an emergency. This plan will likely need to be updated in the next cycle of the HMP.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-13	Smart Growth	All		Town of Hayesville and Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	Deleted	Deleted. This action was combined with Action P-1 and is reflected as such.
Property Protection							
PP-1	Require storm shelters in Mobile Home Parks	All	Low	Town of Hayesville and Clay County Planning; Clay County Board of Commissioners	Local	2020	Reworded and deferred. The town has encouraged the installation of storm shelters in Mobile Home Parks, but there is no regulation requiring these. The town will continue to evaluate implementing such regulations
PP-2	Mandate Tie-downs for mobile homes and propane tanks	All	Low	Town of Hayesville and Clay County Planning; Clay County Board of Commissioners	Local	2020	Reworded and deferred. The town has implemented tie-down mandates to prevent tanks and mobile homes from being lifted by floodwaters or winds and becoming ballistic hazards
PP-3	Update Development Regulations	All	Moderate	Town of Hayesville and Clay County Planning	Local	2020	Reworded and deferred. The town has updated its development regulations to help guide future development away from high hazard areas, but additional updates may be required to keep regulations up to date and appropriate.
PP-4	Implement Critical Facility Protection	All	High	Town of Hayesville and Clay County Engineering; Clay County EMS; Utility Companies; Hospital; NCDOT	Federal, State, Private	2020	Reworded and deferred. The town has taken steps to protect critical facilities but there are many additional steps that could be taken to reduce potential risk many critical facilities in the town.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-5	Utilize Acquisition to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Town of Hayesville and Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	Reworded and deferred. The town has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the town would look into acquisition of homes.
PP-6	Utilize Relocation to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Town of Hayesville and Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	Reworded and deferred. The town has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the town would look into relocation of homes.
PP-7	Provide advanced training to Building Inspectors	All	Moderate	Town of Hayesville and Clay County Fire Department; Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The town has a strong network of building inspectors, but additional training on the most up to date techniques is constantly required.
PP-8	Utilize Windproofing to protect structures	All	Moderate	Town of Hayesville and Clay County Engineering; FEMA; Clay County Planning	Federal, State, Private	2020	Reworded and deferred. The town has encouraged the use of windproofing techniques in the past and will continue to try to implement these techniques into future designs and structures.
Natural Resource Protection							
NRP-1	Preserve and Expand Parks	All	High	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	Reworded and deferred. The town has recognized the need to promote open space preservation and has many parks that are designated as open space. Looking forward, the town will continue to identify areas that can be preserved as parks/open space that will help reduce risk to hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
NRP-2	Wetland Preservation	Flood	Moderate	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	Deferred. The town has recognized the need to preserve wetlands and their natural functions as water retainers. Looking forward, the town will continue to identify areas that can be preserved to help reduce risk to hazards.
NRP-3	Develop Natural Resource Protection Plan	All	Moderate	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	Reworded and deferred. The town works in conjunction with the forest service on fire protection procedures, but it would like to integrate more fully into that process via a natural resource protection plan.
NRP-4	Tree Limb Removal Maintenance Plan	All	Moderate	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Fire Department	Federal, State, Private	2020	Reworded and deferred. The town routinely clears hanging tree limbs from the right of way to prevent damage to utilities. It will continue to provide this service going forward so this action will remain in the plan.
Structural Projects							
SP-1	Raise Bridges	All	Low	Town of Hayesville and Clay County Engineering; FEMA; NCDOT	Federal, State, Private	2020	Reworded and deferred. The town has not taken on any bridge raising projects on its own, but DOT has implemented such projects and the town will continue to support projects that raise bridges out of harm's way.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
SP-2	Stormwater Drain Maintenance	All	Moderate	Town of Hayesville and Clay County Public Works; Clay County Environment, Health & Natural Resources	Federal, State, Private	2020	Deferred. The town routinely cleans and repairs storm drains, but a more comprehensive system of drain maintenance would be useful so the town will continue to evaluate.
Emergency Services							
ES-1	Equipment Buyout	All	Moderate	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Local	2020	Deferred. In the past, the town has purchased equipment to help reduce risk to future disaster events. The town will continue to look into purchases of equipment that make sense especially when grants are available.
ES-2	Form Local coordinators and Communication Network	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Local	2020	Reworded and deferred. The town has worked to improve communication between local coordinators to improve response in smaller communities that may not have fire/police. This coordination has been successful, but will need to be maintained and improved going forward.
ES-3	Integrate Information and Communication Technology	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The town has made significant progress in integrating information and communication technology among all of its departments. However, this is a constantly evolving field and there will be a need to update and re-evaluate fairly consistently.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
ES-4	Use Citizens in Emergency Management Functions	All	Moderate	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. The town has initiated several programs such as Volunteers in Police Service Program and Medical Reserve Corps. However, there will need to be additional steps taken to more fluently integrate citizens in Emergency Management functions.
ES-5	Improve Emergency Transportation	All	Moderate	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. Although there are systems in place for emergency transportation, the town would like to develop emergency thoroughfares for medical transportation in case of a disaster.
ES-6	Mass Casualty Training	All	Moderate	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	Deferred. The town has some experience in mass casualty incidents, but it would like to have additional trainings available to improve this capability.
Public Education and Awareness							
PEA-1	Install Disaster Warning Systems	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Planning	Federal, State, Local	2020	Reworded and deferred. The town has some disaster warning systems in place, but as these technologies have improved, the town has identified this as an area that needs improvement going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-2	Designate Assembly Points	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Planning	Local	2020	Reworded and deferred. The town has designated assembly points that can be easily reached by a number of people in a short amount of time. The town will continue to evaluate these points and make changes as necessary.
PEA-3	Implement Community Awareness Program	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	Reworded and deferred. The town has implemented a community awareness program to provide outreach to citizens on potential hazards. The materials and forms of this outreach will need to be updated and evaluated going forward.
PEA-4	Establish Emergency Shelters	All	High	Town of Hayesville and Clay County Planning; Clay County Emergency Management	Federal, State, Private	2020	Reworded and deferred. The town has established emergency shelters in a number of locations, but would like to find ways to strengthen those facilities and improve communication to citizens of their availability during disaster events.

Macon County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Review and update the floodplain ordinance and insure that new infrastructure is not built in the flood prone areas.	Flood	High	Macon County Planning, Permitting & Development	Local	2020	Deferred. The county has reviewed the floodplain ordinance, but this is something that will need to take place again during the next 5 years, so it will remain in place.
P-2	Continue identifying potential floodplain areas to submit requests for map updates.	Flood	High	Macon County Planning, Permitting & Development	Local	2020	Deferred. The county has identified some areas to submit requests for map updates, however, the county would like to continue to look into and evaluate areas of the floodplain going forward.
Property Protection							
PP-1	Elevate access road (Arthur Drake Road) "above" the floodway.	Flood	Moderate	Macon County Emergency Management	HMGP, PDM	2020, As funds become available	Deferred. The county has attempted to implement this project, but it has not received grant funding and would not be able to fund it with local funding alone. Estimated cost $1,000,000. The county will continue to try to move this project forward over the next 5 years.
PP-2	Work with town to remove Franklin Fire Department from flood plain.	Flood	High	Macon County Emergency Management	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	New action.
PP-3	Protect bridge in the main part of town at the intersection of East Main Street and Highway 64 East from debris coming downstream during flood events.	Flood	High	Macon County Public Works; USACE	HMGP, PDM, USACE	2020, As soon as funds become available	Deferred. NCDOT is in the process of replacing the old town bridge which will help move towards completion of this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-4	Protect sewage treatment plant from flood damage by erecting a concrete flood wall around the plant.	Flood	High	Macon County Public Works	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	Deferred. There has not been any action taken to protect sewage treatment plants from flood damage via a floodwall. Estimated cost $1,000,000. The county will continue to look into funding for this project.
PP-5	Replace inadequately sized water mains and tanks to a size adequate for fire protection.	Wildfire	High	Macon County Public Works	Local	2020, When funding becomes available	Deferred. Water mains have not been replaced. The county would still like to address this action, but will need to find funding to do so. Estimated cost $6.7 million.
PP-6	Ensure all homes are secured properly and that building codes are followed as directed to minimize risk of hazards.	All	High	Macon County Planning, Permitting & Development	Local	2020, When funding becomes available	Deferred. The county continually works to ensure that building codes are followed and that homes are secured to the greatest extent possible. However, this is an action that will still need to be carried out in the future, so it will remain in the plan.
Natural Resource Protection							
NRP-1	Work to increase total area of open space throughout the county, which will have a dual role of reducing risks to many hazards (examples: flooding, tropical storms, etc) and will also serve as space for recreational purposes.	All	Moderate	Macon County Emergency Management and Administration	Local	2020	New action.
NRP-2	Purchase tub grinder for the disposal of storm debris	All	High	Macon County Landfill	Local; PA	2020, As soon as funds become available	Deferred. The county has not purchased a tub grinder for disposal of debris. Estimated cost $1,000,000. The county will continue to try to allocate funding for such a purpose.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Structural Projects							
SP-1	Remove the Fire Department (Burningtown) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	Deleted	Deleted. The county has worked to try to acquire funding to remove this fire department from the floodway, but have not received assistance. Estimated cost $500,000. The county will likely not be able to complete this project due to an issue with the Burningtown FD deed.
SP-2	Remove the Fire Department (West Macon) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	Completed	Completed. The county removed this fire department from the floodway in 2006.
SP-3	Work with Southwestern Community College Division of Public Safety Training Center to pursue funding to relocate the Live Fire Training Center outside of flood-prone area.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	2020, or as soon as funds become available	New action.
Emergency Services							
ES-1	Obtain and install a second source of electricity for public buildings and emergency services buildings to continue operations after unexpected loss of power during a disaster.	All	High	Macon County Emergency Management	State grant	2020, or as soon as funds become available	Deferred. The county has not been able to secure a secondary source of electricity for public/emergency services buildings in the event of an unexpected power loss. The county will continue to look for ways to fund this type of project.
Public Education and Awareness							
PEA-1	The county will work to improve its outreach by utilizing online surveys to get input from the public.	All	High	Macon County Emergency Management	Local	2020	New action.
PEA-2	The county will push information out to the public in a number of ways such as at live outreach events, through paper materials such as brochures, and online.	All	High	Macon County Emergency Management	Local	2020	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-3	Include emergency information in the website to inform and educate citizens about potential risks from hazards and opportunities to mitigate them, as they pertain to the jurisdiction.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized its website to inform and educate citizens about potential risks to hazards and how to mitigate these risks. Going forward, the county will continue to post pertinent information on its website, so this action will remain in place.
PEA-4	Make flyers and information sheets available in public buildings to educate citizens on potential risks from hazards and potential ways to mitigate them as well as safety measures to be conducted during a hazard event.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized flyers and information sheets as a way of reaching out the public and has placed these in public buildings, making them available to the public. The county will need to update these flyers and sheets as better information becomes available, so this action will remain in place.

Town of Franklin Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Town of Franklin to join the NFIP.	Flood	High	Franklin Public Works	Local	2017	New action.
PP-2	Ensure all homes are secured properly and that building codes are followed as directed to minimize risk of hazards.	All	High	Macon County Planning, Permitting & Development; Franklin Administration	Local	2020, When funding becomes available	Deferred. The county continually works to ensure that building codes are followed and that homes are secured to the greatest extent possible. However, this is an action that will still need to be carried out in the future, so it will remain in the plan.
Property Protection							
PP-1	Elevate access road (Arthur Drake Road) "above" the floodway.	Flood	Moderate	Macon County Emergency Management	HMGP, PDM	2020, As funds become available	Deferred. The county has attempted to implement this project, but it has not received grant funding and would not be able to fund it with local funding alone. Estimated cost $1,000,000. The county will continue to try to move this project forward over the next 5 years.
PP-2	Protect bridge in the main part of town at the intersection of East Main Street and Highway 64 East from debris coming downstream during flood events.	Flood	High	Franklin Public Works; USACE	HMGP, PDM, USACE	2020, As soon as funds become available	Deferred. NCDOT is in the process of replacing the old town bridge which will help move towards completion of this action.
PP-3	Protect sewage treatment plant from flood damage by erecting a concrete flood wall around the plant.	Flood	High	Franklin Public Works	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	Deferred. There has not been any action taken to protect sewage treatment plants from flood damage via a floodwall. Estimated cost $1,000,000. The town will continue to look into funding for this project.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-4	Remove Franklin Fire Department and Police Station from flood plain.	Flood	High	Franklin Public Works	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	New action.
Natural Resource Protection							
NRP-1	Increase size/capacity of waste water treatment plant.	Drought	High	Franklin Public Works	CDBG; EPA; USDA	Completed	Completed. The capacity of the wastewater treatment plant was expanded.
NRP-2	Develop new water source/build new water treatment plant to meet the demands of continued growth.	Drought	High	Franklin Public Works	CDBG; EPA, USDA	2020, As soon as funds become available.	Deferred. In the process of increasing capacity with an estimated completion of 2020. Estimated cost $8,000,000.
NRP-3	Purchase tub grinder for the disposal of storm debris	All	High	Macon County Landfill	Local; PA	2020, As soon as funds become available	Deferred. The town has not purchased a tub grinder for disposal of debris. Estimated cost $1,000,000. The town will continue to try to allocate funding for such a purpose.
NRP-4	Work with county to increase total area of open space throughout the county, which will have a dual role of reducing risks to many hazards (examples: flooding, tropical storms, etc) and will also serve as space for recreational purposes.	All	Moderate	Macon County Emergency Management and Administration; Franklin Administration	Local	2020	New action.
Structural Projects							
SP-1	Remove the Fire Department (Burningtown) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	2020, As funds become available	Deferred. The county has worked to try to acquire funding to remove this fire department from the floodway, but have not received assistance. Estimated cost $500,000. The county will continue to try to move this project forward over the next 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
SP-2	Remove the Fire Department (West Macon) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	2020, As funds become available	Deferred. The county has worked to try to acquire funding to remove this fire department from the floodway, but have not received assistance. Estimated cost $500,000. The county will continue to try to move this project forward over the next 5 years.
SP-3	Remove sewer pump station from floodplain at Little Tennessee River and E Main St.	Flood	High	Public Works	HMGP, PDM, 406 Mitigation	2020, As funds become available	New Action.
SP-4	Have public works clean out storm drains, ditches and culverts to help with flow of storm water.	Flood	High	Public Works	Local	2020, As funds become available	New Action.
Emergency Services							
ES-1	Obtain and install a second source of electricity for public buildings and emergency services buildings to continue operations after unexpected loss of power during a disaster.	All	High	Macon County Emergency Management, Franklin Administration	State grant	2020, or as soon as funds become available	Deferred. The town has not been able to secure a secondary source of electricity for public/emergency services buildings in the event of an unexpected power loss. The county will continue to look for ways to fund this type of project.
Public Education and Awareness							
PEA-1	Improve outreach by utilizing online surveys to get input from the public.	All	High	Macon County Emergency Management	Local	2020	New action.
PEA-2	Push information out to the public in a number of ways such as at live outreach events, through paper materials such as brochures, and online.	All	High	Macon County Emergency Management	Local	2020	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-3	Include emergency information in the website to inform and educate citizens about potential risks from hazards and opportunities to mitigate them, as they pertain to the jurisdiction.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized its website to inform and educate citizens about potential risks to hazards and how to mitigate these risks. Going forward, the county will continue to post pertinent information on its website, so this action will remain in place.
PEA-4	Make flyers and information sheets available in public buildings to educate citizens on potential risks from hazards and potential ways to mitigate them as well as safety measures to be conducted during a hazard event.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized flyers and information sheets as a way of reaching out the public and has placed these in public buildings, making them available to the public. The county will need to update these flyers and sheets as better information becomes available, so this action will remain in place.

Town of Highlands Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Replace roadway culvert on Laurel Street with a bridge to alleviate flooding caused by Mill Creek.	Flood	High	Highlands Public Works	HMGP, PDM, 406 Mitigation	2020, When funding becomes available	Deferred. This action is in process and mitigation funds are expected. Estimated cost $250,000.
PP-2	Ensure all homes are secured properly and that building codes are followed as directed to minimize risk of hazards.	All	High	Macon County Planning, Permitting & Development; Highlands Administration	Local	2020, When funding becomes available	Deferred. The county continually works to ensure that building codes are followed and that homes are secured to the greatest extent possible. However, this is an action that will still need to be carried out in the future, so it will remain in the plan.
Property Protection							
PP-1	Upgrade water treatment plant to one that does not use chlorine (the existing container of chlorine gas could rupture during a seismic event).	Earthquake	High	Highlands Public Works	Local	2020, When funding becomes available	Deferred. This action has not been started so the town will work on this action going forward. Estimated cost $800,000.
PP-2	Replace inadequately sized water mains and tanks to a size adequate for fire protection.	Wildfire	High	Highlands Public Works	Local	2020, When funding becomes available	Deferred. Water mains have not been replaced. The town would still like to address this action, but will need to find funding to do so. Estimated cost $6.7 million.
Natural Resource Protection							
NRP-1	Build fence around water plant.	Terrorism	High	Highlands Public Works	Local	Deleted	Deleted. This action was removed from the plan as Terrorism was not addressed in the plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
NRP-2	Work with county to increase total area of open space throughout the county, which will have a dual role of reducing risks to many hazards (examples: flooding, tropical storms, etc) and will also serve as space for recreational purposes.	All	Moderate	Macon County Emergency Management and Administration; Franklin Administration	Local	2020	New action.
Structural Projects							
SP-1	Build storm water controls, such as culverts and floodwalls, in flood prone areas and continue compliance with NFIP.	Flood	High	Town of Highlands Administration	State	2020	Deferred. The town has not generally built many stormwater controls in flood prone areas. This will be a continued area of focus going forward so this action will remain in the plan.
Emergency Services							
ES-1	Obtain and install a second source of electricity for public buildings and emergency services buildings to continue operations after unexpected loss of power during a disaster.	All	High	Macon County Emergency Management, Highlands Administration	State grant	2020, or as soon as funds become available	Deferred. The town has not been able to secure a secondary source of electricity for public/emergency services buildings in the event of an unexpected power loss. The county will continue to look for ways to fund this type of project.
Public Education and Awareness							
PEA-1	Improve outreach by utilizing online surveys to get input from the public.	All	High	Macon County Emergency Management	Local	2020	New action.
PEA-2	Push information out to the public in a number of ways such as at live outreach events, through paper materials such as brochures, and online.	All	High	Macon County Emergency Management	Local	2020	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-3	Include emergency information in the website to inform and educate citizens about potential risks from hazards and opportunities to mitigate them, as they pertain to the jurisdiction.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized its website to inform and educate citizens about potential risks to hazards and how to mitigate these risks. Going forward, the county will continue to post pertinent information on its website, so this action will remain in place.
PEA-4	Make flyers and information sheets available in public buildings to educate citizens on potential risks from hazards and potential ways to mitigate them as well as safety measures to be conducted during a hazard event.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized flyers and information sheets as a way of reaching out the public and has placed these in public buildings, making them available to the public. The county will need to update these flyers and sheets as better information becomes available, so this action will remain in place.
Previously Completed Mitigation Actions							
	Thorough inspection and testing of Sequoia Dam and Mirror Lake Dam.	Dam Failure	High	Highlands Public Works		Completed	Completed. This action was completed during the last update and will be removed.

SECTION 10
PLAN MAINTENANCE

This section discusses how the Clay Macon Region Mitigation Strategy and Mitigation Action Plan will be implemented and how the Regional Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public will continue to be involved in a sustained hazard mitigation planning process. It consists of the following four subsections:

- 10.1 Monitoring and Evaluating the Previous Plan
- 10.2 Implementation and Integration
- 10.3 Monitoring, Evaluation, and Enhancement
- 10.4 Continued Public Involvement

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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 MONITORING AND EVALUATING THE PREVIOUS PLAN

Since the previous two plans were adopted (in 2011), each county has worked to ensure that mitigation was integrated into local activities and that the mitigation plan was appropriately implemented. Each of the counties outlined a process in their previous county-level mitigation plans for monitoring and evaluating the plan throughout the interim period between plan updates.

Each county was ultimately successful in implementing the monitoring and evaluation processes that were outlined in previous plans as both counties held annual meetings to discuss the mitigation plan and the priorities that were outlined in it. Each county's specific process is outlined below with an explanation of how the monitoring and evaluating process was carried out as well as any changes that were identified by the county or its jurisdictions that would be useful to implement during the next update.

Clay County

The Clay County Hazard Mitigation Plan (2011) included an annual review process. This review process was carried out by the Hazard Mitigation Advisory Committee, every year since the previous plan was formally adopted. The annual review consisted of a report addressed to the County Manager and the County Board of Commissioners depicting the implementation status of the plan, the effectiveness of the proposed measures, and, if needed, recommendations of change or amendment for future works. Meetings were organized by the City Planning Department and the committee members reviewed the hazard profile, vulnerability assessment, and mitigation capabilities. If necessary, some responsibilities

were reassigned to different departments based on facts that arose during policy development. In instances where mitigation strategies may not be met as envisioned by the plan, revised goals and objectives were designated as needed. After each review, if the County Board of Commissioners decided that the recommendations require modification to the plan, the Board initiated a plan amendment or ask the County Manager to make a complete update of the plan.

Although there were some minor revisions made to the plan during interim update period, there were few major revisions identified during these annual reviews and the Monitoring and Evaluation Committee generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

Macon County

The Macon County Hazard Mitigation Plan (2011) included a method to ensure that regular review and update of the plan occurs. Periodic revisions and updates of the plan are required to ensure that goals and objectives of the plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. The Mitigation Advisory Committee was responsible for determining if there have been any significant changes in the county that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, the increase or decrease in capability to address hazards, and changes to federal or state legislation are specific examples of factors that may affect the content of the plan. The results of the review were summarized by the Mitigation Advisory Committee in a report that included an evaluation of the effectiveness of the plan and any required or recommended changes or amendments. The report also included an evaluation of the 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. Any changes to the plan were assigned to appropriate local officials with pre-determined timelines for completion.

Although there were some minor revisions made to the plan during interim update period, there were few major revisions identified during these annual reviews and the hazard mitigation review committee generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

10.2 IMPLEMENTATION AND INTEGRATION

Each agency, department, or other partner participating under the Clay Macon Regional Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific “lead” agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. The counties in the Clay Macon 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 Clay Macon Regional Hazard Mitigation Planning Team 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 Clay Macon Region.

Since the previous two plans were adopted, each county and participating jurisdiction 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/local emergency operations plans;
- Integrating the mitigation plan into review and updates of building codes; and
- Integrating the mitigation plan into the capital improvements plan through identification of mitigation actions that require local funding

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the Regional Hazard Mitigation Planning Team, individual county meetings, local staff 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 Clay Macon Regional Hazard Mitigation Planning Team to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

10.3 MONITORING, EVALUATION, AND ENHANCEMENT

Periodic revisions and updates of the Regional Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

When determined necessary, the Clay Macon Regional Hazard Mitigation Planning Team shall meet annually to evaluate the progress attained and to revise, where needed, the activities set forth in the Plan. The findings and recommendations of the Regional Hazard Mitigation Planning Team 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 Team 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 Clay Macon Region. The Macon County Emergency Management Coordinator will be responsible for reconvening the Regional Hazard Mitigation Planning Team for these reviews.

Five Year Plan Review

The Plan will be thoroughly reviewed by the Regional Hazard Mitigation Planning Team every five years to determine whether there have been any significant changes in the Clay Macon 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 county/local 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 Macon County Emergency Management Coordinator will be responsible for reconvening the Regional Hazard Mitigation Planning Team 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 Clay Macon Region Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management (NCDEM) 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 Clay Macon 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 Clay Macon 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 Macon County Emergency Management Coordinator to reconvene the Regional Hazard Mitigation Planning Team 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 Team in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

Plan Amendment Process

Upon the initiation of the amendment process, representatives from the Clay Macon counties will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County/local departments, residents, and businesses. Information will also be forwarded to the North Carolina Division of Emergency Management. This information will be disseminated in order to seek input on the proposed amendment(s) for no less than a 45-day review and comment period.

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

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

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

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

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

Incorporation into Existing Planning Documents

The Clay Macon Regional Hazard Mitigation Planning Team intends to make available to all of Clay and Macon Counties and their municipalities a process by which the requirements of this hazard mitigation plan will be incorporated into other plans. During the planning process for new and updated local planning documents, such as a comprehensive plan, capital improvements plan, or emergency management plan to name a few examples, the Clay County and Macon County Emergency Management Departments will provide a copy of the hazard mitigation plan to the advisory committee of each relevant planning document. The County Emergency Management Departments will advise the advisory committee members to ensure that all goals and strategies of new and updated local planning documents are consistent with the hazard mitigation plan and will not increase hazards in the jurisdictions.

This process will be carried out for each of the planning documents described in *Section 7: Capability Assessment* of this document. It should also be noted that most municipalities within the region are participants in the county-level version of each type of plan and do not have stand-alone municipal plans of their own. Therefore, when the Clay County and Macon County Emergency Management Departments share and advise on the hazard mitigation plan, they are acting on behalf of the municipalities. It should be further noted that due to the smaller size of many municipalities, municipal representatives of the Hazard Mitigation Planning Team are often the same person who participates in the update of comprehensive plans, zoning ordinances, and other planning documents. As such, much of the engrained knowledge these officials have gained from participating in the hazard mitigation planning process is transferred to these processes.

Therefore, each municipality's process for integrating the hazard mitigation plan into other planning mechanisms is the same as the county-level processes because these planning mechanisms are carried out as countywide plans or ordinances and each community's stake in each process is intricately linked.

10.4 CONTINUED PUBLIC INVOLVEMENT

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

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

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

- Advertising meetings of the Regional Hazard Mitigation Planning Team 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 Team;
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place;

- Utilizing the websites of participating jurisdictions to advertise any maintenance and/or periodic review activities taking place; and
- Keeping copies of the Plan in public libraries.

Annex A
Clay County

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

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

A.1 CLAY COUNTY COMMUNITY PROFILE

A.1.1 Geography and the Environment

Clay County is situated along the North Carolina and Georgia state border. The county is located at the southern end of the Appalachian Mountains within the Blue Ridge Province. It comprises one town, the Town of Hayesville, as well as small unincorporated communities. An orientation map is provided as **Figure A.1**.

The county is a typical mountain county consisting of high mountain peaks, sloping mountainsides, and fertile creek and river valleys. The county's highest elevation reaches 5,498 feet. The total area of the county is 221 square miles, 6 square miles of which is water area.

Clay County enjoys a generally mild year-round climate that is characterized by colder winters and warm summers; however, variation in elevation and topography can drastically affect local weather. The average annual temperature for the county is approximately 56˚F, with an average high of 68˚F and low of 43˚F. Typically, the warmest month in Clay County is July and the coldest month is January. The highest recorded temperature in the region was 100˚F (in 2012) and the lowest recorded temperature was -16˚F (in 1985). Precipitation is generally well distributed throughout the year and annual totals average 65 inches.[1]

In general, the spring months are marked by unpredictable weather and changes can occur rapidly with sunny skies yielding to snow in just a few hours. Average high temperatures increase from 60˚F in March to the mid 70s in May. There is a similar increase in average low temperatures, which are just above freezing in March and climb to 50˚F in May.

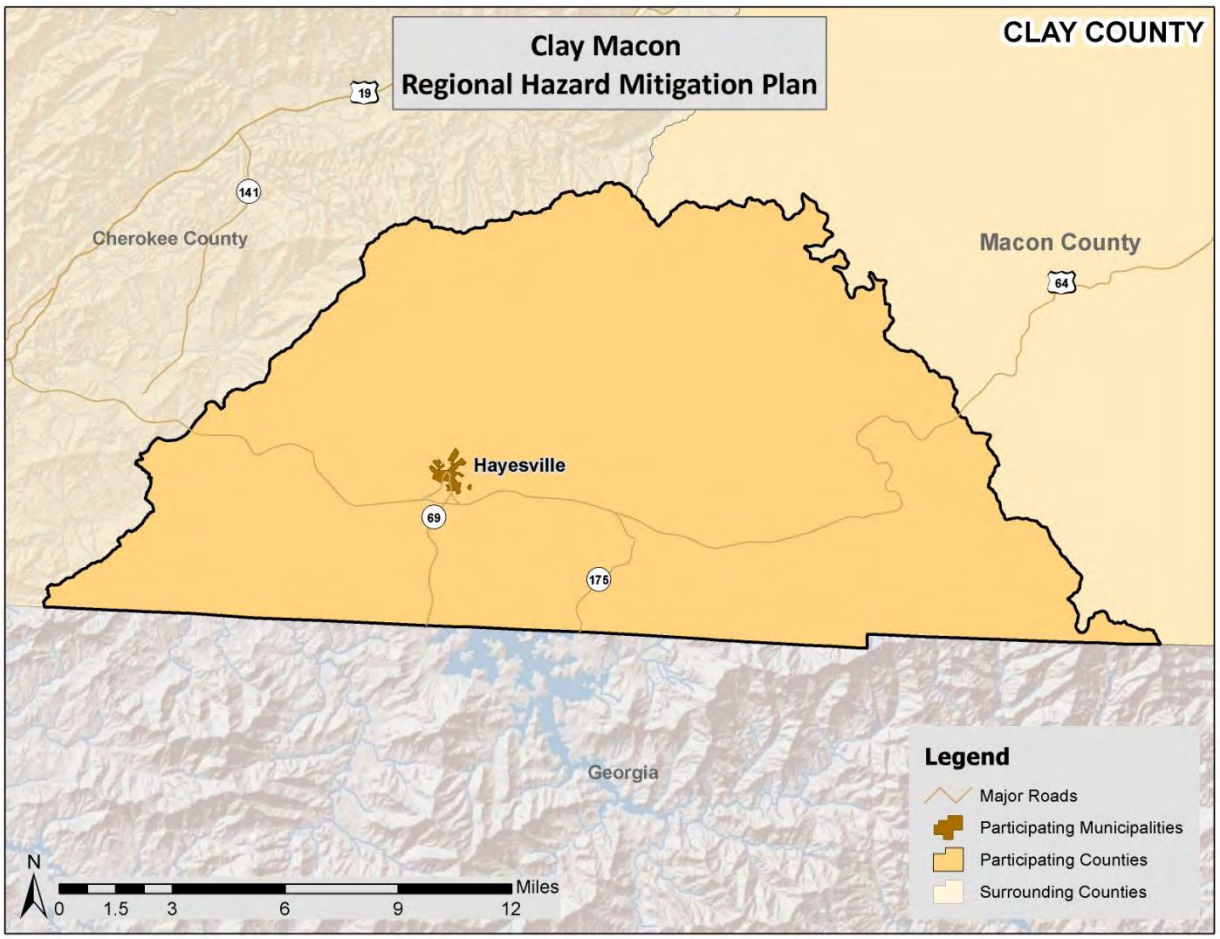
In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the low to mid 80s in July and August. Summertime is typically moderately warn and humid, however, at higher elevations, weather tends to be more pleasant during the summer months.

[1] *Hazard Mitigation Plan for Clay County, North Carolina and the Municipality of Hayesville (*revised August 2009).

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

Winter in Clay County is generally moderate but extremes do occur, especially at higher elevations. Winter lows frequently drop below freezing and temperatures can be even lower at higher elevations. In the winter months, the average high temperature falls between the upper 40s and lower 50s and the average low temperature is in the mid to upper 20s. The county averages about 14 inches of snow per year depending on altitude of the location. Winter precipitation usually results from low pressure storms which frequently pass through the area.

FIGURE A.1: CLAY COUNTY ORIENTATION MAP



A.1.2 Population and Demographics

According to the 2010 Census, Clay County has a population of 10,587 people. The county has seen nearly 21 percent growth between 2000 and 2010, and the population density is 49 people per square

mile. Population counts from the US Census Bureau for 1990, 2000, and 2010 for the county and participating municipality (where available) are presented in **Table A.1**.

TABLE A.1: POPULATION COUNTS FOR CLAY COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Clay County	**7,155**	**8,775**	**10,587**	**20.6%**
Town of Hayesville	--	297	311	4.7%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of Clay County is 49.6 years. The racial characteristics of the county are presented in **Table A.2**. Whites make up the majority of the population in the county, accounting for nearly 97 percent of the population.

TABLE A.2: DEMOGRAPHICS OF CLAY COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Clay County	**96.6%**	**0.6%**	**0.3%**	**0.2%**	**0.0%**	**0.8%**	**1.4%**	**2.4%**
Town of Hayesville	97.4%	0.0%	1.0%	0.0%	0.0%	1.0%	0.6%	2.3%

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

A.1.3 Housing

According to the 2010 US Census, there are 5,425 housing units in Clay County, the majority of which are single family homes or mobile homes. Housing information for the county and municipality is presented in **Table A.3**. As shown in the table, the Town of Hayesville has a significantly lower percentage of seasonal housing units compared to the unincorporated county.

TABLE A.3: HOUSING CHARACTERISTICS OF CLAY COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Clay County	**5,425**	**7,140**	**22.0%**	**$163,000**
Town of Hayesville	171	188	5.9%	$134,400

Source: United States Census Bureau

A.1.4 Infrastructure

Transportation

There are several US and state highways that serve Clay County and link it with other regions of North Carolina as well as the neighboring state of Georgia. US 64 is the major east-west route connecting Clay County to Macon and Cherokee Counties. This highway is also part of the designated scenic byway

called Waterfall Byway. Waterfall Byway winds through five counties, including Clay, and earns its name from the 200 waterfalls that surround the route. Two additional state highways run north to south linking Clay County to Georgia; these include NC 69 and NC 175.

Within Clay County, a public transportation system made up 16 service vehicles serves local human service agencies and the public through subscription.

Currently, there is no rail service in Clay County; however, the Great Smoky Mountain Railroad, which operates tourist excursions in addition to moving **f**reight, runs north of the county.

Asheville Regional Airport is the largest airport in the mountains serving Clay County and all of Western North Carolina. The airport currently offers non-stop commercial flights on 4 airlines to 11 cities. The major airport located nearest to the county is the Charlotte Douglas International Airport, which offers non-stop commercial flights on 10 airlines to more than 140 destinations across the United States as well as to several international destinations. Other major nearby airports include the Hartsfield-Jackson Atlanta International Airport in Georgia and the Nashville Metropolitan Airport in Tennessee.

Utilities

Duke Energy Progress provides electrical power to the southwest corner of Clay County. The Blue Ridge Mountain Electric Membership Corporation (which is a Tennessee Valley Authority distributor) also provides service in the southwestern corner of Clay County.

Water and sewer service is provided in some areas of the county by Clay County Water and Sewer District, but generally municipal water systems are extremely limited in the mountains and private or shared wells and septic systems are considered the norm

Community Facilities

There are a number of buildings and community facilities located throughout Clay County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 3 fire stations, 3 EMS stations, 2 police stations, 1 emergency operations center, and 11 public schools located within the county.

There are no hospitals located in Clay County, however, there are two located nearby in Macon County. The larger of the two is Angel Medical, a 59-bed general hospital located in the Town of Franklin. The Highlands-Cashiers Hospital, in the Town of Highlands, has 24 beds as well as a skilled nursing facility with 80 beds.

Clay County contains numerous local parks, campgrounds, recreation areas, and hiking trails. These include the Nantahala National Forest, Appalachian Trail, Jackrabbit Mountain Biking and Hiking Trail, Hiwassee River, Nantahala Lake, and Chatuge Lake. These facilities offer recreational opportunities to area residents and visitors alike.

A.1.5 Land Use

Many areas of Clay County are undeveloped or sparsely developed due to the mountainous terrain and the conservation of land in the Nantahala National Forest. As shown in **Figure A.1** above, there is one small incorporated municipality located in the study area, and this area is where the county's population is generally concentrated. The incorporated area is also where many businesses, commercial uses, and

institutional uses are located. Land uses in the balance of the study area generally consist of rural residential development, agricultural uses, recreational areas, and forestland.

Clay County has become one of the fastest growing counties in Western North Carolina. This growth has been prompted, in part, by the closeness of Lake Chatuge and the backdrop of the Smoky Mountains. Clay County has become a recreation and vacation destination for thousands of tourists each year. The resulting development pressures are largely on infrastructure and local government services.

Clay County has a comprehensive plan that is intended to help county government leaders and citizens guide short- and long-range change, growth, and development. The plan addresses agriculture and natural resources; historic, cultural and recreation resources; land stewardship; transportation; utilities and community facilities; and economic development. However, the county has not adopted a zoning ordinance to regulate development in the unincorporated portion of the county. A zoning ordinance is maintained by the Town of Hayesville, which regulates land uses within the town limits and extra territorial jurisdiction.

A.1.6 Employment and Industry

According to the North Carolina Employment Security Commission (NCESC), in 2012, Clay County had an average annual employment of 1,923 workers and an average unemployment rate of 9.3 percent (compared to 9.2 percent for the state). In 2012, the Retail Trade industry employed 23.0 percent of the county's workforce followed by Public Administration (14.9%); Health Care and Social Assistance (13.9%); and Educational Services (11.8%). The American Community Survey (ACS) found the average annual median household income in Clay County was $38,536 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

A.2 CLAY COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Clay County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

A.2.1 Drought

Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the county would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

Historical Occurrences

According to the North Carolina Drought Monitor, the Southern Mountains Region, which includes Clay County, experienced moderate to extreme drought conditions during 8 of the last 14 years (2000-2013). **Table A.4** shows the most severe drought condition reported for each year in the Southern Mountains Region, according to PDSI classifications. However, it should be noted that the most severe classification

reported is based on monthly regional averages, and conditions in Clay County may actually have been less or more severe than what is reported.

TABLE A. 4: HISTORICAL DROUGHT OCCURRENCES IN CLAY COUNTY

extreme drought	severe drought	moderate drought	mid-range	moderately moist	very moist	extremely moist
−4.00 and below	−3.00 to −3.99	−2.00 to −2.99	−1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

	Clay County	
2000	-3.34	Severe Drought
2001	-3.62	Severe Drought
2002	-3.72	Severe Drought
2003	-0.05	Mid-range
2004	-1.76	Mid-range
2005	-1.07	Mid-range
2006	-2.20	Moderate Drought
2007	-4.30	Extreme Drought
2008	-4.23	Extreme Drought
2009	-3.34	Severe Drought
2010	-1.77	Mid-range
2011	-2.18	Moderate Drought
2012	-1.38	Mid-range
2013	1.34	Mid-range

Source: North Carolina State Climate Office

Data from the National Climatic Data Center (NCDC) was also reviewed to obtain additional information on historical drought events in the region, but no events were reported in Clay County.

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Clay County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

A.2.2 Extreme Heat

Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. All of Clay County is susceptible to extreme heat conditions.

Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in Clay County. There were no events reported.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. However, no weather stations with data are located in Clay County, so information was obtained from records for neighboring Macon County. Temperature

information has been reported since 1872. The recorded maximum for Macon County can be found below in **Table A.5**.

TABLE A.5: HIGHEST RECORDED TEMPERATURE IN MACON COUNTY

Location	Date	Temperature (°F)
Franklin	7/29/1952	101
MACON COUNTY MAXIMUM	--	**101**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the region. The closest location to Clay County is Coweeta (in neighboring Macon County). **Table A.6** shows the average maximum temperatures from 1971 to 2000 at the Coweeta Experiment Station observation station which can be used as a general comparison for the county.

TABLE A.6: AVERAGE MAXIMUM TEMPERATURE IN COWEETA EXP STN, MACON COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	48.9	53.0	60.3	68.3	74.8	80.7	83.9	82.5	77.5	69.4	60.3	51.9

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Clay County has a probability level of unlikely (less than 1 percent annual probability) for future extreme heat events to impact the county.

A.2.3 Hailstorm

Location and Spatial Extent

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

Historical Occurrences

According to the National Climatic Data Center, 16 recorded hailstorm events have affected Clay County since 1985.[2] **Table A.7** is a summary of the hail events in Clay County. **Table A.8** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in over $13,000 (2014 dollars) in property damages.[3] Hail ranged in diameter from 0.75 inches to 1.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

[2] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1955 through July 2014. It is likely that additional hail events have affected Clay County. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.
[3] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

TABLE A.7: SUMMARY OF HAIL OCCURRENCES IN CLAY COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Hayesville	10	0/0	$0
Unincorporated Area	6	0/0	$13,232
CLAY COUNTY TOTAL	**16**	**0/0**	**$13,232**

Source: National Climatic Data Center

TABLE A.8: HISTORICAL HAIL OCCURRENCES IN CLAY COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Hayesville				
HAYESVILLE	4/28/2002	0.75 in.	0/0	$6,616
HAYESVILLE	4/28/2002	0.75 in.	0/0	$6,616
HAYESVILLE	4/19/2006	0.75 in.	0/0	$0
HAYESVILLE	5/13/2006	1.00 in.	0/0	$0
HAYESVILLE	5/20/2006	0.88 in.	0/0	$0
HAYESVILLE	5/20/2006	0.88 in.	0/0	$0
HAYESVILLE	6/17/2009	0.75 in.	0/0	$0
HAYESVILLE	5/26/2011	1.00 in.	0/0	$0
HAYESVILLE	6/15/2011	1.75 in.	0/0	$0
HAYESVILLE	4/26/2012	1.75 in.	0/0	$0
Unincorporated Area				
CLAY CO.	6/7/1985	1.75 in.	0/0	$0
CLAY CO.	6/7/1985	1.75 in.	0/0	$0
CLAY CO.	4/15/1987	1.50 in.	0/0	$0
BRASSTOWN	1/5/1997	0.75 in.	0/0	$0
PINELOG	5/7/1998	1.75 in.	0/0	$0
TUSQUITEE	6/9/2011	1.75 in.	0/0	$0

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is likely (between 10 and 100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that Clay County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

A.2.4 Hurricane and Tropical Storm

Location and Spatial Extent

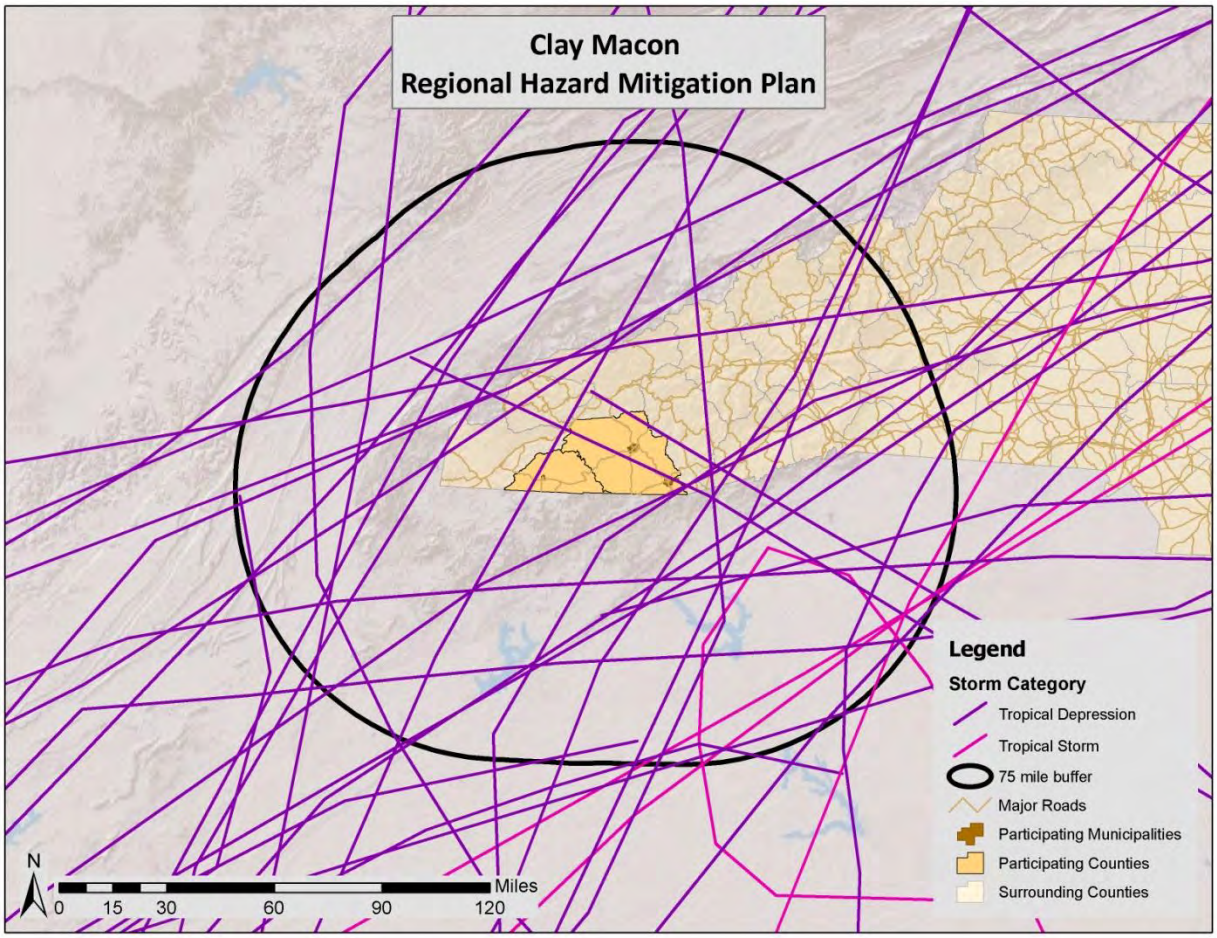
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Clay County. The entire county is equally susceptible to hurricane and tropical storms.

Historical Occurrences

According to the National Hurricane Center's historical storm track records, 34 hurricane or tropical storm tracks have passed within 75 miles of the Clay Macon Region since 1859.[4] This includes 4 tropical storms and 30 tropical depressions.

Of the recorded storm events, five storms have traversed directly through the Clay Macon Region as shown in **Figure A.2**. **Table A.9** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Clay Macon Region) and maximum Category of the storm based on the Saffir-Simpson Scale.

FIGURE A.2: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CLAY MACON REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

[4] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

TABLE A.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CLAY MACON REGION (1850–2013)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/17/1859	NOT NAMED	35.2	Tropical Storm
9/11/1882	NOT NAMED	35.2	Tropical Storm
9/11/1882	NOT NAMED	35.2	Tropical Storm
7/8/1896	NOT NAMED	26.4	Tropical Depression
9/28/1901	NOT NAMED	30.8	Tropical Depression
9/15/1900	NOT NAMED	22.0	Tropical Depression
9/23/1907	NOT NAMED	30.8	Tropical Depression
10/11/1905	NOT NAMED	22.0	Tropical Depression
10/11/1902	NOT NAMED	30.8	Tropical Depression
9/16/1903	NOT NAMED	26.4	Tropical Depression
9/18/1906	NOT NAMED	26.4	Tropical Depression
9/4/1913	NOT NAMED	17.6	Tropical Depression
8/30/1911	NOT NAMED	26.4	Tropical Depression
7/15/1916	NOT NAMED	30.8	Tropical Depression
9/5/1915	NOT NAMED	26.4	Tropical Depression
8/15/1928	NOT NAMED	26.4	Tropical Depression
10/17/1932	NOT NAMED	17.6	Tropical Depression
8/13/1940	NOT NAMED	30.8	Tropical Depression
8/28/1949	NOT NAMED	35.2	Tropical Storm
6/8/1968	CELESTE	22.0	Tropical Depression
9/24/1975	ELOISE	26.4	Tropical Depression
9/8/1977	BABE	22.0	Tropical Depression
8/17/1985	ONE-C	26.4	Tropical Depression
8/28/1992	ANDREW	17.6	Tropical Depression
8/28/1992	IVAN	17.6	Tropical Depression
8/17/1994	BERYL	13.2	Tropical Depression
7/23/1997	DANNY	17.6	Tropical Depression
7/2/2003	DOLORES	17.6	Tropical Depression
9/28/2004	NOT NAMED	17.6	Tropical Depression
9/28/2004	JEANNE	17.6	Tropical Depression
9/8/2004	FRANCES	22.0	Tropical Depression
7/7/2005	CINDY	17.6	Tropical Depression
8/27/2008	FAY	13.2	Tropical Depression
9/6/2011	LEE	30.0	Tropical Depression

Source: National Hurricane Center

The National Climatic Data Center reported one event associated with a hurricane or tropical storm in Clay County between 1996 and 2014.[5] This storm event occurred on September 16, 2004 and was

[5] These hurricane/tropical storm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014.

classified as a tropical storm (Ivan). Numerous trees and power lines were reported down across the county and $18,901 (2014 dollars) of property damage were reported.[6]

Federal records indicate that no disaster declarations related to hurricane or tropical storms were made for the county.[7]

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

Tropical Storm Frances – September 7-8, 2004
Tropical Storm Frances was a slow-moving, relatively large storm that dumped heavy rains over the eastern United States. The remnants of Frances produced a swath of 5 to 15 inches of rain across the North Carolina Mountains with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph along the Appalachian Mountains and thousands of trees were downed. Trees fell on structures, vehicles, and power lines. Flooding also led to numerous landslides in the area which added to the damage of infrastructure and residential and commercial structures. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

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

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

Probability of Future Occurrences

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

[6] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.
[7] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.

A.2.5 Lightning

Location and Spatial Extent

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Clay County is uniformly exposed to lightning.

Historical Occurrences

According to the National Climatic Data Center, there have been no recorded lightning events in Clay County since 1996, as listed in summary **Table A.10**.[8] A complete listing of those events can be found in **Table A.11.**[9] Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE A.10: SUMMARY OF LIGHTNING OCCURRENCES IN CLAY COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Hayesville	0	0	$0
Unincorporated Area	0	0	$0
CLAY COUNTY TOTAL	**0**	**0/0**	**$0**

Source: National Climatic Data Center

TABLE A.11: HISTORIC LIGHTNING OCCURRENCES IN CLAY COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Hayesville				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

*Property Damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Although there were no historical lightning events reported in Clay County via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), Clay County is located in an area of the country that experienced an average of 2 to 4 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

[8] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is certain that additional lightning events have occurred in Clay County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

[9] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

A.2.6 Thunderstorm Wind / High Wind

Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Clay County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Clay County has uniform exposure to an event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms and high winds were at least partially responsible for two disaster declarations in Clay County in 1973 and 1995.[10] According to NCDC, there have been 58 reported thunderstorm wind and high wind events since 1985 in Clay County.[11] These events caused almost $531,000 (2014 dollars) in damages.[12] There were no reports of any injuries or fatalities. **Table A.12** summarizes this information. **Table A.13** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event.

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Hayesville	33	0/0	$332,725
Unincorporated Area	25	0/0	$197,960
CLAY COUNTY TOTAL	**58**	**0/0**	**$530,685**

Source: National Climatic Data Center

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

	Date	Type	Magnitude†	Deaths / Injuries	Property Damage*
Hayesville					
Hayesville	4/15/1993	Thunderstorm Wind	0 kts.	0/0	$0
HAYESVILLE	5/22/2004	Thunderstorm Wind	60 kts. EG	0/0	$6,300
HAYESVILLE	5/31/2004	Thunderstorm Wind	65 kts. EG	0/0	$25,202
HAYESVILLE	6/12/2004	Thunderstorm Wind	65 kts. EG	0/0	$18,901
HAYESVILLE	7/26/2004	Thunderstorm Wind	60 kts. EG	0/0	$5,040
HAYESVILLE	4/22/2005	Thunderstorm Wind	65 kts. EG	0/0	$3,656
HAYESVILLE	7/1/2005	Thunderstorm Wind	55 kts. EG	0/0	$7,313
HAYESVILLE	8/5/2005	Thunderstorm Wind	60 kts. EG	0/0	$12,188
HAYESVILLE	8/5/2005	Thunderstorm Wind	60 kts. EG	0/0	$18,282
HAYESVILLE	7/21/2006	Thunderstorm Wind	60 kts. EG	0/0	$17,711

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

[11] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1955 through July 2014 and these high wind events are only inclusive of those reported by NCDC from 1996 through July 2014. It is certain that additional thunderstorm and high wind events have occurred in Clay County. As additional local data becomes available, this hazard profile will be amended.

[12] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

	Date	Type	Magnitude†	Deaths / Injuries	Property Damage*
HAYESVILLE	9/28/2006	Thunderstorm Wind	60 kts. EG	0/0	$35,421
HAYESVILLE	8/3/2007	Thunderstorm Wind	52 kts. EG	0/0	$9,184
HAYESVILLE	8/24/2007	Thunderstorm Wind	55 kts. EG	0/0	$22,960
HAYESVILLE	5/10/2008	Thunderstorm Wind	50 kts. EG	0/0	$0
HAYESVILLE	5/10/2008	Thunderstorm Wind	50 kts. EG	0/0	$0
HAYESVILLE	6/28/2008	Thunderstorm Wind	60 kts. EG	0/0	$19,900
HAYESVILLE	7/6/2008	Thunderstorm Wind	55 kts. EG	0/0	$0
HAYESVILLE	2/11/2009	Thunderstorm Wind	55 kts. EG	0/0	$5,548
HAYESVILLE	5/15/2009	Thunderstorm Wind	50 kts. EG	0/0	$0
HAYESVILLE	6/17/2009	Thunderstorm Wind	60 kts. EG	0/0	$22,190
HAYESVILLE	6/17/2009	Thunderstorm Wind	60 kts. EG	0/0	$16,643
HAYESVILLE	4/25/2010	Thunderstorm Wind	52 kts. EG	0/0	$2,183
HAYESVILLE	6/21/2010	Thunderstorm Wind	52 kts. EG	0/0	$2,183
HAYESVILLE	6/21/2010	Thunderstorm Wind	55 kts. EG	0/0	$10,916
HAYESVILLE	6/25/2010	Thunderstorm Wind	50 kts. EG	0/0	$5,458
HAYESVILLE	6/15/2011	Thunderstorm Wind	60 kts. EG	0/0	$15,873
HAYESVILLE	6/18/2011	Thunderstorm Wind	55 kts. EG	0/0	$10,582
HAYESVILLE	6/24/2011	Thunderstorm Wind	52 kts. EG	0/0	$5,291
HAYESVILLE	4/17/2012	Thunderstorm Wind	52 kts. EG	0/0	$20,735
HAYESVILLE	6/13/2013	Thunderstorm Wind	50 kts. EG	0/0	$3,065
HAYESVILLE	4/28/2014	Thunderstorm Wind	50 kts. EG	0/0	$5,000
HAYESVILLE	6/19/2014	Thunderstorm Wind	50 kts. EG	0/0	$5,000
HAYESVILLE	7/8/2014	Thunderstorm Wind	50 kts. EG	0/0	$0
Unincorporated Area					
CLAY CO.	6/6/1985	Thunderstorm Wind	0 kts.	0/0	$0
CLAY CO.	6/7/1985	Thunderstorm Wind	0 kts.	0/0	$0
CLAY CO.	6/7/1985	Thunderstorm Wind	0 kts.	0/0	$0
BRASSTOWN	7/13/2003	Thunderstorm Wind	60 kts. EG	0/0	$0
COUNTYWIDE	8/15/2003	Thunderstorm Wind	60 kts. EG	0/0	$0
COUNTYWIDE	7/5/2004	Thunderstorm Wind	60 kts. EG	0/0	$25,202
CLAY (ZONE)	12/22/2004	High Wind	45 kts. ES	0/0	$0
SHOOTING CREEK	7/1/2005	Thunderstorm Wind	55 kts. EG	0/0	$3,656
SHOOTING CREEK	8/30/2005	Thunderstorm Wind	60 kts. EG	0/0	$18,282
FIRES CREEK	5/27/2006	Thunderstorm Wind	60 kts. EG	0/0	$17,711
SHOOTING CREEK	9/23/2006	Thunderstorm Wind	60 kts. EG	0/0	$14,169
CLAY (ZONE)	10/17/2006	High Wind	65 kts. EG	0/0	$29,518
CLAY (ZONE)	12/1/2006	Strong Wind	40 kts. EG	0/0	$17,711
CLAY (ZONE)	2/25/2007	High Wind	60 kts. EG	0/0	$17,220
FIRES CREEK	4/10/2009	Thunderstorm Wind	55 kts. EG	0/0	$8,876
FIRES CREEK	5/8/2009	Thunderstorm Wind	55 kts. EG	0/0	$0
CLAY (ZONE)	12/9/2009	High Wind	60 kts. EG	0/0	$11,095
CLAY (ZONE)	12/25/2009	High Wind	55 kts. EG	0/0	$5,548
TUSQUITEE	6/25/2010	Thunderstorm Wind	52 kts. EG	0/0	$5,458
SHOOTING CREEK	6/25/2010	Thunderstorm Wind	52 kts. EG	0/0	$5,458
WARNE	8/13/2010	Thunderstorm Wind	50 kts. EG	0/0	$2,183
SHOOTING CREEK	4/4/2011	Thunderstorm Wind	52 kts. EG	0/0	$5,291

	Date	Type	Magnitude†	Deaths / Injuries	Property Damage*
BRASSTOWN	6/19/2011	Thunderstorm Wind	55 kts. EG	0/0	$10,582
SHOOTING CREEK	7/1/2012	Thunderstorm Wind	50 kts. EG	0/0	$0
SHOOTING CREEK	7/1/2012	Thunderstorm Wind	50 kts. EG	0/0	$0

†If known, maximum measured gusts (MG) were recorded; otherwise, estimated gusts (EG) were recorded.
*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

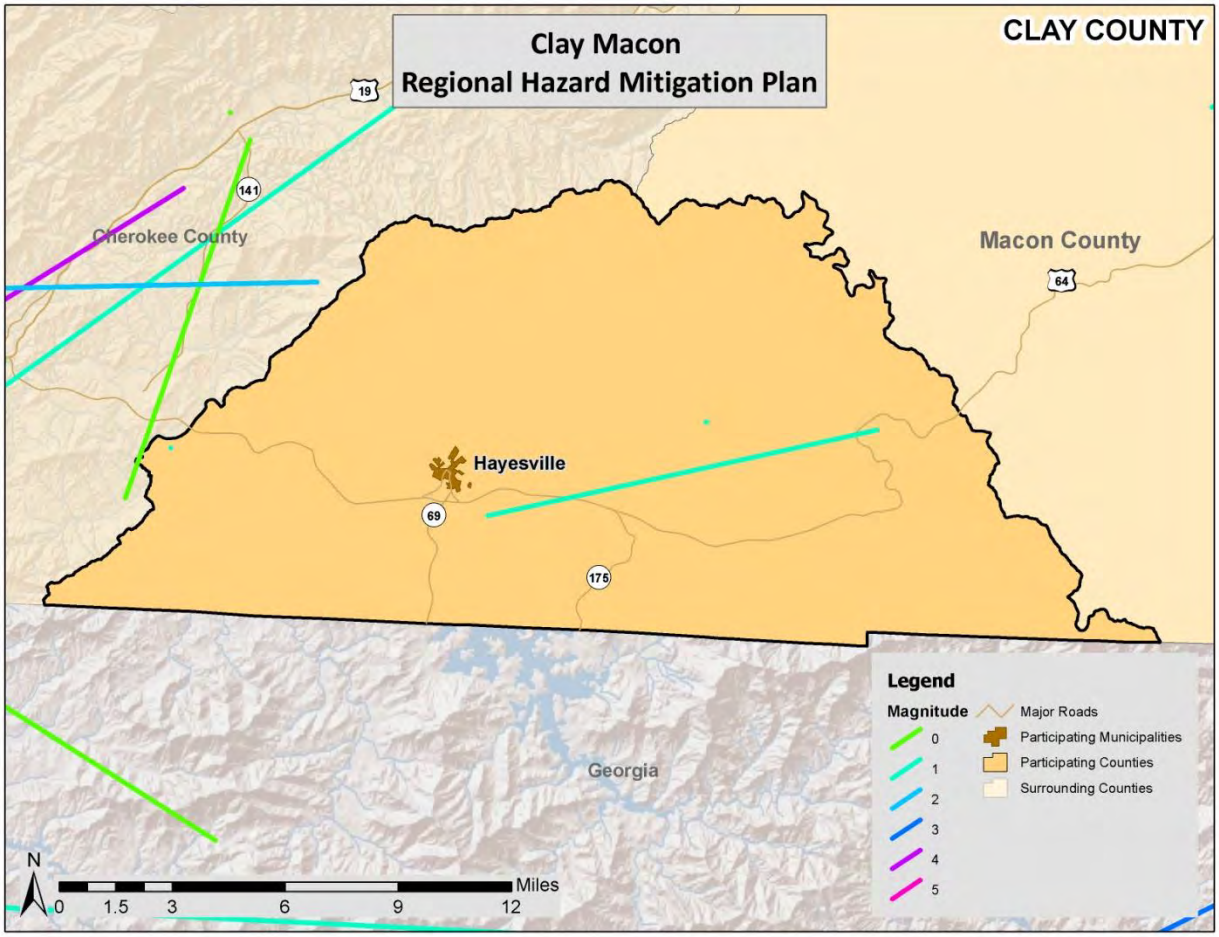
Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county.

A.2.7 Tornado

Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in Clay County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Clay County is uniformly exposed to this hazard. With that in mind, Figure **A.3** shows tornado track data for many of the major tornado events that have impacted the county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE A.3: HISTORICAL TORNADO TRACKS IN CLAY COUNTY



Source: National Weather Service Storm Prediction Center

Historical Occurrences

Tornadoes are a fairly rare occurrence in mountainous areas. However, they have and do occur in Clay County. According to the National Climatic Data Center, there have been a total of five recorded tornado events in Clay County since 1965 (**Table A.14**), resulting in almost $283,000 (2014 dollars) in property damages (**Table A.15**).[13] [14] The magnitude of these tornadoes ranges from F0 to F1 in intensity, although an F2 to F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 64 years.

[13] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1950 through July 2014. It is likely that additional tornadoes have occurred in Clay County. As additional local data becomes available, this hazard profile will be amended.

[14] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Hayesville	1	0/0	$21,832
Unincorporated Area	4	0/0	$261,023
CLAY COUNTY TOTAL	**5**	**0/0**	**$282,855**

Source: National Climatic Data Center

TABLE A.15: HISTORICAL TORNADO IMPACTS IN CLAY COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Hayesville					
HAYESVILLE	4/25/2010	EF1	0/0	$21,832	The tornado began north of Hayesville as an EF0 rating with a maximum wind speed of 65 mph and a damage path of 20 yards. It strengthened to an EF1 rating with a maximum wind speed of 90 mph and a damage path of 60 yards. The tornado weakened to an EF0 rating with a maximum wind speed of 65 mph and a damage path of 10 yards before dissipating. The path length was 1.5 miles.
Unincorporated Area					
CLAY CO.	1/10/1965	F1	0/0	$18,891	--
CLAY CO.	12/25/1974	F1	0/0	$120,705	Tornado touched down about 4 times 1-1/2 miles southeast of Hayesville. One house destroyed and 3 others damaged.
CLAY CO.	12/25/1974	F1	0/0	$120,705	Tornado touched down about 4 times 1-1/2 miles southeast of Hayesville. One house destroyed and 3 others damaged.
CLAY CO.	2/25/1980	F0	0/0	$722	--

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. Furthermore, the mountainous terrain of the county makes tornadoes a rare occurrence. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Clay County experience a direct tornado strike. The probability of future tornado occurrences affecting Clay County is possible (1 to 10 percent annual probability).

A.2.8 Winter Storm and Freeze

Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Clay County is accustomed to severe winter weather conditions and frequently receives severe winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

Historical Occurrences

Winter weather has not resulted in any disaster declarations in Clay County.[15] According to the National Climatic Data Center, there have been a total of 20 recorded winter storm events in Clay County since 1996 (**Table A.16**).[16] These events did not result in any recorded damages.[17] Detailed information on the recorded winter storm events can be found in **Table A.17**.

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Clay County	20	0/0	$0

Source: National Climatic Data Center

TABLE A.17: HISTORICAL WINTER STORM IMPACTS IN CLAY COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Hayesville				
None Reported	--	--	--	--
Unincorporated Area				
CLAY (ZONE)	3/19/1996	Heavy Snow	0/0	$0
CLAY (ZONE)	1/10/1997	Winter Storm	0/0	$0
CLAY (ZONE)	12/30/1997	Winter Storm	0/0	$0
CLAY (ZONE)	12/22/1998	Ice Storm	0/0	$0
CLAY (ZONE)	12/2/2000	Winter Storm	0/0	$0
CLAY (ZONE)	12/18/2000	Winter Storm	0/0	$0
CLAY (ZONE)	1/1/2001	Winter Storm	0/0	$0
CLAY (ZONE)	1/20/2001	Winter Storm	0/0	$0
CLAY (ZONE)	3/20/2001	Winter Storm	0/0	$0
CLAY (ZONE)	1/5/2002	Winter Storm	0/0	$0
CLAY (ZONE)	1/5/2003	Heavy Snow	0/0	$0
CLAY (ZONE)	1/16/2003	Winter Storm	0/0	$0
CLAY (ZONE)	1/9/2004	Winter Storm	0/0	$0

[15] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[16] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is certain that additional winter storm conditions have affected Clay County.
[17] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

	Date	Type of Storm	Deaths / Injuries	Property Damage*
CLAY (ZONE)	1/29/2005	Ice Storm	0/0	$0
CLAY (ZONE)	2/11/2006	Heavy Snow	0/0	$0
CLAY (ZONE)	2/1/2007	Winter Weather	0/0	$0
CLAY (ZONE)	1/29/2010	Heavy Snow	0/0	$0
CLAY (ZONE)	12/25/2010	Heavy Snow	0/0	$0
CLAY (ZONE)	3/5/2013	Heavy Snow	0/0	$0
CLAY (ZONE)	2/13/2014	Heavy Snow	0/0	$0

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

There have been several severe winter weather events in Clay County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

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

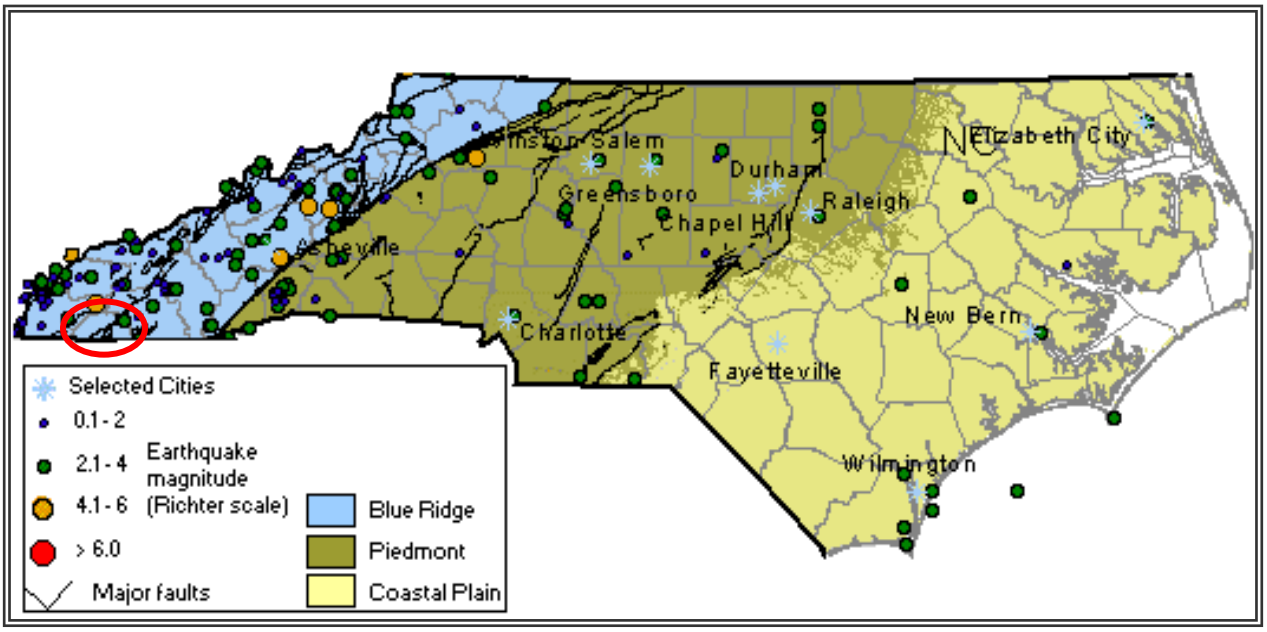
Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could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

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

A.2.9 Earthquake

Location and Spatial Extent
Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure A.4** is a map showing geological and seismic information for North Carolina.

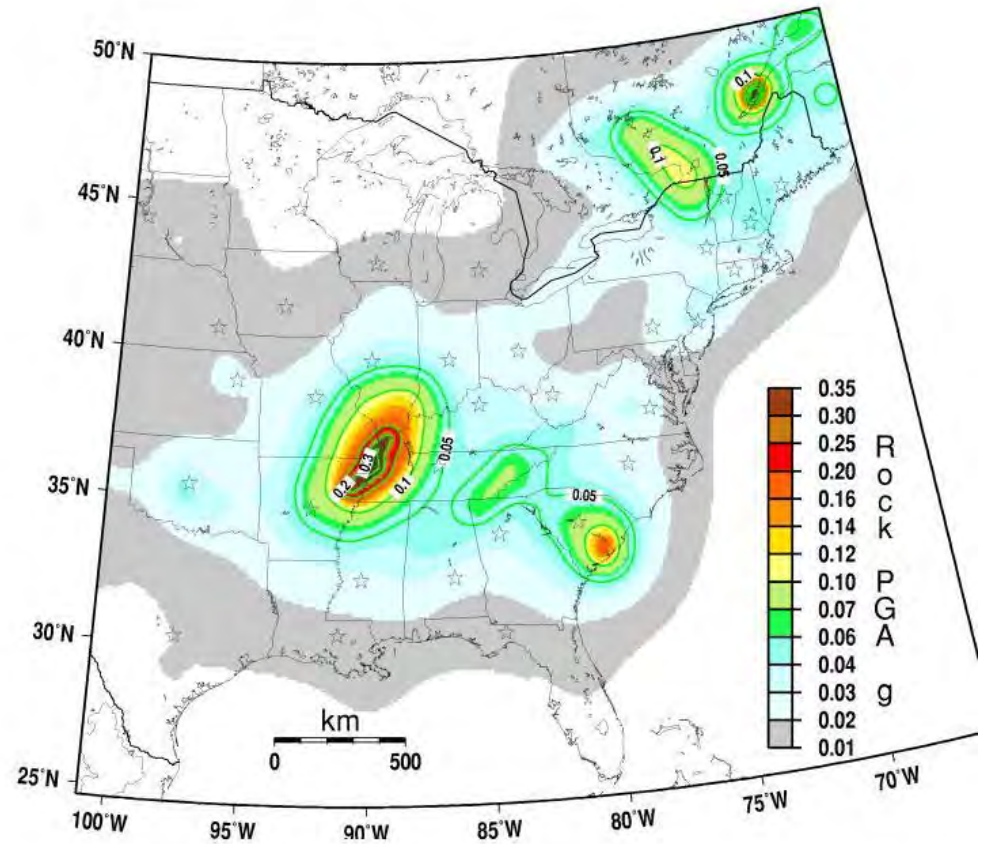
FIGURE A.4: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure A.5 shows the intensity level associated with Clay County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Clay County lies within an approximate zone of level "5" to "7" ground acceleration. This indicates that the county exists within an area of moderate seismic risk.

FIGURE A.5: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: United States Geological Survey, 2008

Historical Occurrences

At least 14 earthquakes are known to have affected Clay County since 1913. The strongest of these measured a V on the Modified Mercalli Intensity (MMI) scale. **Table A.18** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table A.19** presents a detailed occurrence of each event including the date, distance for the epicenter, and Modified Mercalli Intensity (if known).[18]

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

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Hayesville	7	V	< 4.8
Unincorporated Area	7	V	< 4.8
CLAY COUNTY TOTAL	**14**	**V**	**< 4.8**

Source: National Geophysical Data Center

[18] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

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

Location	Date	Epicentral Distance	Magnitude	MMI
Hayesville				
Hayesville	1/1/1935	19.0 km	--	IV
Hayesville	11/24/1957	29.0 km	--	III
Hayesville	11/9/1968	531.0 km	5.3	IV
Hayesville	11/30/1973	84.0 km	4.7	V
Hayesville	8/2/1974	179.0 km	4.9	III
Hayesville	7/27/1980	347.0 km	5.1	III
Hayesville	9/24/1982	79.0 km	3.4	III
Unincorporated Area				
Brasstown	4/17/1913	36.0 km	--	IV
Brasstown	1/1/1935	31.0 km	--	IV
Shooting Creek	1/1/1935	11.0 km	--	V
6 mi. from Hayesville	11/24/1957	29.0 km	--	IV
Brasstown	11/30/1973	84.0 km	4.7	IV
Warne	11/30/1973	89.0 km	4.7	IV
Brasstown	8/13/1979	44.0 km	3.7	IV

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Clay County is unlikely. However, it is likely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 10 and 100 percent (likely).

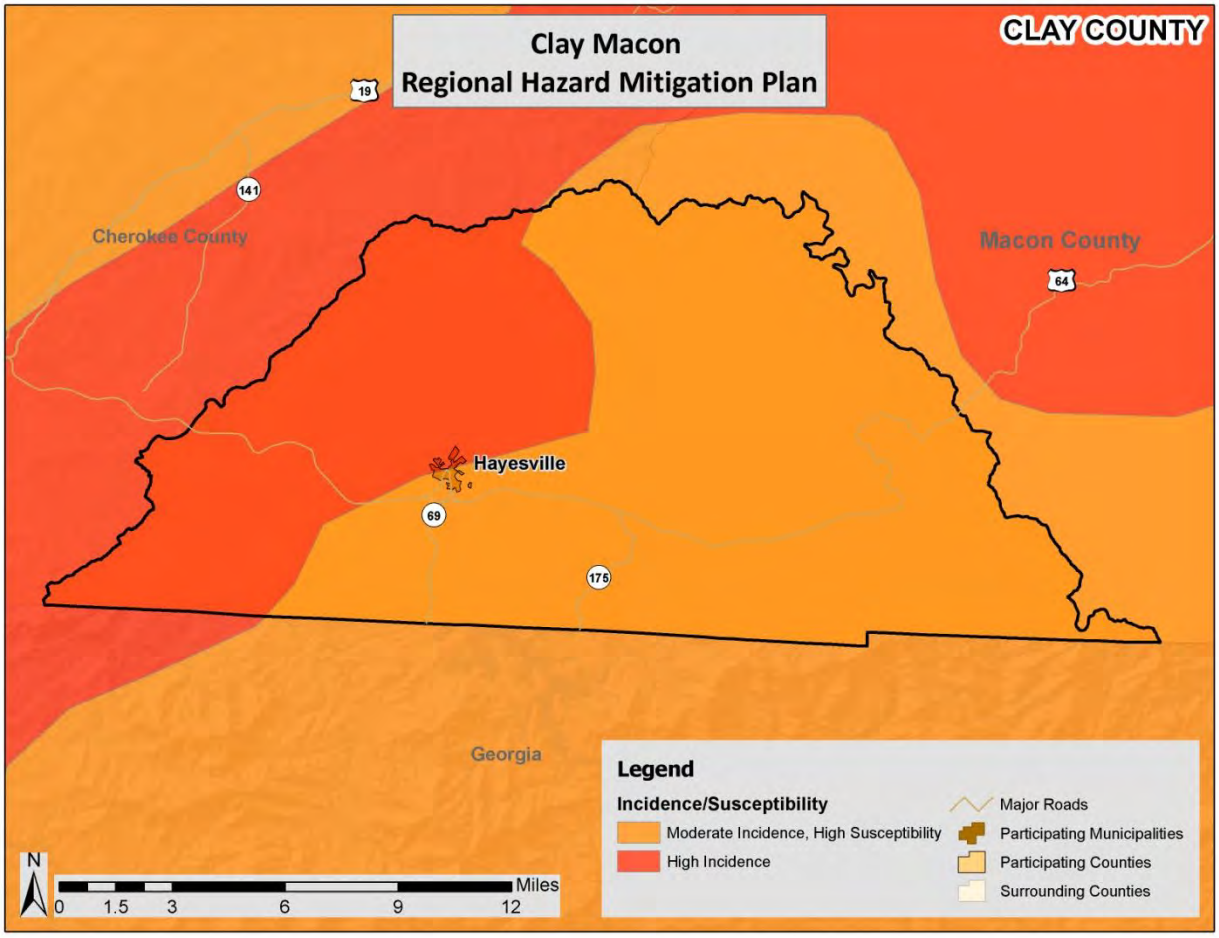
A.2.10 Landslide

Location and Spatial Extent

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

According to **Figure A.6** below, the majority of the county has moderate landslide activity. The remaining portion of the county, along the western border, has a high incidence occurrence rate. It should also be noted that there is high susceptibility throughout the entire county.

FIGURE A.6: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF CLAY COUNTY



Source: United States Geological Survey

Historical Occurrences

Steep topography throughout Clay County makes the planning area susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. **Table A.20** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey.[19] The georeferenced locations of the landslide events presented in the aforementioned tables are presented in **Figure A.7**. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Clay County.

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

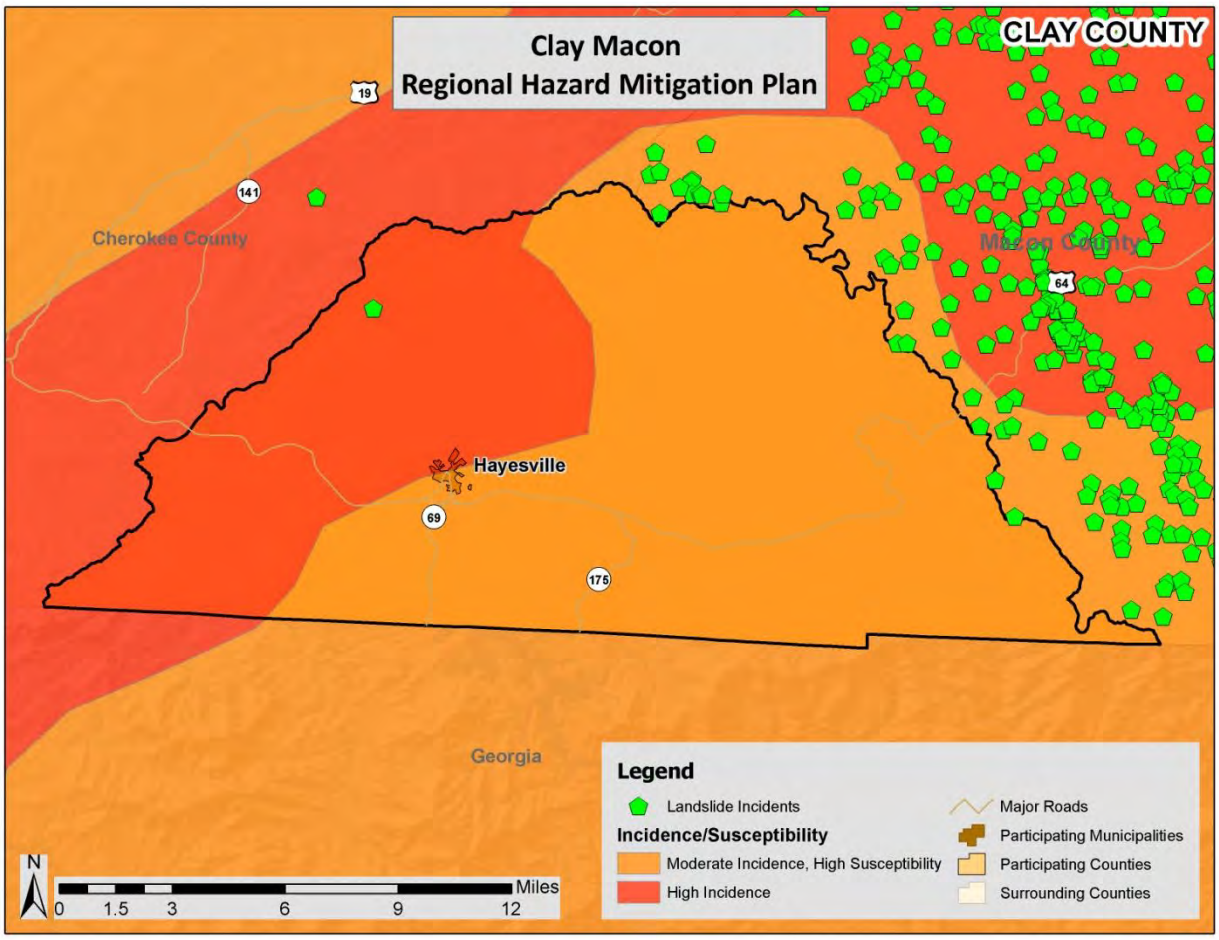
Location	Number of Occurrences
Hayesville	0

[19] It should be noted that the North Carolina Geological Survey (NCGS) emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

Location	Number of Occurrences
Unincorporated Area	1
CLAY COUNTY TOTAL	**1**

Source: North Carolina Geological Survey

FIGURE A.7: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN CLAY COUNTY



Source: North Carolina Geological Survey

There was no additional historical information reported in the previous county hazard mitigation plan.

Probability of Future Occurrences

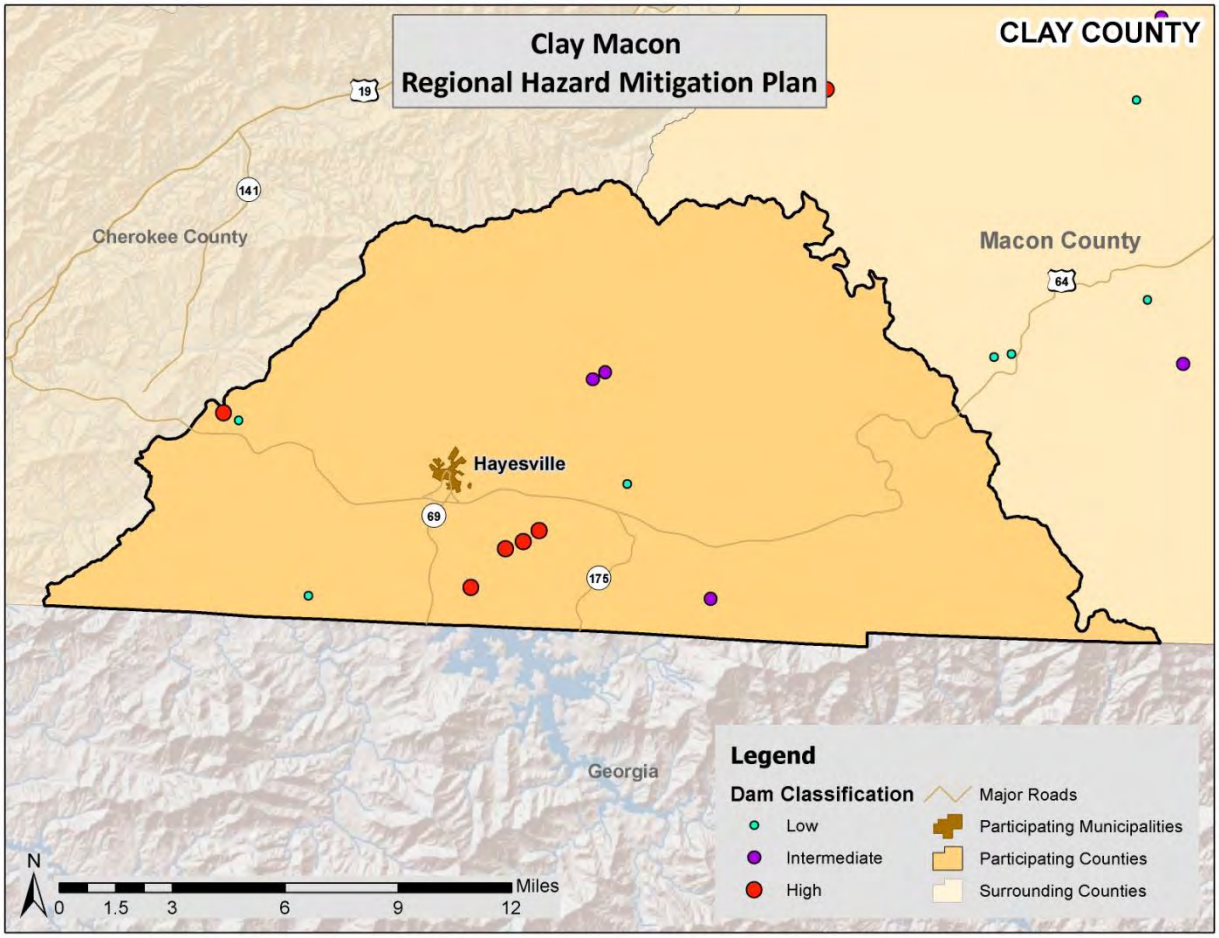
Based on historical information and the USGS susceptibility index, the probability of future landslide events is highly likely (100 percent annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Clay County have greater risk than others given factors such as steepness on slope and modification of slopes.

A.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division of Land Management there are 11 dams in Clay County.[20] **Figure A.8** shows the dam location and the corresponding hazard ranking for each. Of these dams, five are classified as high hazard potential. These high hazard dams are listed in **Table A.21**.

FIGURE A.8: CLAY COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources, 2013

TABLE A.21: CLAY COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Clay County				
Chatuge Lake Dam	High		247,800	Federal
Mission Lake Dam	High		5,433	Utility

[20] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Chatuge/Saddle Dam No. 1	High			Federal
Chatuge/Saddle Dam No. 2	High			Federal
Chatuge/Saddle Dam No. 3	High			Federal

Source: North Carolina Division of Land Resources, 2013

It should also be noted that the North Carolina dam classification regulations were recently updated. As a result of the change, more dams are generally classified as high hazard.

Historical Occurrences

There have been no dam breaches reported in the county. However, it should be noted that several breach scenarios in the county could be catastrophic.

There was no information provided on historical dam failure events in the previous county hazard mitigation plan.

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

A.2.12 Erosion

Location and Spatial Extent

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

Historical Occurrences

Several sources were vetted to identify areas of erosion in Clay County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Erosion was not addressed in the previous Clay County hazard mitigation plan.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Clay County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent).

A.2.13 Flood

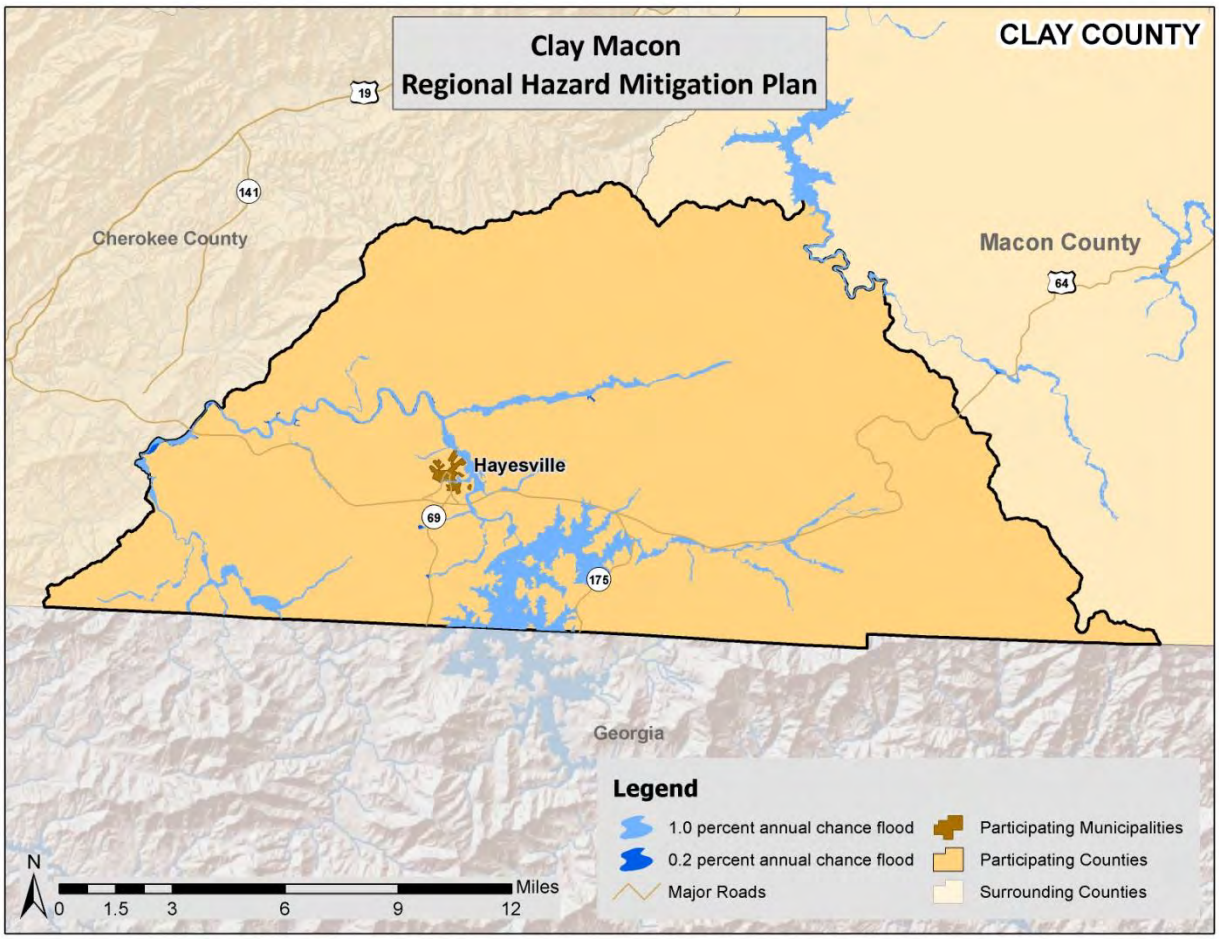
Location and Spatial Extent

There are areas in Clay County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate

Maps (DFIRM).[21] This includes Zone AE (1-percent annual chance floodplain with elevation) and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 221 square miles that make up Clay County, there are 12.3 square miles of land in zone AE (1-percent annual chance floodplain/100-year floodplain) and 0.2 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 5.7 percent of the total land area in Clay County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure A.9** and **Figure A.10** illustrate the location and extent of currently mapped special flood hazard areas for Clay County and its municipality based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

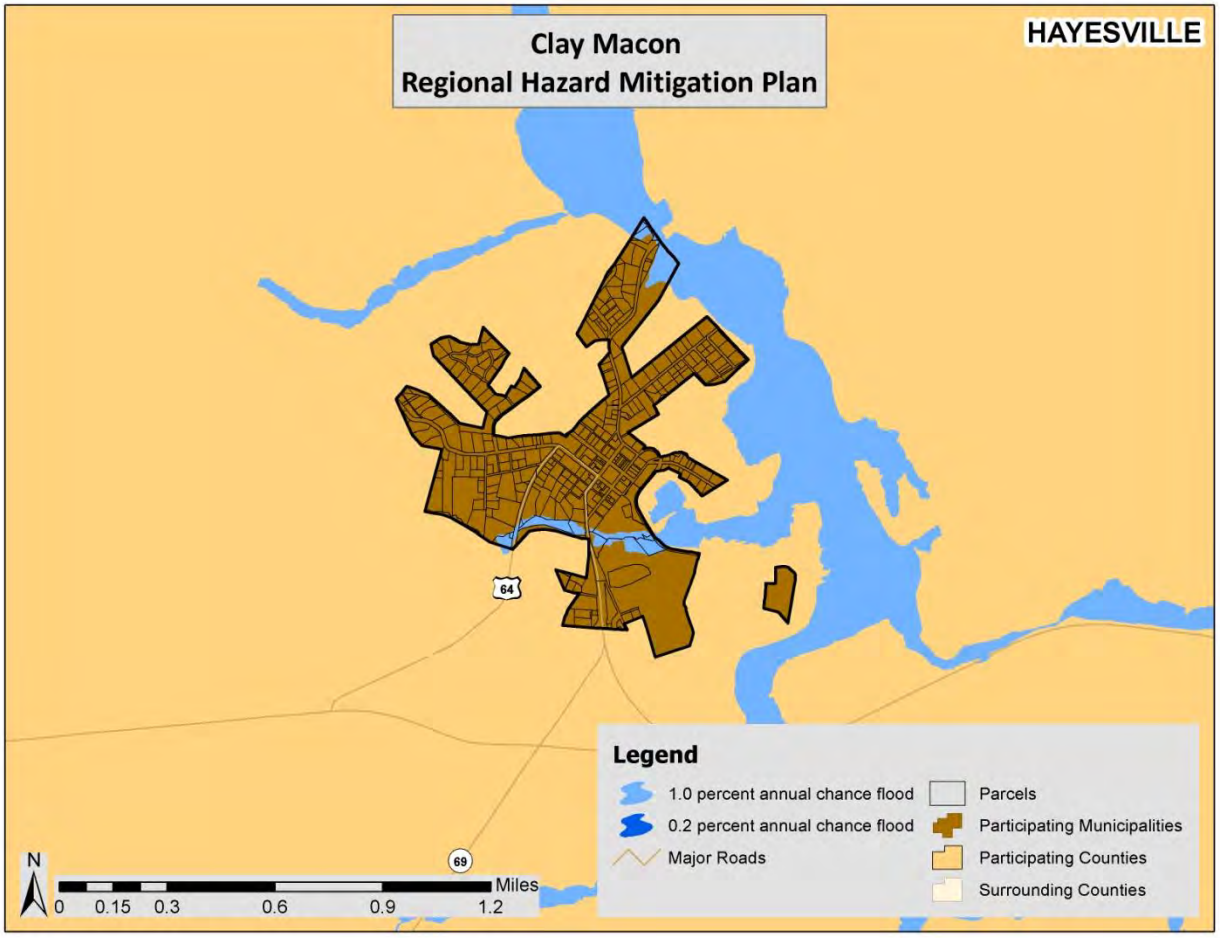
FIGURE A.9: SPECIAL FLOOD HAZARD AREAS IN CLAY COUNTY



Source: Federal Emergency Management Agency

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

FIGURE A.10: SPECIAL FLOOD HAZARD AREAS IN HAYESVILLE



Source: Federal Emergency Management Agency

Historical Occurrences

Flooding was at least partially responsible for two disaster declarations in Clay County in 1973 and 1995.[22] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of five events in Clay County since 1998.[23] A summary of these events is presented in **Table A.22**. These events accounted for over $1.2 million (2014 dollars) in property damage in the county.[24] Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in **Table A.23**.

TABLE A.22: SUMMARY OF FLOOD OCCURRENCES IN CLAY COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Hayesville	0	0/0	$0

[22] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[23] These flood events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is likely that additional occurrences have occurred and have gone unreported.
[24] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Unincorporated Area	5	0/0	$1,234,139
CLAY COUNTY TOTAL	**5**	**0/0**	**$1,234,139**

Source: National Climatic Data Center

TABLE A.23: HISTORICAL FLOOD EVENTS IN CLAY COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Hayesville				
None Reported	--	--	--	--
Unincorporated Area				
COUNTYWIDE	1/7/1998	Flood	0/0	$0
COUNTYWIDE	1/7/1998	Flash Flood	0/0	$0
COUNTYWIDE	5/6/2003	Flash Flood	0/0	$1,234,139
SOUTHWEST PORTION	7/16/2003	Flash Flood	0/0	$0
WARNE	9/21/2009	Flood	0/0	$0

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of September 2014, there have been 13 flood losses reported in Clay County through the National Flood Insurance Program (NFIP) since 1978, totaling just over $74,000 in claims payments. A summary of these figures for the county is provided in **Table A.24**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Clay County were either uninsured, denied claims payment, or not reported.

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

Location	Flood Losses	Claims Payments
Hayesville	0	$0
Unincorporated Area	13	$74,129
CLAY COUNTY TOTAL	**13**	**$74,129**

Source: Federal Emergency Management Agency; National Flood Insurance Program

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 July 2014, there are no non-mitigated repetitive loss property located in Clay County. **Table A.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Clay County.

TABLE A.25: REPETITIVE LOSS PROPERTIES IN CLAY COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Contents Payments	Total Payments	Average Payment
Hayesville	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
CLAY COUNTY TOTAL							

Source: National Flood Insurance Program

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Clay County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdiction and unincorporated areas of the county have risk to flooding, though not all areas will experience floods. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

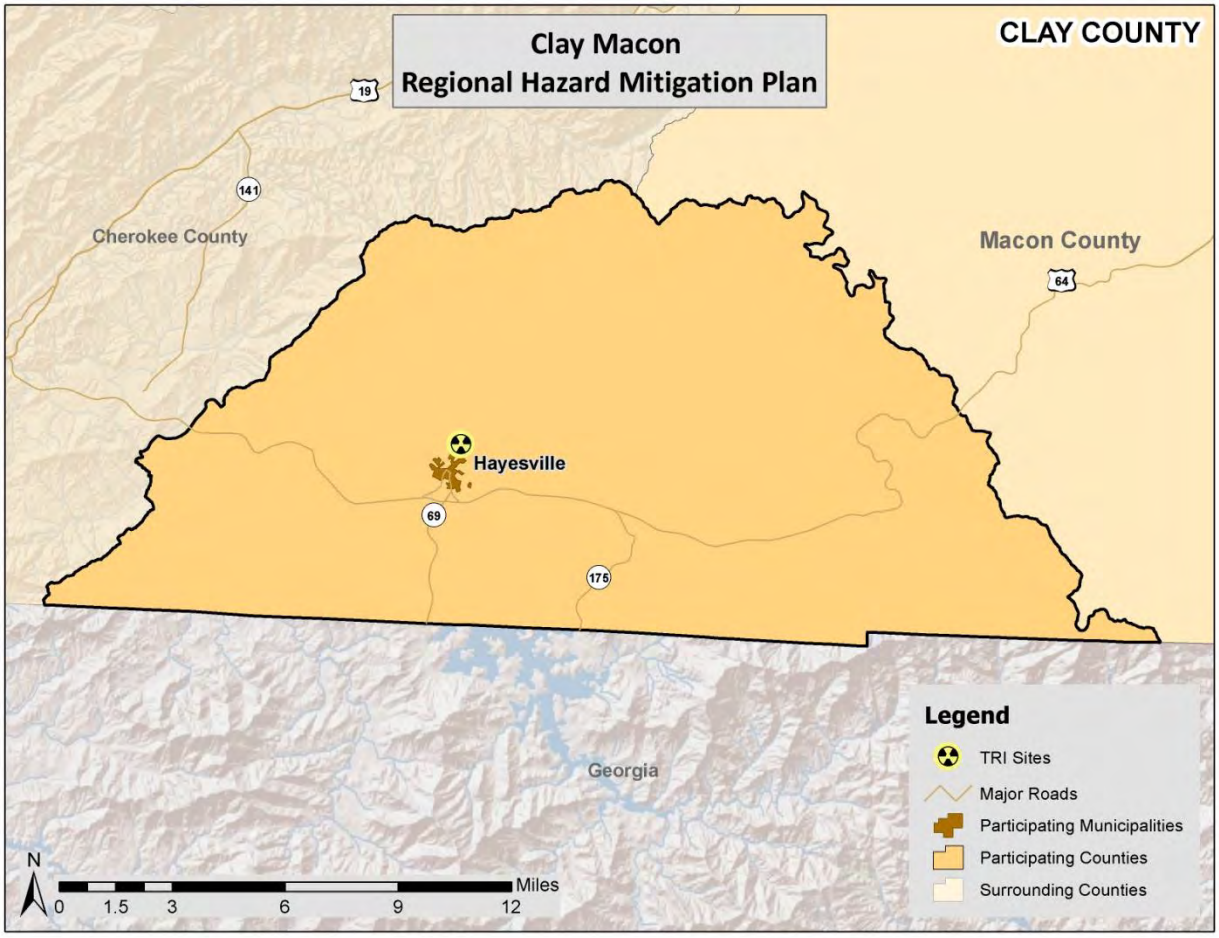
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, the southwestern portion of the county has more floodplain and thus a higher risk of flood than the rest of the county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

A.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Clay County has one TRI site. This site is shown in **Figure A.11.**

FIGURE A.11: TOXIC RELEASE INVENTORY (TRI) SITES IN CLAY COUNTY



Source: Environmental Protection Agency

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

Historical Occurrences

There have been no recorded HAZMAT incidents in Clay County since 1971 (**Table A.26**). **Table A.27** presents detailed information on historic HAZMAT incidents in Clay County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

TABLE A.26: SUMMARY OF HAZMAT INCIDENTS IN CLAY COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Hayesville	0	0/0	$0
Unincorporated Area	0	0/0	$0
CLAY COUNTY TOTAL	**0**	**0/0**	**$0**

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE A.27: HAZMAT INCIDENTS IN CLAY COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Hayesville							
None Reported	--	--	--	--	--	--	--
Unincorporated Area							
None Reported	--	--	--	--	--	--	--

*Property damage is reported in 2014 dollars.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Probability of Future Occurrences

Given the location of one toxic release inventory site in Clay County and potential future roadway incidents, it is possible that a hazardous material incident may occur in the county (between 1 and 10 percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence. The county may also be impacted by neighboring counties which also face risk due to TRI sites.

A.2.15 Wildfire

Location and Spatial Extent

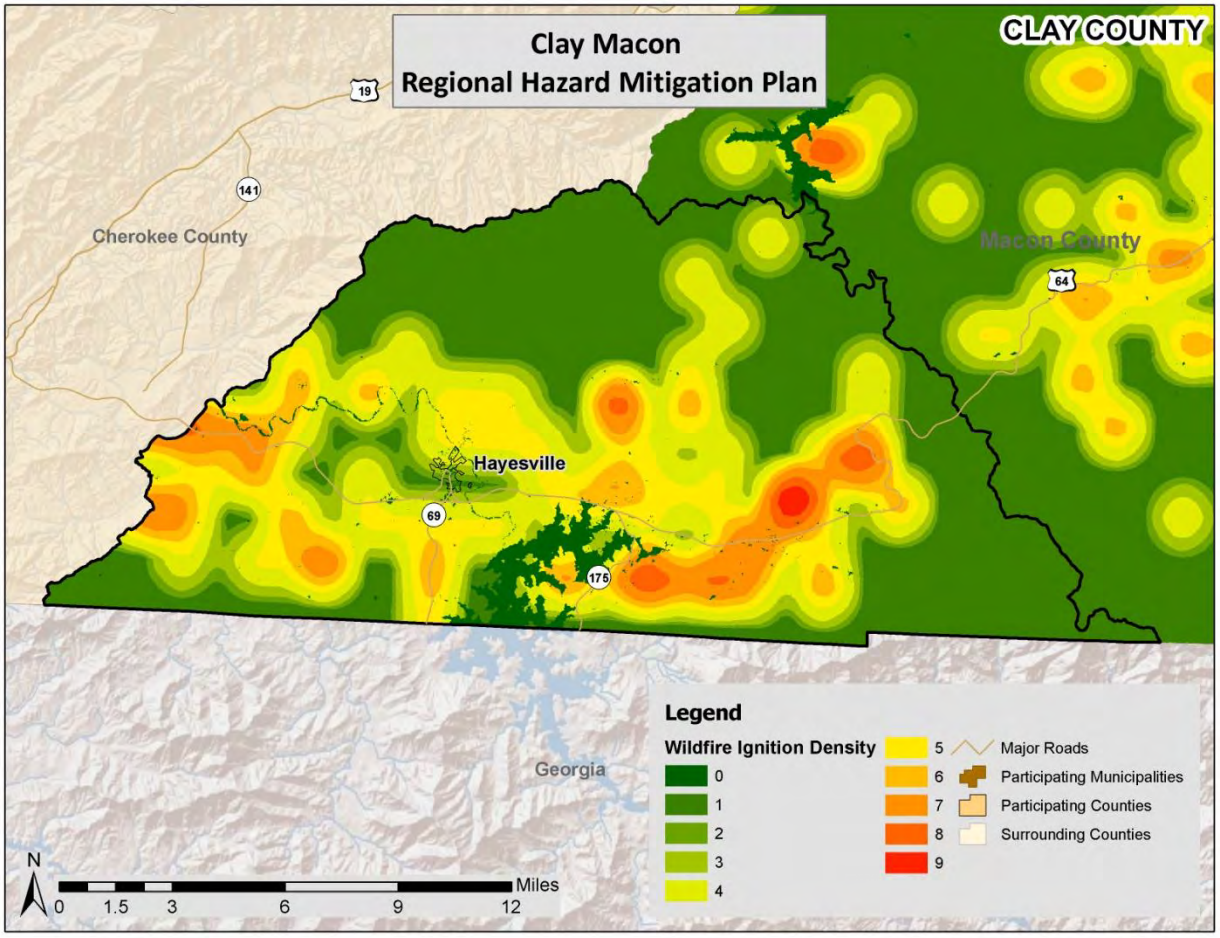
The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Wildfire Ignition Density shown in the figure below gives an indication of historic location.

Historical Occurrences

Figure A.12 shows the Wildfire Ignition Density in Clay County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.[25]

[25] Southern Wildfire Risk Assessment, 2014.

FIGURE A.12: WILDFIRE IGNITION DENSITY IN CLAY COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2004 to 2013, Clay County experienced an average of 19 wildfires annually which burn an average of 83 acres per year. The data indicates that most of these fires are small, averaging four acres per fire. **Table A.28** lists the number of reported wildfire occurrences in the county between the years 2004 and 2013.

TABLE A.28: HISTORICAL WILDFIRE OCCURRENCES IN CLAY COUNTY

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Clay County										
Number of Fires	20	14	18	26	29	24	17	18	13	8
Number of Acres	145.1	32.9	86.4	111.6	276.2	26.3	17.1	54.1	47.5	35.9

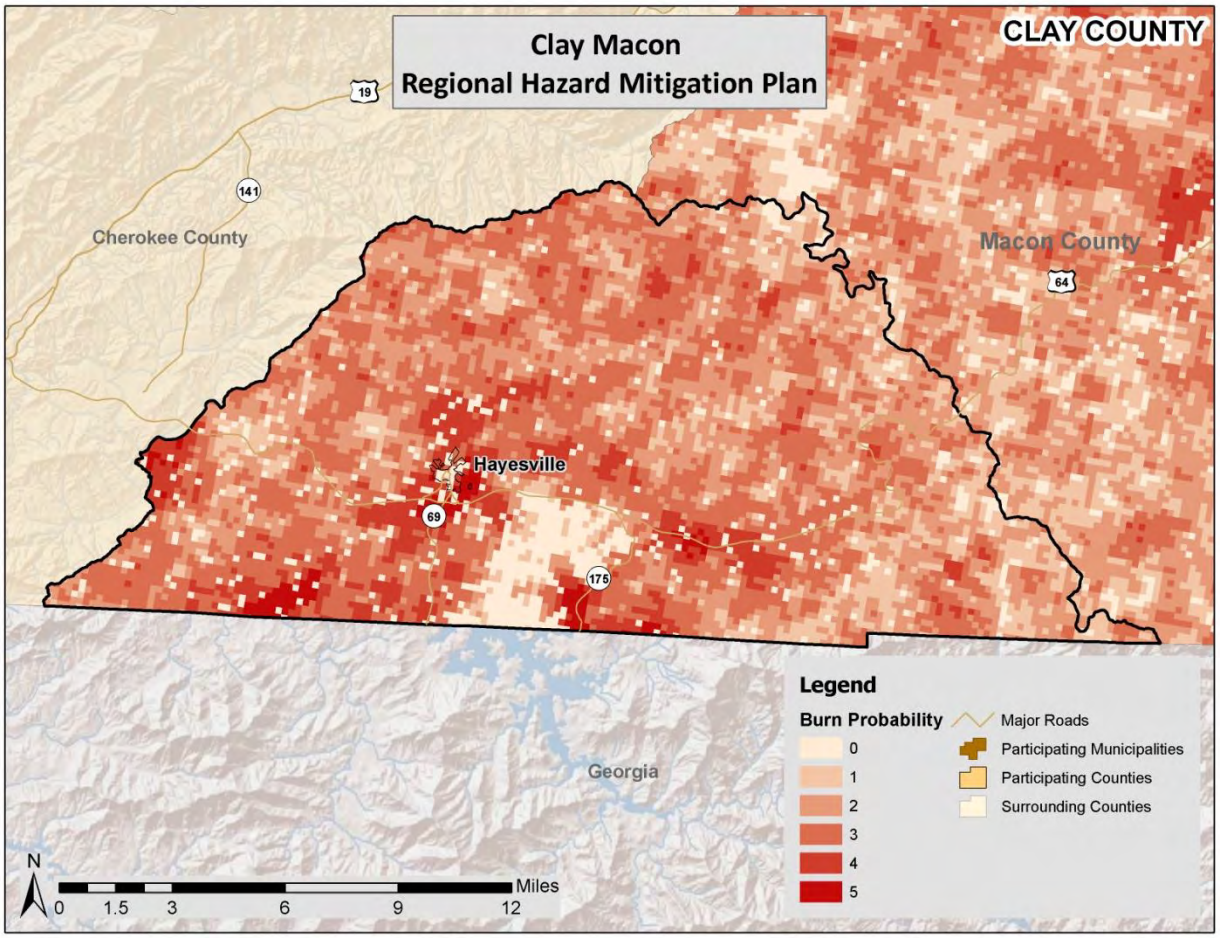
Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Clay County. **Figure A.13** shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases

during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. In this case, the participating jurisdictions appear to have a similar risk to the surrounding areas. The probability assigned to Clay County for future wildfire events is likely (10 to 100 percent annual probability).

FIGURE A.13: BURN PROBABILITY IN CLAY COUNTY



Source: Southern Wildfire Risk Assessment

A.2.16 Conclusions on Hazard Risk

The hazard profiles presented above were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and

experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

Hazard Extent

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

TABLE A.29: EXTENT OF CLAY COUNTY HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the PDSI classifications which include Extremely Moist, Very Moist, Mid-Range, Moderate Drought, Severe Drought, and Extreme Drought classifications (pages 5:5-5:6). According to PDSI classifications, the most severe drought condition is Extreme. Clay County has received this ranking twice over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. However, records are not available for Clay County. The highest temperature recorded in neighboring Macon County was 101 degrees Fahrenheit (reported on July 29, 1952).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Clay County was 1.75 inches (last reported on April 26, 2012). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through Clay County was Hurricane Frances in 2004. This storm carried tropical depression force winds of 22 knots (approximately 25 mph) upon arrival in Clay County. However, it should be noted that stronger storm could impact the county without a direct hit.
Lightning	According to the Vaisala flash density map (Figure 5.5), Clay County is located in an area that experiences 2 to 4 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 59-year history from the National Climatic Data Center, the strongest recorded wind event in Clay County was last reported on October 17, 2006 at 65 knots (approximately 75 mph). It should be noted that future events may exceed this historical occurrence.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.15 and 5.16). The greatest magnitude reported in the county was an F1 (last reported on April 25, 2010).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). However, records are not available for Clay County. The greatest 24-hour snowfall reported in neighboring Macon County was 25.5 inches on March 3, 1993. Due to extreme variations in elevation throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.

Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from Clay County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was V (slightly strong) with a correlating Richter Scale measurement of approximately 4.8 (last reported on November 30, 1973). The epicenter of this earthquake was located 84.0 km away.
Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is moderate across the majority of Clay County (there is high incidence along the western border of the county). There is also high susceptibility throughout the county.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 11 dams in Clay County, 5 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Clay County.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 5.7 percent of the total land area in Clay County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the county. While a gage does not exist within each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was at Hiwassee River below Hayesville on October 3, 1898. Water reached a discharge of 17,000 cubic feet per second and the stream gage height was recorded at 16.10 feet.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, there have been no hazardous materials incident reported in the county. It should be noted that future events are possible and the largest incident reported in neighboring Macon County was 8,000 LGA released on the highway on December 27, 1979 (larger events are also possible).
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2004-2013. The greatest number of fires to occur in Clay County in any year was 29 in 2008. The greatest number of acres to burn in the county in a single year occurred in 2008 when 276 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Clay County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.18.2.

Table A.30 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles

developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE A.30: SUMMARY OF PRI RESULTS FOR CLAY COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Unlikely	Minor	Large	More than 24 hours	Less than 1 week	**1.8**
Hailstorm	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Hurricane and Tropical Storm	Possible	Limited	Large	More than 24 hours	Less than 24 hours	**2.3**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm / High Wind	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	**3.1**
Tornado	Possible	Critical	Small	Less than 6 hours	Less than 6 hours	**2.4**
Winter Storm and Freeze	Highly Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.3**
Geologic Hazards						
Earthquake	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Landslide	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**3.0**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Erosion	Likely	Minor	Small	More than 24 hours	More than 1 week	**2.1**
Flood	Likely	Critical	Small	6 to 12 hours	Less than 1 week	**2.8**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.3**

A.2.17 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Clay County, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table A.31**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Clay County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section A.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE A.31: CONCLUSIONS ON HAZARD RISK FOR CLAY COUNTY

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

A.3 CLAY COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Clay County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

A.3.1 Asset Inventory

Table A.32 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for participating areas of the Clay Macon Region (study area of vulnerability assessment).[26]

[26] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

TABLE A.32: IMPROVED PROPERTY IN CLAY COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings[27]	Total Assessed Value of Improvements
Hayesville	256	$33,188,000	250	$23,563,213
Unincorporated Area	16,664	$2,231,079,900	9,115	$972,985,052
CLAY COUNTY TOTAL	**16,920**	**$2,264,267,900**	**9,365**	**$996,548,265**

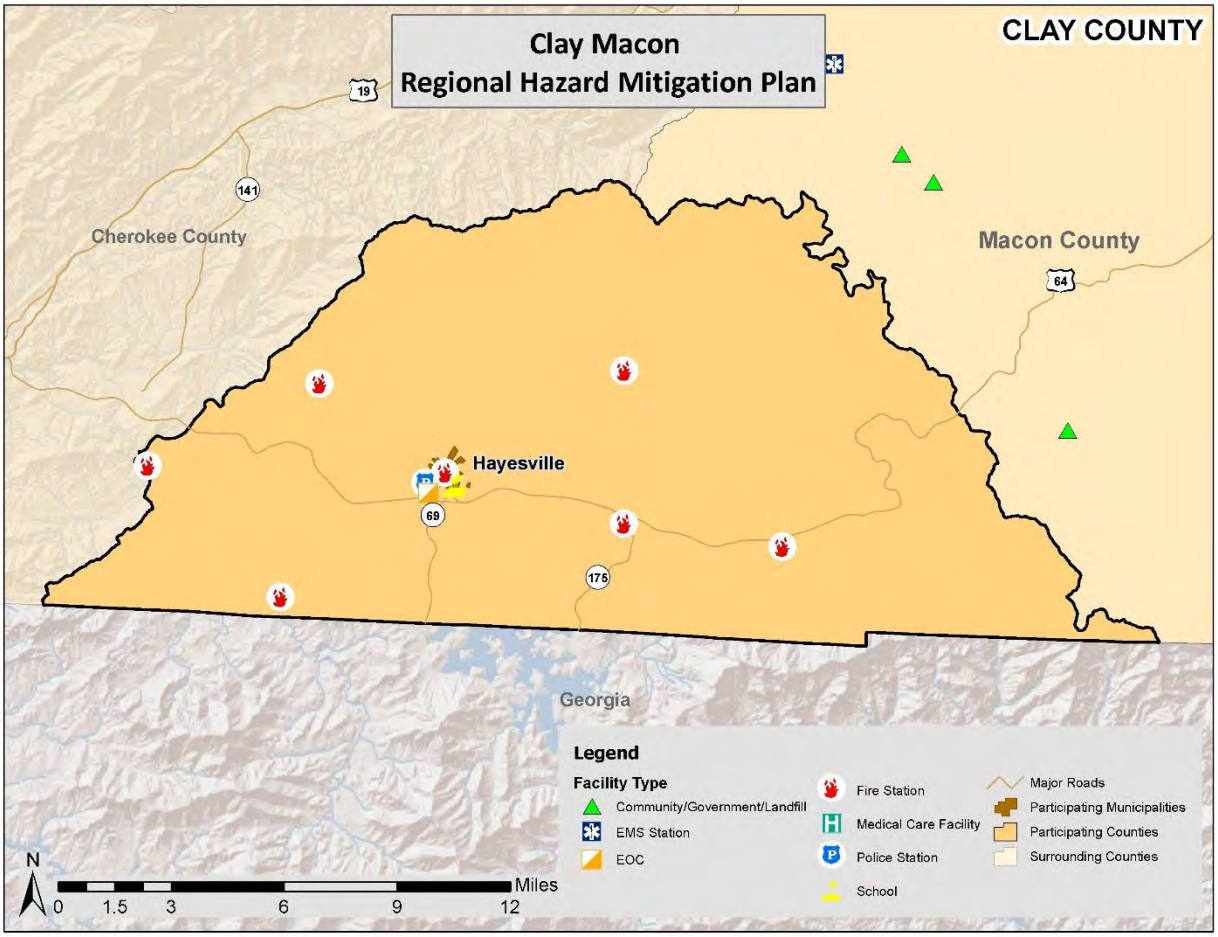
Table A.33 lists the fire stations, EMS stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in Clay County. Local county GIS departments supplied the critical facility data, though other local officials contributed information as well. It should be noted that some counties did not have digital data available for some of the critical facility categories. Therefore, information provided may be incomplete. In addition, **Figure A.14** shows the locations of essential facilities in Clay County. **Table A.45**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the county.

TABLE A.33: CRITICAL FACILITY INVENTORY IN CLAY COUNTY

Location	Fire Stations	EMS Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Hayesville	1	0	0	0	0	3	0
Unincorporated Area	6	1	1	0	0	0	0
CLAY COUNTY TOTAL	**7**	**1**	**1**	**0**	**1**	**3**	**0**

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

FIGURE A.14: CRITICAL FACILITY LOCATIONS IN CLAY COUNTY



Source: Local Government GIS Departments

A.3.2 Social Vulnerability

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

Table A.34 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Clay County according to Census data is 10,587 persons. Additional population estimates are presented above in Section A.1.

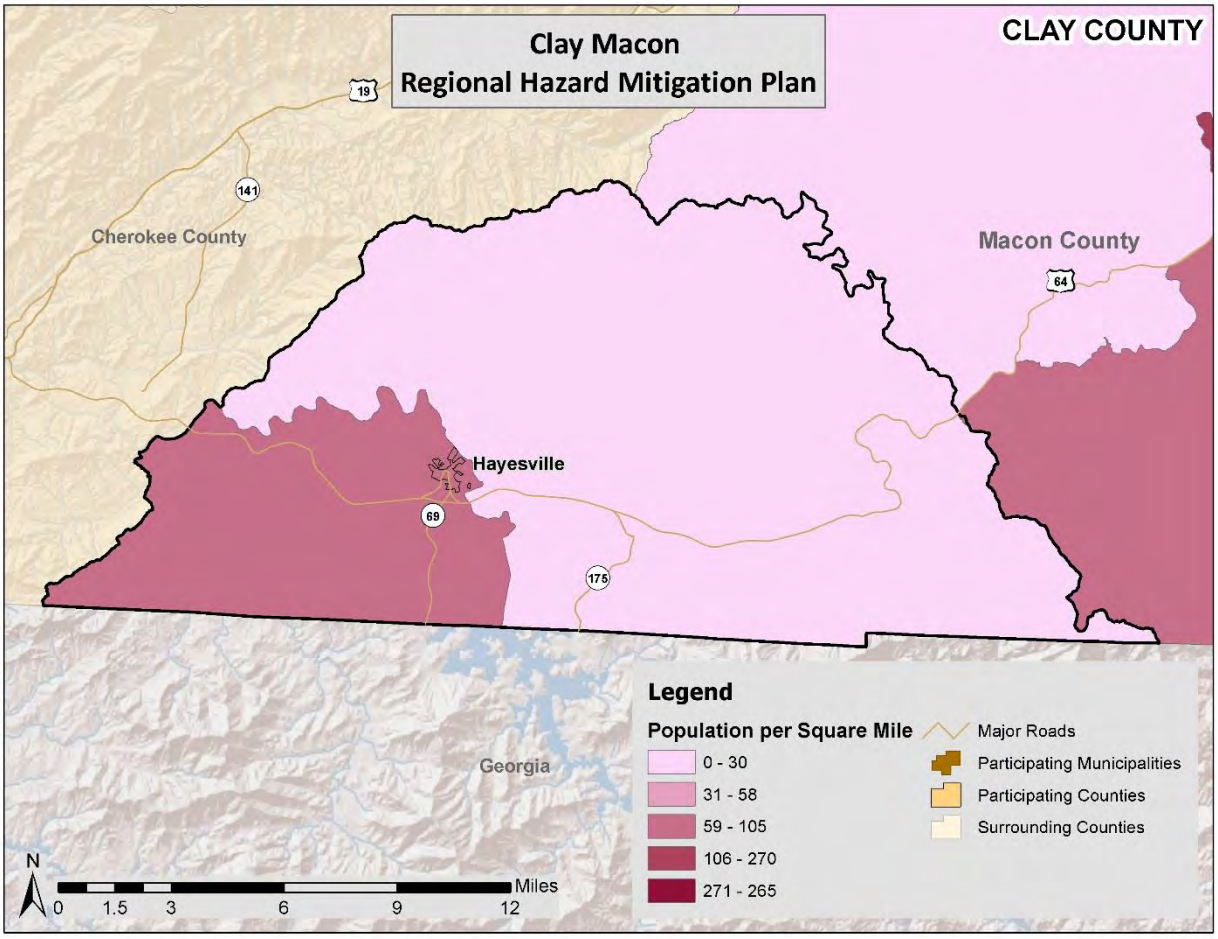
TABLE A.34: TOTAL POPULATION IN CLAY COUNTY

Jurisdiction	2010 Census Population
Clay County	**10,587**
Town of Hayesville	311

Source: United States Census 2010

In addition, **Figure A.15** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE A.15: POPULATION DENSITY IN CLAY COUNTY



Source: United States Census Bureau, 2010

A.3.3 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Clay County, are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (erosion, dam and levee failure). The total county exposure, and thus risk, was presented in **Table A.32**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table A.44.**

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

Hurricane and Tropical Storm

Historical evidence indicates that Clay County has some risk to the hurricane and tropical storm hazard. Several tracks have come near or traversed through the county, as shown and discussed in Section A.2.4.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the county as shown below in **Table A.35.** Only losses to buildings are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE A.35: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Clay County	$9,000

Source: Hazus-MH 2.1

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

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

Location	50-year event	100-year event	500-year event	1,000-year event
Hayesville	50.4	59.6	77.6	84.1
Unincorporated Area	50.4	59.6	77.6	85.5
MAXIMUM WIND SPEED REPORTED	**50.4**	**59.6**	**77.6**	**85.5**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across Clay County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Clay County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for the region. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table A.37** summarizes the findings.

TABLE A.37: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Clay County	$40,000

Source: Hazus-MH 2.1

Social Vulnerability

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

Critical Facilities

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table A.45**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Clay County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

Landslide

In order to complete the vulnerability assessment for landslides in Clay County, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section A.2.10), county level tax parcel data, and GIS analysis. **Table A.38** presents the potential at-risk property where available. All of Clay County is identified as either moderate or high incidence areas by the USGS landslide data and all areas of the county are also of high landslide susceptibility. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE A.38: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk		Number of Improvements At Risk		Total Value of Improvements At Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Hayesville	158	112	139	117	$17,394,328	$7,350,002
Unincorporated Area	10,485	6,335	5,873	3,260	$671,219,022	$315,685,950
CLAY COUNTY TOTAL	**10,643**	**6,447**	**6,012**	**3,377**	**$688,613,350**	**$323,035,952**

Source: United States Geological Survey

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

Critical Facilities
All critical facilities in Clay County are located in a high susceptibility area. Additionally, three fire stations are located in a high incidence area. All remaining critical facilities are located within a moderate incidence area. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in Clay County, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for county assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

Flood

Historical evidence indicates that Clay County is susceptible to flood events. A total of five flood events have been reported by the National Climatic Data Center resulting in $1.2 million (2014 dollars) in damages. On an annualized level, these damages amounted to $77,134 for Clay County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for the county. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table A.39** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

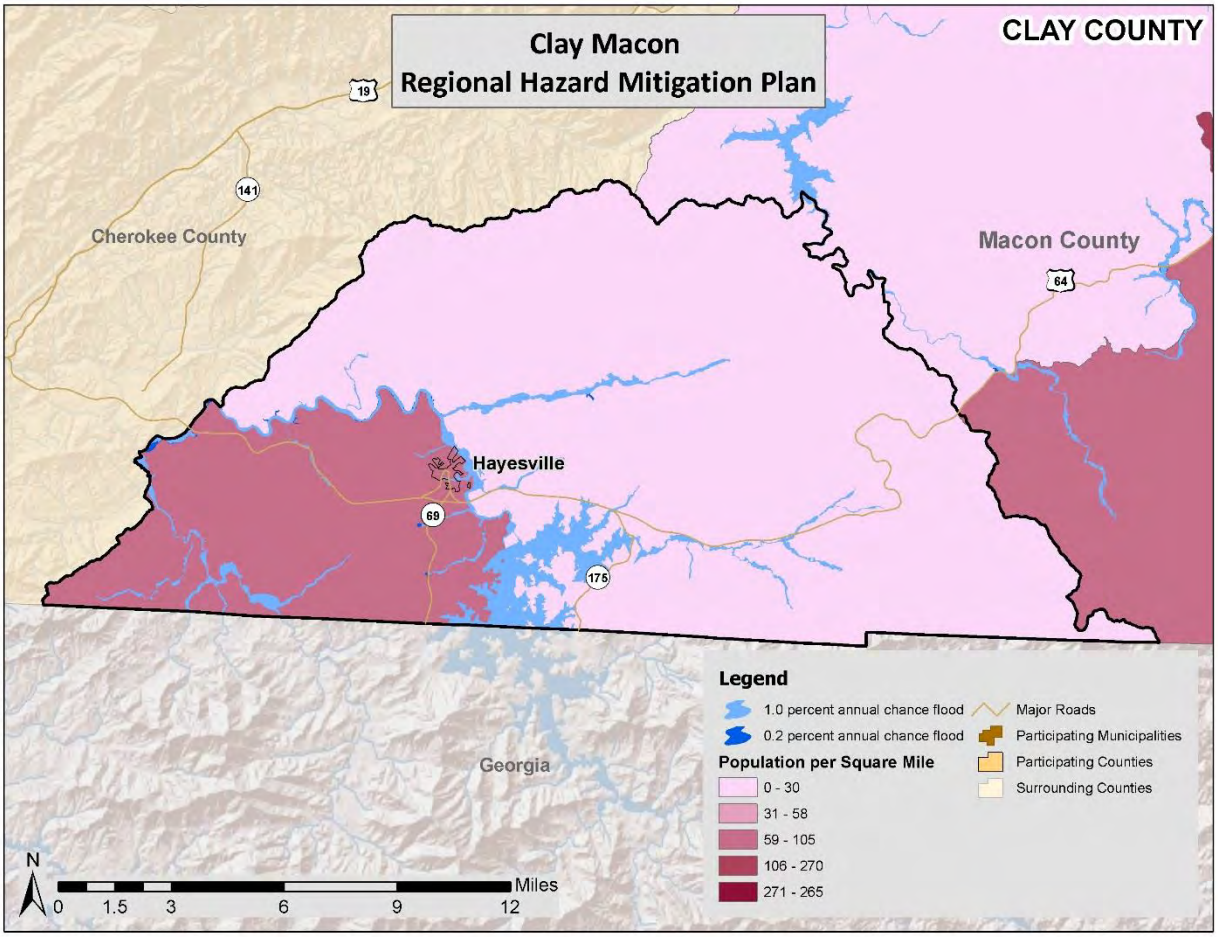
TABLE A.39: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Hayesville	14	5	$497,007	0	0	$0
Unincorporated Area	2,567	475	$170,894,356	264	39	$21,229,327
CLAY COUNTY TOTAL	**2,581**	**480**	**$171,391,363**	**264**	**39**	**$21,229,327**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability
Since 2010 population was only available at the tract level, it was difficult to determine a reliable figure on population at-risk to flood due to tract level population data. **Figure A.16** is presented to gain a better understanding of at risk population.

FIGURE A.16 : POPULATION DENSITY NEAR FLOODPLAINS



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

The critical facility analysis revealed that there is one fire station located in the Clay County 1.0-percent annual chance floodplain and no critical facilities located in the 0.2-percent annual change floodplain based on FEMA DFIRM boundaries and GIS analysis. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Clay County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Hazardous Materials Incident

Although historical evidence and existing Toxic Release Inventory sites indicate that Clay County is susceptible to hazardous materials events, there are few reports of damage. Therefore, it is difficult to

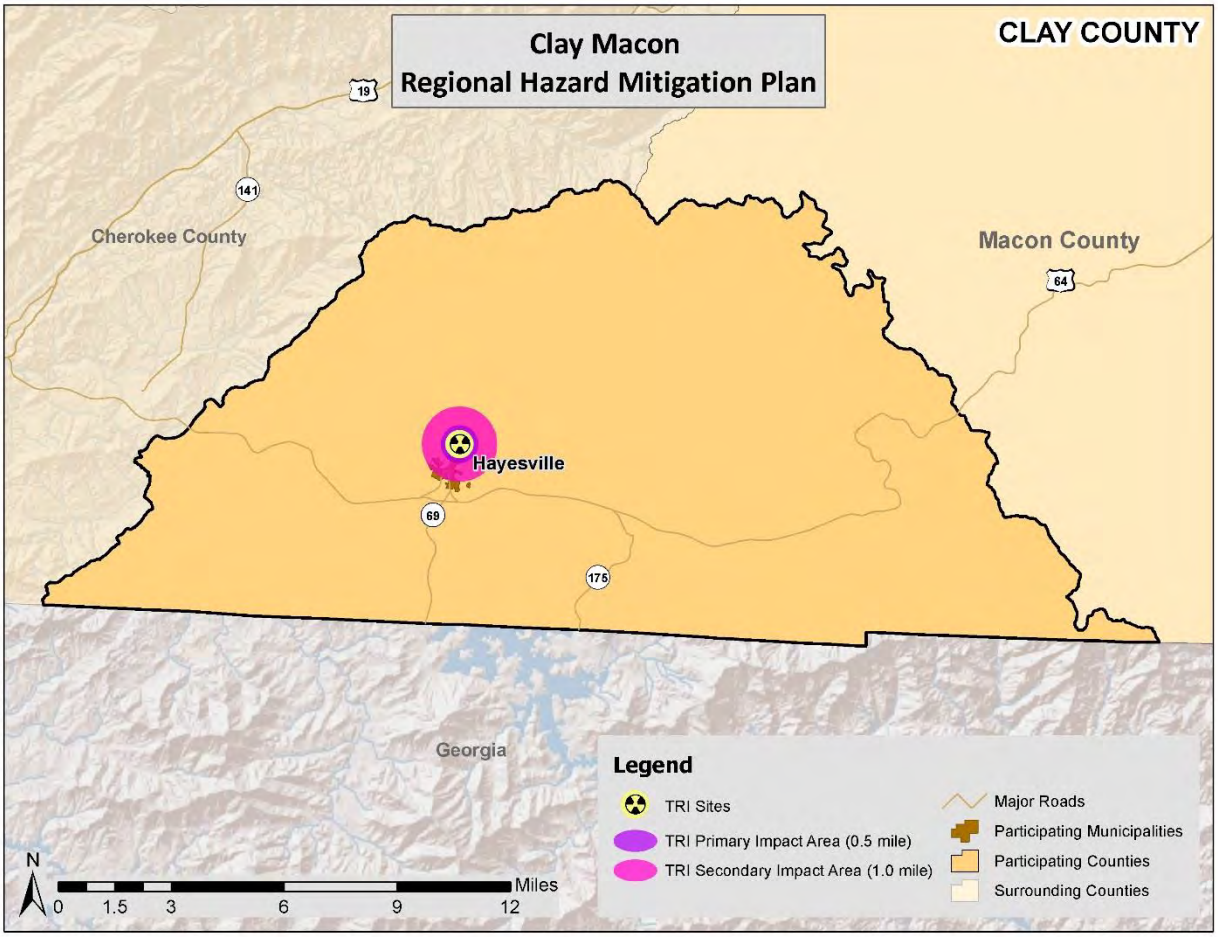
calculate a reliable annualized loss figure. It is assumed that while one major event could result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annualized loss estimate for Clay County.

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

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[28] In both scenarios, two sizes of buffers—0.5 and 1.0 miles—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in Clay County, along with buffers, were used for analysis as shown in **Figure A.17.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure A.18** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table A.40** (fixed sites), **Table A.41** (mobile road sites) and **Table A.42** (mobile railroad sites).[29]

[28] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an event).
[29] Note that parcels included in the 0.5-mile analysis are also included in the 1.0-mile analysis.

FIGURE A.17 : TRI SITES WITH BUFFERS IN CLAY COUNTY



Source: Environmental Protection Agency

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

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Hayesville	49	51	$2,941,934	239	218	$20,923,820
Unincorporated Area	204	126	$16,366,596	665	360	$69,695,050
CLAY COUNTY TOTAL	**253**	**177**	**$19,308,530**	**904**	**578**	**$90,618,870**

FIGURE A.18 : MOBILE HAZMAT BUFFERS IN CLAY COUNTY

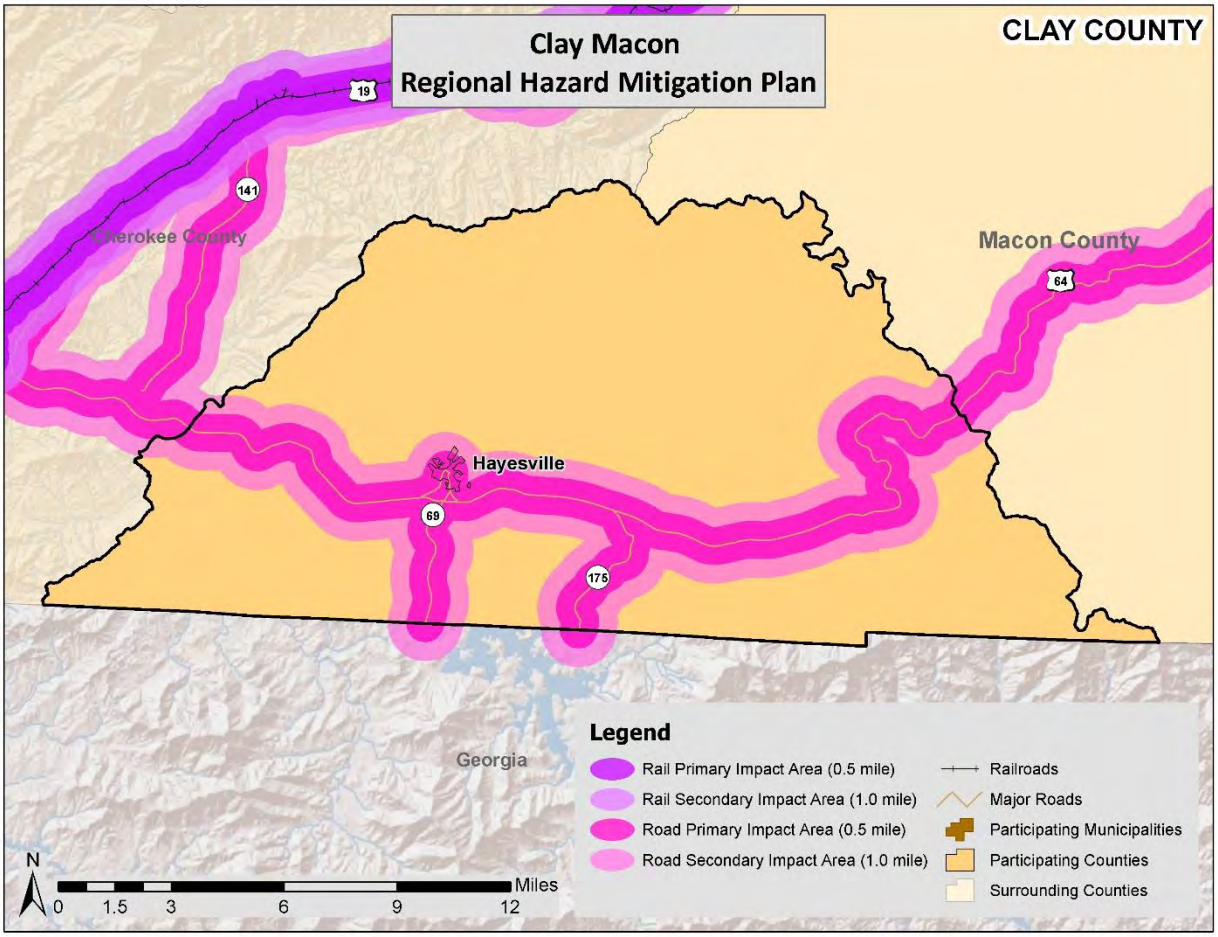


TABLE A.41: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

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
Hayesville	251	240	$23,002,067	256	250	$23,563,213
Unincorporated Area	5,774	3,468	$418,174,097	9,081	5,210	$616,470,210
CLAY COUNTY TOTAL	**6,025**	**3,708**	**$441,176,164**	**9,337**	**5,460**	**$640,033,423**

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

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Hayesville	256	250	$23,563,213	256	250	$23,563,213
Unincorporated Area	16,664	9,115	$972,985,052	16,664	9,115	$972,985,052
CLAY COUNTY TOTAL	**16,920**	**9,365**	**$996,548,265**	**16,920**	**9,365**	**$996,548,265**

Social Vulnerability

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

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are no Clay County facilities located in a HAZMAT risk zone. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Clay County revealed that there are nine critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and no critical facilities located in the railroad HAZMAT buffer areas. The 1.0-mile road buffer area (worst case scenario modeled) includes the following critical facilities in Clay County: 3 fire stations, 1 EMS station, 1 EOC, 1 police station, and 3 schools. It should be noted that many of the facilities located in the buffer areas for road are also located in the buffer areas for the fixed site analysis. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

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

Wildfire

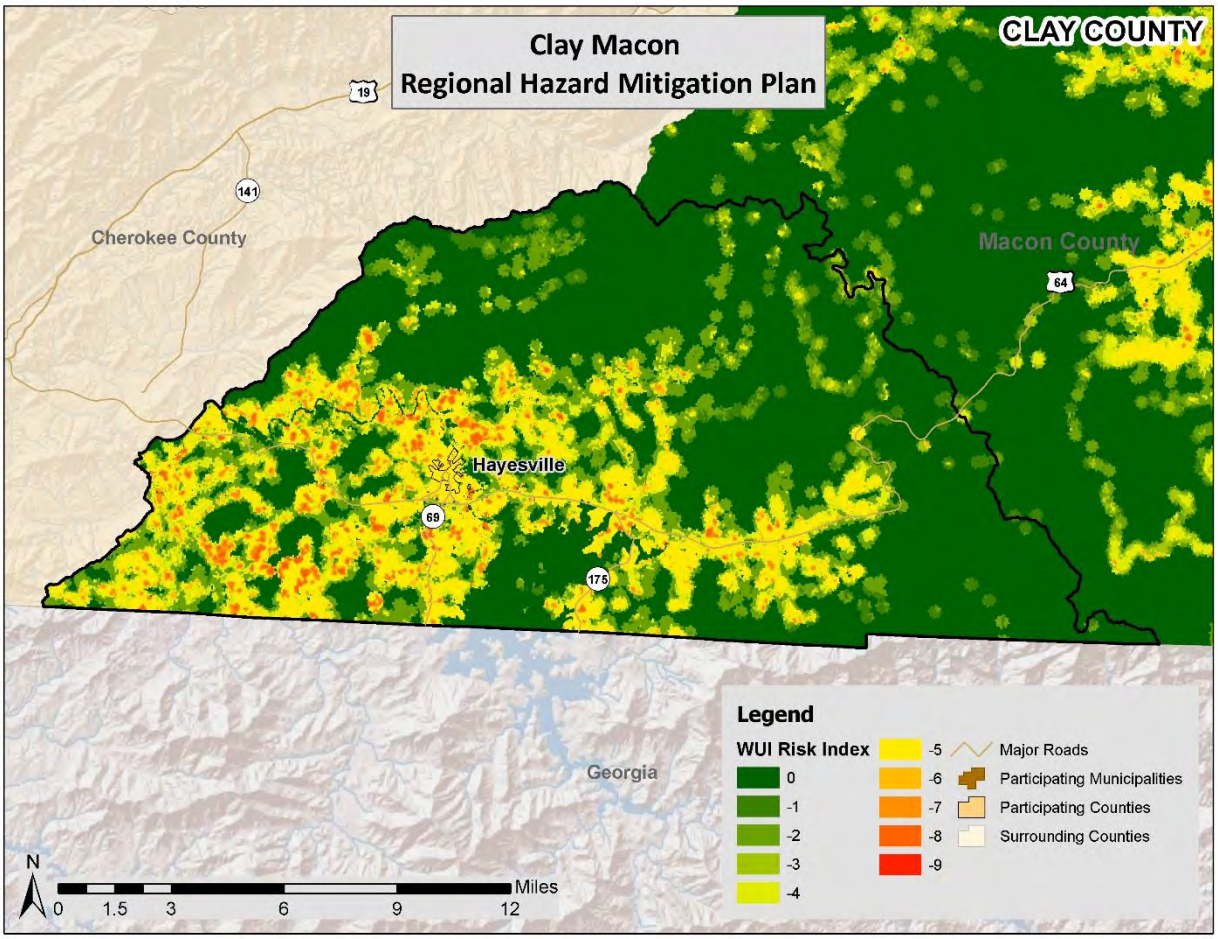
Although historical evidence indicates that Clay County is susceptible to wildfire events, there are few reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the county.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure A.19** shows the Wildland Urban Interface Risk Index (WUIRI) data which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the Wildland Urban Interface and rural

areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to -9 with lower values being most severe (as noted previously, this is only a measure of relative risk). **Figure A.20** shows the areas of analysis where any grid cell is less than -5. Areas with a value below -5 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

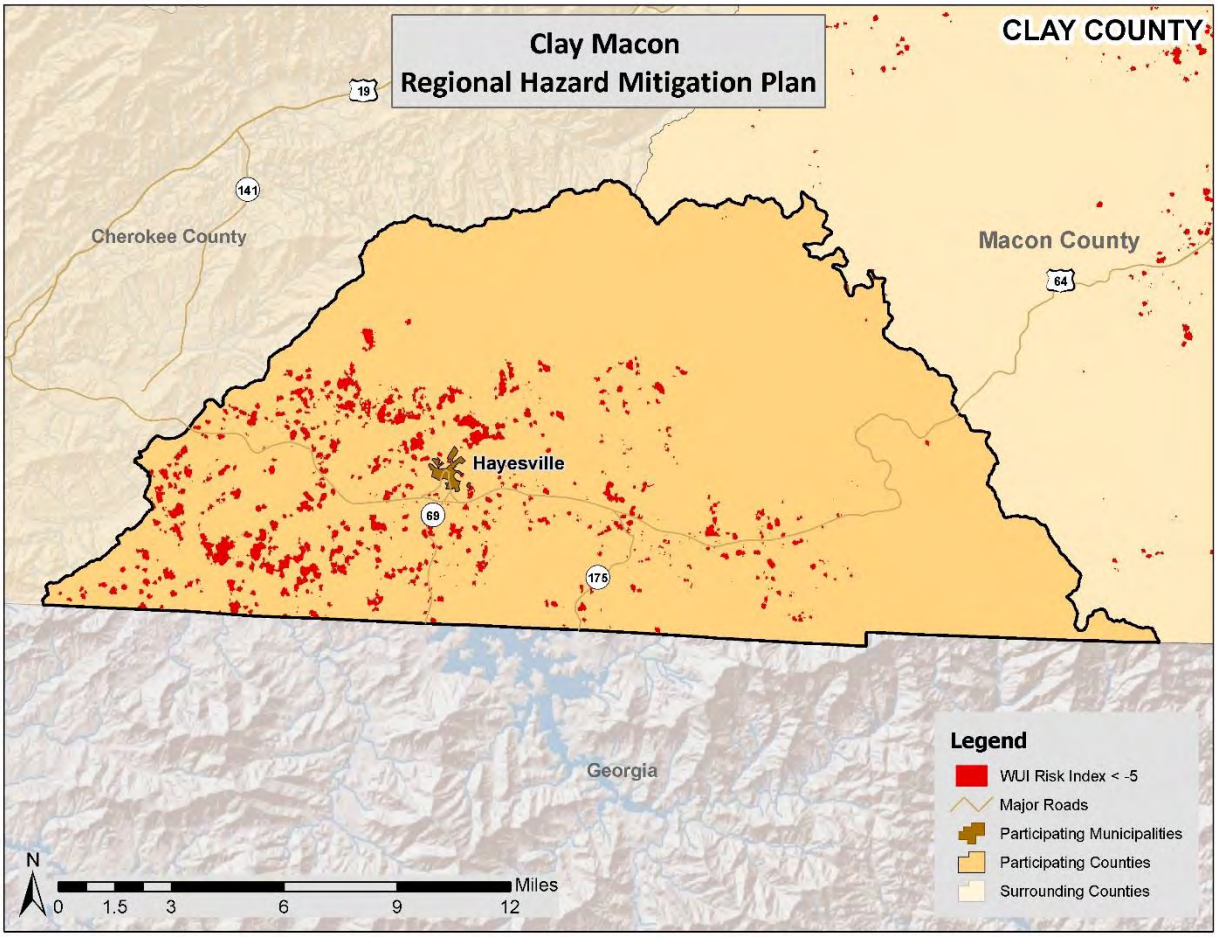
Table A.43 shows the results of the analysis.

FIGURE A.19: WUI RISK INDEX AREAS IN CLAY COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE A.20: WILDFIRE RISK AREAS IN CLAY COUNTY



Source: Southern Wildfire Risk Assessment Data

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

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Hayesville	7	6	$289,584
Unincorporated Area	4501	1387	$279,176,484
CLAY COUNTY TOTAL	**4,508**	**1,393**	**$279,466,068**

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire county. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in wildfire areas of concern. It should also be noted, that several factors could impact the spread of a wildfire putting all

facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Clay County.

Conclusions on Hazard Vulnerability

Table A.44 presents a summary of annualized loss for each hazard in Clay County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

TABLE A.44: ANNUALIZED LOSS FOR CLAY COUNTY

Event	Chatham County
Atmospheric Hazards	
Drought	Negligible
Extreme Heat	Negligible
Hailstorm	$1,103
Hurricane & Tropical Storm	$9,000
Lightning	Negligible
Severe Thunderstorm / High Wind	$22,670
Tornado	$10,785
Winter Storm & Freeze	Negligible
Geologic Hazards	
Earthquake	$40,000
Landslide	Negligible
Hydrologic Hazards	
Dam Failure	Negligible
Erosion	Negligible
Flood	$77,134
Other Hazards	
HAZMAT Incident	Negligible
Wildfire	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme heat, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table A.45** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE A.45: AT-RISK CRITICAL FACILITIES IN CLAY COUNTY

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
CLAY COUNTY																				
Clay County EMS / Dispatch	EMS Station	X	X	X	X	X	X	X	X		X					X	X			
Clay County EOC	EOC	X	X	X	X	X	X	X	X		X					X	X			
Brasstown Fire Station	Fire Station	X	X	X	X	X	X	X	X	X		X			X					
Elf Fire Station	Fire Station	X	X	X	X	X	X	X	X		X					X	X			
Fires Creek Fire Station	Fire Station	X	X	X	X	X	X	X	X	X										
Hayesville Central Fire Station	Fire Station	X	X	X	X	X	X	X	X		X					X	X			
Shooting Creek Fire Station	Fire Station	X	X	X	X	X	X	X	X		X				X	X	X			
Tusquitte Fire Station	Fire Station	X	X	X	X	X	X	X	X		X				X					
Warne Fire Station	Fire Station	X	X	X	X	X	X	X	X	X					X					
Clay County Sherriff Department	Police Station	X	X	X	X	X	X	X	X		X				X	X	X			
Hayesville Elementary	School	X	X	X	X	X	X	X	X							X	X			
Hayesville High	School	X	X	X	X	X	X	X	X							X	X			
Hayesville Middle	School	X	X	X	X	X	X	X	X							X	X			

A.4 CLAY COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Clay County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

A.4.1 Planning and Regulatory Capability

Table A.46 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Clay County. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Clay Macon Regional Hazard Mitigation Plan.

TABLE A.46: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
CLAY COUNTY	✓	✓	✓	✓				✓				✓			✓		✓			✓	✓	✓	
Hayesville	✓	✓	✓	✓				✓				✓			✓	✓	✓			✓	✓	✓	

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

Emergency Management

Hazard Mitigation Plan
Clay County has previously adopted a hazard mitigation plan. The Town of Hayesville as also included in this plan.

Emergency Operations Plan
The Clay County Emergency Management Office maintains emergency operational guidelines which define the responsibility of every person and organization involved in the response and recovery of an emergency in the county.

General Planning

Comprehensive Land Use Plan
Clay County has adopted a comprehensive plan intended to help county government leaders and citizens guide short- and long-range change, growth, and development. This plan includes the unincorporated area of Clay County as well as the incorporated Town of Hayesville and its extraterritorial jurisdiction.

Capital Improvements Plan
Clay County included a 20-year capital improvement plan in the county Water and Sewer System Master Plan update that summarizes the capital improvements recommended in the plan.

Zoning Ordinance
Clay County has not adopted a zoning ordinance in the unincorporated areas of the county. However, the Town of Hayesville has adopted a zoning ordinance.

Subdivision Ordinance
Clay County and the Town of Hayesville have each adopted and enforce subdivision regulations.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Clay County provides building code enforcement for the unincorporated county as well as the Town of Hayesville.

Floodplain Management

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

TABLE A.47: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
CLAY COUNTY†	04/01/99	05/04/09	125	$31,311,700	13	$74,129
Hayesville	12/11/08	05/04/09	6	$871,500	0	$0

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 12/9/14; NFIP claims and policy information as of 9/30/14

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

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Clay County and the Town of Hayesville both participate in the NFIP and have adopted flood damage prevention regulations.

Floodplain Management Plan
Clay County has a floodplain management plan that contains provisions for elevating structures in the floodplain and structural measures like rebuilding and retrofitting but as only Zone A flood maps are available, the requirements are not specific.

Open Space Management Plan
Clay County has a system-wide comprehensive parks and recreation plan that describes existing facilities, rationale for the decisions in improvements, maintenance, and acquisition.

Stormwater Management Plan
Clay County and the Town of Hayesville do not have a stormwater management plan in place; however, the county and town both include some regulations related to stormwater management in various local ordinances.

A.4.2 Administrative and Technical Capability

Table A.48 provides a summary of the capability assessment results for Clay County with regard to relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

TABLE A.48: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
CLAY COUNTY		✓		✓	✓		✓	✓	✓	
Hayesville		✓		✓	✓		✓	✓	✓	

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

A.4.3 Fiscal Capability

Table A.49 provides a summary of the results for Clay County with regard to relevant fiscal resources. A checkmark (✓) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds) according to the previous county hazard mitigation plan.

TABLE A.49: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP, FMAP, PDM, and other federal, state, local and non-governmental funding sources, etc.
CLAY COUNTY	✓	✓	✓						✓	✓
Hayesville	✓	✓	✓							✓

A.4.4 Political Capability

The previous hazard mitigation plan indicates that in Clay County, as with any local jurisdiction, the receptivity of the citizens to new policies and programs is directly related to the immediate impact to the individual. With this in mind, any proposed initiatives must be preceded by public education and involvement. As citizens become more aware of the rationale for proposed changes, it is more likely that the will show support. Over the past few years, Hayesville has made several ordinance revisions. In 2002, a system-wide comprehensive parks and recreation plan was adopted and a zoning ordinance was implemented in 2000. In Clay County, as with many municipalities, major changes will likely be met with resistance. However, incremental changes stand a better chance of success over the long term. In terms of changes to hazard mitigation there are numerous opportunities for Clay County, however, public education and progressive steps are essential for the success of any new initiatives. If the public supportive of proposed changes, the elected officials who are responsible for adopting them are more likely to show their support. Building a disaster resistant community depends primarily on involving the pubic and achieving participation. As required by FEMA for the local hazard mitigation plan, public participation is a must and, to make it true, the political climate out to be suitable.

A.4.5 Conclusions on Local Capability

Table A.50 shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information

found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its municipalities is 30.0, which falls into the moderate capability ranking.

TABLE A.50: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
CLAY COUNTY	36	Moderate
Hayesville	24	Moderate

A.5 CLAY COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Clay County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Planning Team and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

A.5.1 Mitigation Goals

Clay County developed six mitigation goals in coordination with the other participating Clay Macon Region jurisdictions. The regional mitigation goals are presented in **Table A.51**.

TABLE A.51: CLAY MACON REGIONAL MITIGATION GOALS

	Goal
Goal #1	Prevent or lessen the negative impacts caused by natural disasters and/or technological and manmade incidents.
Goal #2	Increase the response capability in the region, especially to unexpected emergencies that have never experienced before.
Goal #3	Protect public and private property and other assets from the damage that results from hazard events.
Goal #4	Increase public awareness of natural and technological/manmade hazards.
Goal #5	Reduce the impact of hazards by preserving or restoring the function of natural systems.
Goal #6	Lessen the impact of hazards by responsibly modifying the environment, hardening existing or proposed structures, and implementing projects that have a positive effect on reducing the negative impact of hazards.

A.5.2 Mitigation Action Plan

The mitigation actions proposed by Clay County and the Town of Hayesville are listed in the following individual Mitigation Action Plans.

Clay County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Implement projects that promote Sustainable Development and Smart Growth	All	Moderate	Clay County Board of Commissioners	Local	2020	Although the county has worked towards implementing projects that support sustainable development and Smart Growth, there will continue to be a need to focus on these types of projects in the future so this action will remain in the plan.
P-2	Enforce Zoning and Subdivision regulations that reduce risk	All	High	Clay County Planning	Local	2020	The county has attempted to enforce zoning and subdivision regulations that drive growth away from high hazard areas. However, these regulations require continual maintenance to ensure property is not put at risk.
P-3	Encourage Open Space Preservation throughout the county	All	Moderate	Clay County Planning	Local	2020	The county has recognized the need to promote open space preservation and has many areas that are designated as open space including parks and forest land. Looking forward, the county will continue to identify areas that can be preserved as open space that will help reduce risk to hazards.
P-4	Enforce Floodplain Management Regulations	Flood	High	Clay County Planning	Local	2020	The county enforces floodplain management regulations in accordance with the NFIP and will continue to enforce these regulations going forward so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-5	Develop a Transportation and Evacuation Plan	All	Moderate	Clay County Transportation; Clay County EMS	Local	2020	Although an official transportation and evacuation plan has not been developed, the county has made strides to define evacuation routes and identify major transportation corridors
P-6	Set Government Expenditure Limitation in High Hazard Areas	All	High	Clay County Board of Commissioners; Clay County Planning	Local	2020	In the past, the county has limited expenditures in high hazard areas, but as the county continues to grow and development takes place, it will be important for the county to continue to work on limiting expenditures on construction in known high risk areas.
P-7	Create a Business and Industry Plan to promote disaster planning	All	High	Clay County Planning; Clay County Chamber of Commerce	Local	2020	County officials have a strong relationship with businesses and industry and have worked to help business leaders with becoming safer and better prepared for disasters. Nevertheless, there is still significant work to be done to prepare all local businesses for a major disaster.
P-8	Develop an Inclement Weather Plan	All	Moderate	Clay County Planning; Clay County Emergency Management; Clay County Public Works	Local	2020	Although the county has plans in place for what to do in the event of inclement weather, developing an official inclement weather plan has not taken place yet.
P-9	Update Comprehensive Plan	All	High	Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	2020	The county has adopted a comprehensive plan that runs through 2021. This plan will likely need to be updated roughly within the next hazard mitigation plan update cycle.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-10	Develop Stormwater Management Plan	Flood	Moderate	NC DENR; NRCS	Federal, State, Private	2020	In conjunction with the state, the county has implemented some stormwater management planning and will continue to work on improving stormwater management going forward.
P-11	Develop a Capital Improvement Plan (CIP) to guide the major capital expenditures over a given period	All	High	Clay County Board of Commissioners	Federal, State, Private	2020	The county has implemented a number of projects that have reduced risk in the past, but the county will continue to work on including projects in the CIP in the future.
P-12	Update the Emergency Operation Guideline	All	High	Clay County Emergency Management	Federal, State, Private	2020	The county has developed an Emergency Operation Guideline for action to be taken in an emergency. This plan will likely need to be updated in the next cycle of the HMP.
P-13	Smart Growth	All		Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	Deleted	This action was combined with Action P-1 and is reflected as such.
Property Protection							
PP-1	Require storm shelters in Mobile Home Parks	All	Low	Clay County Planning; Clay County Board of Commissioners	Local	2020	The county has encouraged the installation of storm shelters in Mobile Home Parks, but there is no regulation requiring these. The county will continue to evaluate implementing such regulations
PP-2	Mandate Tie-downs for mobile homes and propane tanks	All	Low	Clay County Planning; Clay County Board of Commissioners	Local	2020	The county has implemented tie-down mandates to prevent tanks and mobile homes from being lifted by floodwaters or winds and becoming ballistic hazards

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-3	Update Development Regulations	All	Moderate	Clay County Planning	Local	2020	The county has updated its development regulations to help guide future development away from high hazard areas, but additional updates may be required to keep regulations up to date and appropriate.
PP-4	Implement Critical Facility Protection	All	High	Clay County Engineering; Clay County EMS; Utility Companies; Hospital; NCDOT	Federal, State, Private	2020	The county has taken steps to protect critical facilities but there are many additional steps that could be taken to reduce potential risk many critical facilities in the county.
PP-5	Utilize Acquisition to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	The county has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the county would look into acquisition of homes.
PP-6	Utilize Relocation to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	The county has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the county would look into relocation of homes.
PP-7	Provide advanced training to Building Inspectors	All	Moderate	Clay County Fire Department; Clay County Board of Commissioners	Federal, State, Private	2020	The county has a strong network of building inspectors, but additional training on the most up to date techniques is constantly required.
PP-8	Utilize Windproofing to protect structures	All	Moderate	Clay County Engineering; FEMA; Clay County Planning	Federal, State, Private	2020	The county has encouraged the use of windproofing techniques in the past and will continue to try to implement these techniques into future designs and structures.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Natural Resource Protection							
NRP-1	Preserve and Expand Parks	All	High	Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	The county has recognized the need to promote open space preservation and has many parks that are designated as open space. Looking forward, the county will continue to identify areas that can be preserved as parks/open space that will help reduce risk to hazards.
NRP-2	Wetland Preservation	Flood	Moderate	Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	The county has recognized the need to preserve wetlands and their natural functions as water retainers. Looking forward, the county will continue to identify areas that can be preserved to help reduce risk to hazards.
NRP-3	Develop Natural Resource Protection Plan	All	Moderate	Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	The county works in conjunction with the forest service on fire protection procedures, but it would like to integrate more fully into that process via a natural resource protection plan.
NRP-4	Tree Limb Removal Maintenance Plan	All	Moderate	Clay County Environment, Health & Natural Resources; Clay County Fire Department	Federal, State, Private	2020	The county routinely clears hanging tree limbs from the right of way to prevent damage to utilities. It will continue to provide this service going forward so this action will remain in the plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Structural Projects							
SP-1	Raise Bridges	All	Low	Clay County Engineering; FEMA; NCDOT	Federal, State, Private	2020	The county has not taken on any bridge raising projects on its own, but DOT has implemented such projects and the county will continue to support projects that raise bridges out of harm's way.
SP-2	Stormwater Drain Maintenance	All	Moderate	Clay County Public Works; Clay County Environment, Health & Natural Resources	Federal, State, Private	2020	The county routinely cleans and repairs storm drains, but a more comprehensive system of drain maintenance would be useful so the county will continue to evaluate.
Emergency Services							
ES-1	Equipment Buyout	All	Moderate	Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Local	2020	In the past, the county has purchased equipment to help reduce risk to future disaster events. The county will continue to look into purchases of equipment that make sense especially when grants are available.
ES-2	Form Local coordinators and Communication Network	All	High	Clay County Emergency Management; Clay County Board of Commissioners	Local	2020	The county has worked to improve communication between local coordinators to improve response in smaller communities that may not have fire/police. This coordination has been successful, but will need to be maintained and improved going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
ES-3	Integrate Information and Communication Technology	All	High	Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	The county has made significant progress in integrating information and communication technology among all of its departments. However, this is a constantly evolving field and there will be a need to update and re-evaluate fairly consistently.
ES-4	Use Citizens in Emergency Management Functions	All	Moderate	Clay County Emergency Management	Federal, State, Private	2020	The county has initiated several programs such as Volunteers in Police Service Program and Medical Reserve Corps. However, there will need to be additional steps taken to more fluently integrate citizens in Emergency Management functions.
ES-5	Improve Emergency Transportation	All	Moderate	Clay County Emergency Management	Federal, State, Private	2020	Although there are systems in place for emergency transportation, the county would like to develop emergency thoroughfares for medical transportation in case of a disaster.
ES-6	Mass Casualty Training	All	Moderate	Clay County Emergency Management	Federal, State, Private	2020	The county has some experience in mass casualty incidents, but it would like to have additional trainings available to improve this capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Public Education and Awareness							
PEA-1	Install Disaster Warning Systems	All	High	Clay County Emergency Management; Clay County Planning	Federal, State, Local	2020	The county has some disaster warning systems in place, but as these technologies have improved, the county has identified this as an area that needs improvement going forward.
PEA-2	Designate Assembly Points	All	High	Clay County Emergency Management; Clay County Planning	Local	2020	The county has designated assembly points that can be easily reached by a number of people in a short amount of time. The county will continue to evaluate these points and make changes as necessary.
PEA-3	Implement Community Awareness Program	All	High	Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	The county has implemented a community awareness program to provide outreach to citizens on potential hazards. The materials and forms of this outreach will need to be updated and evaluated going forward.
PEA-4	Establish Emergency Shelters	All	High	Clay County Planning; Clay County Emergency Management	Federal, State, Private	2020	The county has established emergency shelters in a number of locations, but would like to find ways to strengthen those facilities and improve communication to citizens of their availability during disaster events.

Town of Hayesville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Implement projects that promote Sustainable Development and Smart Growth	All	Moderate	Town of Hayesville and Clay County Board of Commissioners	Local	2020	Although the town has worked towards implementing projects that support sustainable development and Smart Growth, there will continue to be a need to focus on these types of projects in the future so this action will remain in the plan.
P-2	Enforce Zoning and Subdivision regulations that reduce risk	All	High	Town of Hayesville and Clay County Planning	Local	2020	The town has attempted to enforce zoning and subdivision regulations that drive growth away from high hazard areas. However, these regulations require continual maintenance to ensure property is not put at risk.
P-3	Encourage Open Space Preservation	All	Moderate	Town of Hayesville and Clay County Planning	Local	2020	The town has recognized the need to promote open space preservation and has many areas that are designated as open space including parks and forest land. Looking forward, the town will continue to identify areas that can be preserved as open space that will help reduce risk to hazards.
P-4	Enforce Floodplain Management Regulations	Flood	High	Town of Hayesville and Clay County Planning	Local	2020	The town enforces floodplain management regulations in accordance with the NFIP and will continue to enforce these regulations going forward so this action will remain in place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-5	Develop a Transportation and Evacuation Plan	All	Moderate	Town of Hayesville and Clay County Transportation; Clay Conty EMS	Local	2020	Although an official transportation and evacuation plan has not been developed, the town has made strides to define evacuation routes and identify major transportation corridors
P-6	Set Government Expenditure Limitation in High Hazard Areas	All	High	Town of Hayesville and Clay County Board of Commissioners; Clay County Planning	Local	2020	In the past, the town has limited expenditures in high hazard areas, but as the town continues to grow and development takes place, it will be important for the town to continue to work on limiting expenditures on construction in known high risk areas.
P-7	Create a Business and Industry Plan to promote disaster planning	All	High	Town of Hayesville and Clay County Planning; Clay County Chamber of Commerce	Local	2020	Town officials have a strong relationship with businesses and industry and have worked to help business leaders with becoming safer and better prepared for disasters. Nevertheless, there is still significant work to be done to prepare all local businesses for a major disaster.
P-8	Develop an Inclement Weather Plan	All	Moderate	Town of Hayesville and Clay County Planning; Clay County Emergency Management; Clay County Public Works	Local	2020	Although the town has plans in place for what to do in the event of inclement weather, developing an official inclement weather plan has not taken place yet.
P-9	Update Comprehensive Plan	All	High	Town of Hayesville and Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	2020	The town has adopted a comprehensive plan that runs through 2021. This plan will likely need to be updated roughly within the next hazard mitigation plan update cycle.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
P-10	Develop Stormwater Management Plan	Flood	Moderate	NC DENR; NRCS	Federal, State, Private	2020	In conjunction with the state, the town has implemented some stormwater management planning and will continue to work on improving stormwater management going forward.
P-11	Develop a Capital Improvement Plan (CIP) to guide the major capital expenditures over a given period	All	High	Town of Hayesville and Clay County Board of Commissioners	Federal, State, Private	2020	The town has implemented a number of projects that have reduced risk in the past, but the town will continue to work on including projects in the CIP in the future.
P-12	Update the Emergency Operation Guideline	All	High	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	The town has developed an Emergency Operation Guideline for action to be taken in an emergency. This plan will likely need to be updated in the next cycle of the HMP.
P-13	Smart Growth	All		Town of Hayesville and Clay County Board of Commissioners; Clay County Planning	Federal, State, Private	Deleted	This action was combined with Action P-1 and is reflected as such.
Property Protection							
PP-1	Require storm shelters in Mobile Home Parks	All	Low	Town of Hayesville and Clay County Planning; Clay County Board of Commissioners	Local	2020	The town has encouraged the installation of storm shelters in Mobile Home Parks, but there is no regulation requiring these. The town will continue to evaluate implementing such regulations

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-2	Mandate Tie-downs for mobile homes and propane tanks	All	Low	Town of Hayesville and Clay County Planning; Clay County Board of Commissioners	Local	2020	The town has implemented tie-down mandates to prevent tanks and mobile homes from being lifted by floodwaters or winds and becoming ballistic hazards
PP-3	Update Development Regulations	All	Moderate	Town of Hayesville and Clay County Planning	Local	2020	The town has updated its development regulations to help guide future development away from high hazard areas, but additional updates may be required to keep regulations up to date and appropriate.
PP-4	Implement Critical Facility Protection	All	High	Town of Hayesville and Clay County Engineering; Clay County EMS; Utility Companies; Hospital; NCDOT	Federal, State, Private	2020	The town has taken steps to protect critical facilities but there are many additional steps that could be taken to reduce potential risk many critical facilities in the town.
PP-5	Utilize Acquisition to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Town of Hayesville and Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	The town has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the town would look into acquisition of homes.
PP-6	Utilize Relocation to Allow Property Owners to Voluntarily be Removed from High Hazard Areas	All	Moderate	Town of Hayesville and Clay County Planning; NCDENR; FEMA	Federal, State, Private	2020	The town has not extensively used acquisition in the past, but if homeowners are willing and grant funding is available, the town would look into relocation of homes.
PP-7	Provide advanced training to Building Inspectors	All	Moderate	Town of Hayesville and Clay County Fire Department; Clay County Board of Commissioners	Federal, State, Private	2020	The town has a strong network of building inspectors, but additional training on the most up to date techniques is constantly required.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-8	Utilize Windproofing to protect structures	All	Moderate	Town of Hayesville and Clay County Engineering; FEMA; Clay County Planning	Federal, State, Private	2020	The town has encouraged the use of windproofing techniques in the past and will continue to try to implement these techniques into future designs and structures.
Natural Resource Protection							
NRP-1	Preserve and Expand Parks	All	High	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	The town has recognized the need to promote open space preservation and has many parks that are designated as open space. Looking forward, the town will continue to identify areas that can be preserved as parks/open space that will help reduce risk to hazards.
NRP-2	Wetland Preservation	Flood	Moderate	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	The town has recognized the need to preserve wetlands and their natural functions as water retainers. Looking forward, the town will continue to identify areas that can be preserved to help reduce risk to hazards.
NRP-3	Develop Natural Resource Protection Plan	All	Moderate	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Planning	Local	2020	The town works in conjunction with the forest service on fire protection procedures, but it would like to integrate more fully into that process via a natural resource protection plan.
NRP-4	Tree Limb Removal Maintenance Plan	All	Moderate	Town of Hayesville and Clay County Environment, Health & Natural Resources; Clay County Fire Department	Federal, State, Private	2020	The town routinely clears hanging tree limbs from the right of way to prevent damage to utilities. It will continue to provide this service going forward so this action will remain in the plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Structural Projects							
SP-1	Raise Bridges	All	Low	Town of Hayesville and Clay County Engineering; FEMA; NCDOT	Federal, State, Private	2020	The town has not taken on any bridge raising projects on its own, but DOT has implemented such projects and the town will continue to support projects that raise bridges out of harm's way.
SP-2	Stormwater Drain Maintenance	All	Moderate	Town of Hayesville and Clay County Public Works; Clay County Environment, Health & Natural Resources	Federal, State, Private	2020	The town routinely cleans and repairs storm drains, but a more comprehensive system of drain maintenance would be useful so the town will continue to evaluate.
Emergency Services							
ES-1	Equipment Buyout	All	Moderate	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Local	2020	In the past, the town has purchased equipment to help reduce risk to future disaster events. The town will continue to look into purchases of equipment that make sense especially when grants are available.
ES-2	Form Local coordinators and Communication Network	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Local	2020	The town has worked to improve communication between local coordinators to improve response in smaller communities that may not have fire/police. This coordination has been successful, but will need to be maintained and improved going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
ES-3	Integrate Information and Communication Technology	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	The town has made significant progress in integrating information and communication technology among all of its departments. However, this is a constantly evolving field and there will be a need to update and re-evaluate fairly consistently.
ES-4	Use Citizens in Emergency Management Functions	All	Moderate	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	The town has initiated several programs such as Volunteers in Police Service Program and Medical Reserve Corps. However, there will need to be additional steps taken to more fluently integrate citizens in Emergency Management functions.
ES-5	Improve Emergency Transportation	All	Moderate	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	Although there are systems in place for emergency transportation, the town would like to develop emergency thoroughfares for medical transportation in case of a disaster.
ES-6	Mass Casualty Training	All	Moderate	Town of Hayesville and Clay County Emergency Management	Federal, State, Private	2020	The town has some experience in mass casualty incidents, but it would like to have additional trainings available to improve this capability.
Public Education and Awareness							
PEA-1	Install Disaster Warning Systems	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Planning	Federal, State, Local	2020	The town has some disaster warning systems in place, but as these technologies have improved, the town has identified this as an area that needs improvement going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-2	Designate Assembly Points	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Planning	Local	2020	The town has designated assembly points that can be easily reached by a number of people in a short amount of time. The town will continue to evaluate these points and make changes as necessary.
PEA-3	Implement Community Awareness Program	All	High	Town of Hayesville and Clay County Emergency Management; Clay County Board of Commissioners	Federal, State, Private	2020	The town has implemented a community awareness program to provide outreach to citizens on potential hazards. The materials and forms of this outreach will need to be updated and evaluated going forward.
PEA-4	Establish Emergency Shelters	All	High	Town of Hayesville and Clay County Planning; Clay County Emergency Management	Federal, State, Private	2020	The town has established emergency shelters in a number of locations, but would like to find ways to strengthen those facilities and improve communication to citizens of their availability during disaster events.

Annex B
Macon County

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

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

B.1 MACON COUNTY COMMUNITY PROFILE

B.1.1 Geography and the Environment

Macon County is situated along the North Carolina and Georgia state border. The county is located at the southern end of the Appalachian Mountains within the Blue Ridge Province. It comprises two towns, the Town of Franklin and the Town of Highlands, as well as small unincorporated communities. An orientation map is provided as **Figure B.1**.

The county is a typical mountain county consisting of high mountain peaks, sloping mountainsides, and fertile creek and river valleys. The county's highest elevation reaches 5,499 feet. The total area of the county is 520 square miles, 4 square miles of which is water area.

Macon County enjoys a generally mild year-round climate that is characterized by colder winters and warm summers; however, variation in elevation and topography can drastically affect local weather. The average annual temperature for the county is approximately 55˚F, with an average high of 68˚F and low of 42˚F. Typically, the warmest month in Macon County is July and the coldest month is January. The highest recorded temperature in the region was 101˚F (in 1952) and the lowest recorded temperature was -19˚F (in 1985). Precipitation is generally well distributed throughout the year and annual totals average between 54 and 72 inches.[1]

In general, the spring months are marked by unpredictable weather and changes can occur rapidly with sunny skies yielding to snow in just a few hours. Average high temperatures increase from 60˚F in March to the mid 70s in May. There is a similar increase in average low temperatures, which are just above freezing in March and climb to the upper 40s near 50˚F in May.

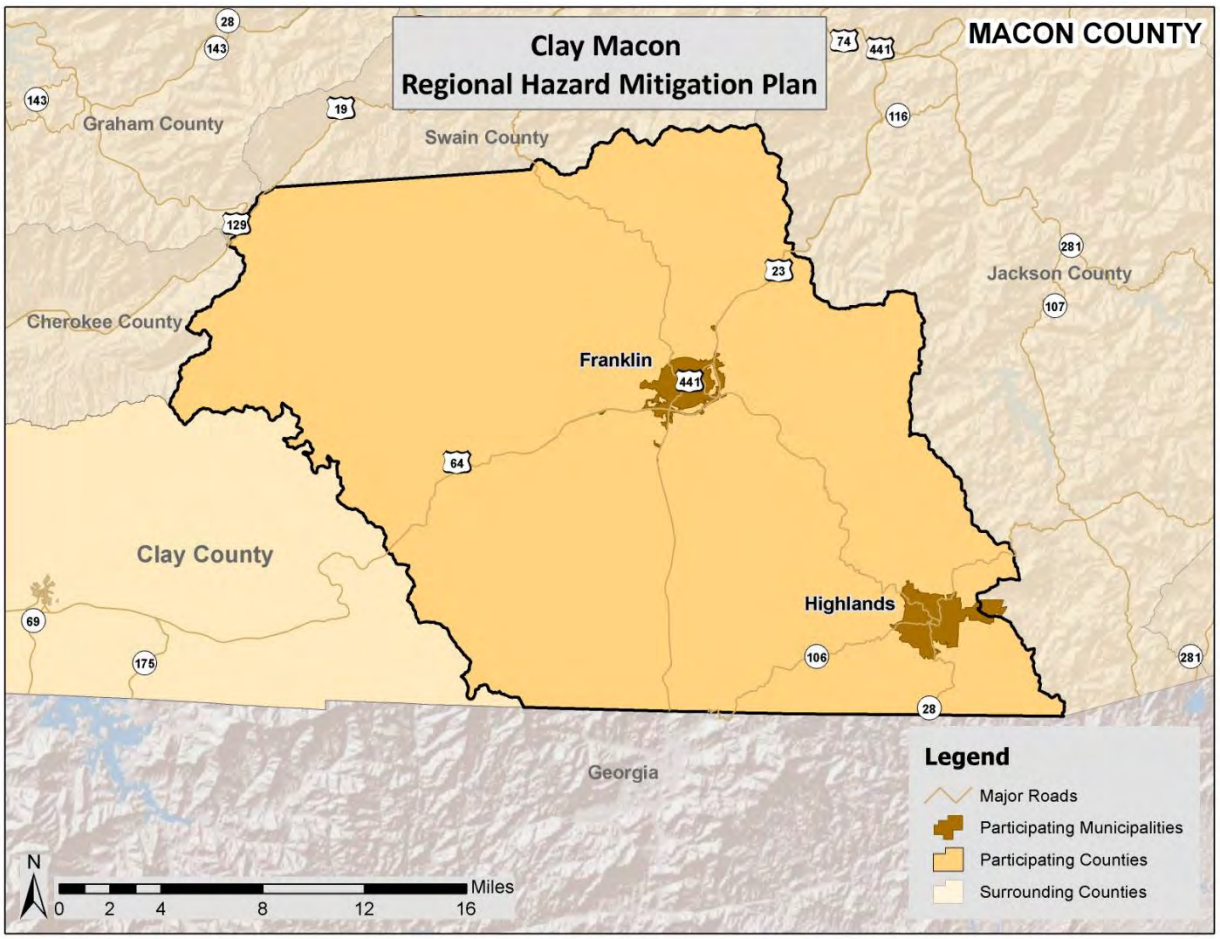
In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the low to mid 80s in July and August. Summertime is typically moderately warn and humid, however, at higher elevations, weather tends to be more pleasant during the summer months.

[1] State Climate Office of North Carolina.

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

Winter in Macon County is generally moderate but extremes do occur, especially at higher elevations. Winter lows frequently drop below freezing and temperatures can be even lower at higher elevations. In the winter months, the average high temperature falls between the upper 40s and lower 50s and the average low temperature is in the mid 20s. The county averages about seven inches of snow per year depending on altitude of the location. Winter precipitation usually results from low pressure storms which frequently pass through the area.

FIGURE A.1: MACON COUNTY ORIENTATION MAP



B.1.2 Population and Demographics

According to the 2010 Census, Macon County has a population of 33,922 people. The county has seen almost 14% growth between 2000 and 2010, and the population density is 66 people per square mile.

Population counts from the US Census Bureau for 1990, 2000, and 2010 for the county and participating municipalities (where available) are presented in **Table B.1**.

TABLE B.1: POPULATION COUNTS FOR MACON COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Macon County	**23,499**	**29,811**	**33,922**	**13.8%**
Town of Franklin	2,873	3,490	3,845	10.2%
Town of Highlands	--	909	924	1.7%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of Macon County is 47.8 years. The racial characteristics of the county are presented in **Table B.2**. Whites make up the majority of the population in the county, accounting for nearly 94 percent of the population.

TABLE B.2: DEMOGRAPHICS OF MACON COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Macon County	**93.8%**	**1.3%**	**0.5%**	**0.6%**	**0.0%**	**2.7%**	**1.1%**	**6.6%**
Town of Franklin	90.1%	2.1%	0.5%	0.8%	0.0%	4.8%	1.7%	13.0%
Town of Highlands	94.3%	0.0%	0.2%	0.6%	0.0%	3.0%	1.8%	5.7%

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

B.1.3 Housing

According to the 2010 US Census, there are 25,245 housing units in Macon County, the majority of which are single family homes or mobile homes. Housing information for the county and municipalities is presented in **Table B.3**. As shown in the table, the Town of Highlands has a significantly higher percentage of seasonal housing units compared to the rest of the county.

TABLE B.3: HOUSING CHARACTERISTICS OF MACON COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Macon County	**20,746**	**25,245**	**32.3%**	**$167,800**
Town of Franklin	1,916	2,142	5.4%	$152,000
Town of Highlands	1,713	2,099	70.9%	$420,700

Source: United States Census Bureau

B.1.4 Infrastructure

Transportation

There are several US and state highways that serve Macon County and link it with other regions of North Carolina as well as the neighboring state of Georgia. US 64 is the major east-west route connecting Macon County to Clay and Jackson Counties. This highway is also part of the designated scenic byway called Waterfall Byway. Waterfall Byway winds through five counties, including Macon, and earns its name from the 200 waterfalls that surround the route. The major north-south highway in the county is US 23/441, which connects Macon County to Tennessee and Jackson County. NC 28 is a primary state highway that also runs north to south through the Nantahala National Forest.

Within Macon County, Macon County Transit provides public transportation for its county's citizens through appointments on a first call first served basis.

Currently, there is no rail service in Macon County; however, the Great Smoky Mountain Railroad, which operates tourist excursions in addition to moving freight, runs north of the county.

Asheville Regional Airport is the largest airport in the mountains serving Macon County and all of Western North Carolina. The airport currently offers non-stop commercial flights on 4 airlines to 11 cities. The major airport located nearest to the county is the Charlotte Douglas International Airport, which offers non-stop commercial flights on 10 airlines to more than 140 destinations across the United States as well as to several international destinations. Other major nearby airports include the Hartsfield-Jackson Atlanta International Airport in Georgia and the Nashville Metropolitan Airport in Tennessee.

Utilities

Duke Energy Progress provides electrical power to Macon County. The Haywood Electric Membership Corporation also provides service in the southeastern corner of Macon County.

Water and sewer service is provided in some areas of the county by the Towns of Franklin and Highlands, but generally municipal water systems are extremely limited in the mountains and private or shared wells and septic systems are considered the norm.

Community Facilities

There are a number of buildings and community facilities located throughout Macon County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 7 fire stations, 1 EMS station, 1 police station, 1 emergency operations center, and 3 public schools located within the county.

There are two located in Macon County. The larger of the two is Angel Medical, a 59-bed general hospital located in the Town of Franklin. The Highlands-Cashiers Hospital, in the Town of Highlands, has 24 beds as well as a skilled nursing facility with 80 beds.

Macon County contains numerous local parks, campgrounds, recreation areas, and hiking trails. These include the Nantahala National Forest, Appalachian Trail, and Nantahala Lake. These facilities offer recreational opportunities to area residents and visitors alike.

B.1.5 Land Use

Many areas of Macon County are undeveloped or sparsely developed due to the mountainous terrain and the conservation of land in the Nantahala National Forest. As shown in **Figure B.1** above, there are only two incorporated municipalities located in the study area, and this area is where the county's population is generally concentrated. The incorporated area is also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of rural residential development, agricultural uses, recreational areas, and forestland.

Macon County has undergone steady growth since the late 1960s. The comfortable climate and beautiful landscapes attract more residents each year. Traditionally, Macon County development generally occurs as low-density rural sprawl. Future development in unincorporated areas will likely continue to follow rural patterns. Because the Towns of Franklin and Highlands are population centers, they generally experience development in more dense patterns than the more rural areas of the county and most likely will continue these development trends into the future.

Macon County has a comprehensive plan that is intended to help guide short- and long-range change, growth, and development. The plan addresses economic development and public services, land use and environment, education and recreation, transportation and housing, and healthcare/childcare/senior citizens. However, the county has not adopted a zoning ordinance to regulate development in the unincorporated portion of the county. A unified development ordinance is maintained by the Town of Franklin and a zoning ordinance is maintained by the Town of Highlands, which regulate land uses within the town limits and extra territorial jurisdiction.

B.1.6 Employment and Industry

According to the North Carolina Employment Security Commission (NCESC), in 2012, Macon County had an average annual employment of 10,548 workers and an average unemployment rate of 10.4 percent (compared to 9.2 percent for the state). In 2012, the Retail Trade industry employed 16.8 percent of the county's workforce followed by Health Care and Social Assistance (15.1%); Accommodation and Food Services (12.6%); and Educational Services (8.9%). The American Community Survey (ACS) found the average annual median household income in Macon County was $38,134 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

B.2 MACON COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Macon County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

B.2.1 Drought

Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the county would be uniformly exposed to drought, making the spatial

extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

Historical Occurrences

According to the North Carolina State Climate Office, the Southern Mountains Region, which includes Macon County, experienced moderate to extreme drought occurrences in 8 of the last 14 years (2000-2013). **Table B.4** shows the most severe drought condition reported for each year in the Southern Mountains Region, according to PDSI classifications. However, it should be noted that the most severe classification reported is based on monthly regional averages, and conditions in Macon County may actually have been less or more severe than what is reported.

TABLE B. 4: HISTORICAL DROUGHT OCCURRENCES IN MACON COUNTY

extreme drought	severe drought	moderate drought	mid-range	moderately moist	very moist	extremely moist
-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

	Macon County	
2000	**-3.34**	**Severe Drought**
2001	**-3.62**	**Severe Drought**
2002	**-3.72**	**Severe Drought**
2003	**-0.05**	Mid-range
2004	**-1.76**	Mid-range
2005	**-1.07**	Mid-range
2006	**-2.20**	**Moderate Drought**
2007	**-4.30**	**Extreme Drought**
2008	**-4.23**	**Extreme Drought**
2009	**-3.34**	**Severe Drought**
2010	**-1.77**	Mid-range
2011	**-2.18**	**Moderate Drought**
2012	**-1.38**	Mid-range
2013	**1.34**	Mid-range

Source: North Carolina State Climate Office

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Macon County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

B.2.2 Extreme Heat

Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. All of Macon County is susceptible to extreme heat conditions.

Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in Macon County. There were no events reported.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been reported since 1872. The recorded maximum for Macon County can be found below in **Table B.5**.

TABLE A.5: HIGHEST RECORDED TEMPERATURE IN MACON COUNTY

Location	Date	Temperature (F)
Franklin	7/29/1952	101
MACON COUNTY MAXIMUM	--	**101**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the county. The most centralized location is in Franklin. **Table B.6** shows the average maximum temperatures from 1971 to 2000 at the Franklin observation station which can be used as a general comparison for the county.

TABLE B.6: AVERAGE MAXIMUM TEMPERATURE IN FRANKLIN, MACON COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	47.7	52.5	60.3	68.5	75.6	81.3	84.5	83.2	77.9	69.4	59.5	50.4

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Macon County has a probability level of unlikely (less than 1 percent annual probability) for future extreme heat events to impact the county.

B.2.3 Hailstorm

Location and Spatial Extent

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

Historical Occurrences

According to the National Climatic Data Center, 68 recorded hailstorm events have affected Macon County since 1984.[2] **Table B.7** is a summary of the hail events in Macon County. **Table B.8** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in

[2] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1955 through July 2014. It is likely that additional hail events have affected Macon County. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

almost $7,000 (2014 dollars) in property damages.[3] Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE B.7: SUMMARY OF HAIL OCCURRENCES IN MACON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Franklin	24	0/0	$0
Highlands	9	0/0	$0
Unincorporated Area	35	0/0	$6,616
MACON COUNTY TOTAL	**68**	**0/0**	**$6,616**

Source: National Climatic Data Center

TABLE B.8: HISTORICAL HAIL OCCURRENCES IN MACON COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Franklin				
Franklin	6/15/1995	0.88 in.	0/0	$0
Franklin	6/16/1995	0.75 in.	0/0	$0
Franklin	6/17/1995	0.75 in.	0/0	$0
FRANKLIN	4/20/1996	1.00 in.	0/0	$0
FRANKLIN	2/13/2000	0.75 in.	0/0	$0
FRANKLIN	6/20/2002	1.50 in.	0/0	$0
FRANKLIN	7/1/2002	0.75 in.	0/0	$0
FRANKLIN	5/15/2003	0.75 in.	0/0	$0
FRANKLIN	7/13/2003	0.88 in.	0/0	$0
FRANKLIN	5/10/2005	0.88 in.	0/0	$0
FRANKLIN	4/3/2006	0.75 in.	0/0	$0
FRANKLIN	4/19/2006	0.75 in.	0/0	$0
FRANKLIN	4/20/2006	0.88 in.	0/0	$0
FRANKLIN	4/20/2006	1.50 in.	0/0	$0
FRANKLIN	4/20/2006	1.00 in.	0/0	$0
FRANKLIN	4/20/2006	1.00 in.	0/0	$0
FRANKLIN	5/13/2006	1.25 in.	0/0	$0
FRANKLIN	8/3/2007	0.88 in.	0/0	$0
FRANKLIN	8/24/2007	2.00 in.	0/0	$0
FRANKLIN	8/24/2007	1.00 in.	0/0	$0
FRANKLIN	5/26/2011	0.88 in.	0/0	$0
FRANKLIN	4/26/2012	0.75 in.	0/0	$0
FRANKLIN	4/26/2012	1.00 in.	0/0	$0
FRANKLIN	6/18/2014	0.75 in.	0/0	$0
Highlands				
Highlands	3/31/1993	0.75 in.	0/0	$0
HIGHLANDS	5/6/1999	1.00 in.	0/0	$0

[3] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

	Date	Magnitude	Deaths / Injuries	Property Damage*
HIGHLANDS	7/22/2003	1.00 in.	0/0	$0
HIGHLANDS	8/5/2005	1.75 in.	0/0	$0
HIGHLANDS	5/11/2007	0.75 in.	0/0	$0
HIGHLANDS	5/20/2008	1.00 in.	0/0	$0
HIGHLANDS	5/15/2010	1.00 in.	0/0	$0
HIGHLANDS	6/1/2011	1.00 in.	0/0	$0
HIGHLANDS	6/9/2011	1.00 in.	0/0	$0
Unincorporated Area				
MACON CO.	3/28/1984	2.75 in.	0/0	$0
MACON CO.	6/7/1985	1.00 in.	0/0	$0
MACON CO.	3/15/1989	0.75 in.	0/0	$0
MACON CO.	3/19/1992	0.88 in.	0/0	$0
Nantahala	2/21/1993	0.75 in.	0/0	$0
Countywide	3/31/1993	1.00 in.	0/0	$0
Nr Franklin	5/14/1995	1.50 in.	0/0	$0
BURNING TOWN	4/20/1996	0.75 in.	0/0	$0
GOLD MINE	6/21/1997	1.50 in.	0/0	$0
OTTO	5/7/1999	0.75 in.	0/0	$0
AQUONE	6/20/2002	0.75 in.	0/0	$0
SCALY	7/2/2002	1.00 in.	0/0	$6,616
SCALY	3/27/2005	0.88 in.	0/0	$0
OTTO	4/2/2006	0.75 in.	0/0	$0
OTTO	4/3/2006	0.75 in.	0/0	$0
CULLASAJA	8/5/2009	0.75 in.	0/0	$0
SEALY MTN	5/27/2010	0.75 in.	0/0	$0
SEALY MTN	4/27/2011	1.00 in.	0/0	$0
FAIRVIEW	5/26/2011	1.00 in.	0/0	$0
IOTLA	5/26/2011	1.50 in.	0/0	$0
PRENTISS	5/26/2011	1.00 in.	0/0	$0
ELLNAY	5/26/2011	1.00 in.	0/0	$0
OTTO	5/26/2011	1.00 in.	0/0	$0
OTTO	6/2/2011	0.88 in.	0/0	$0
AQUONE	7/3/2011	1.00 in.	0/0	$0
BLOSSOMTOWN	3/2/2012	1.75 in.	0/0	$0
FRANKLIN ARPT	3/2/2012	1.75 in.	0/0	$0
ELLNAY	3/2/2012	2.00 in.	0/0	$0
HIGDONVILLE	4/5/2012	0.75 in.	0/0	$0
ELLNAY	4/26/2012	1.00 in.	0/0	$0
ELLNAY	4/26/2012	1.00 in.	0/0	$0
SHOOKVILLE	7/5/2012	1.00 in.	0/0	$0
ELLIJAY	5/20/2013	1.00 in.	0/0	$0
FRANKLIN ARPT	5/22/2013	0.88 in.	0/0	$0
TERESITA	6/19/2014	1.50 in.	0/0	$0

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is likely (between 10 and 100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that Macon County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

B.2.4 Hurricane and Tropical Storm

Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Macon County. The entire county is equally susceptible to hurricane and tropical storms.

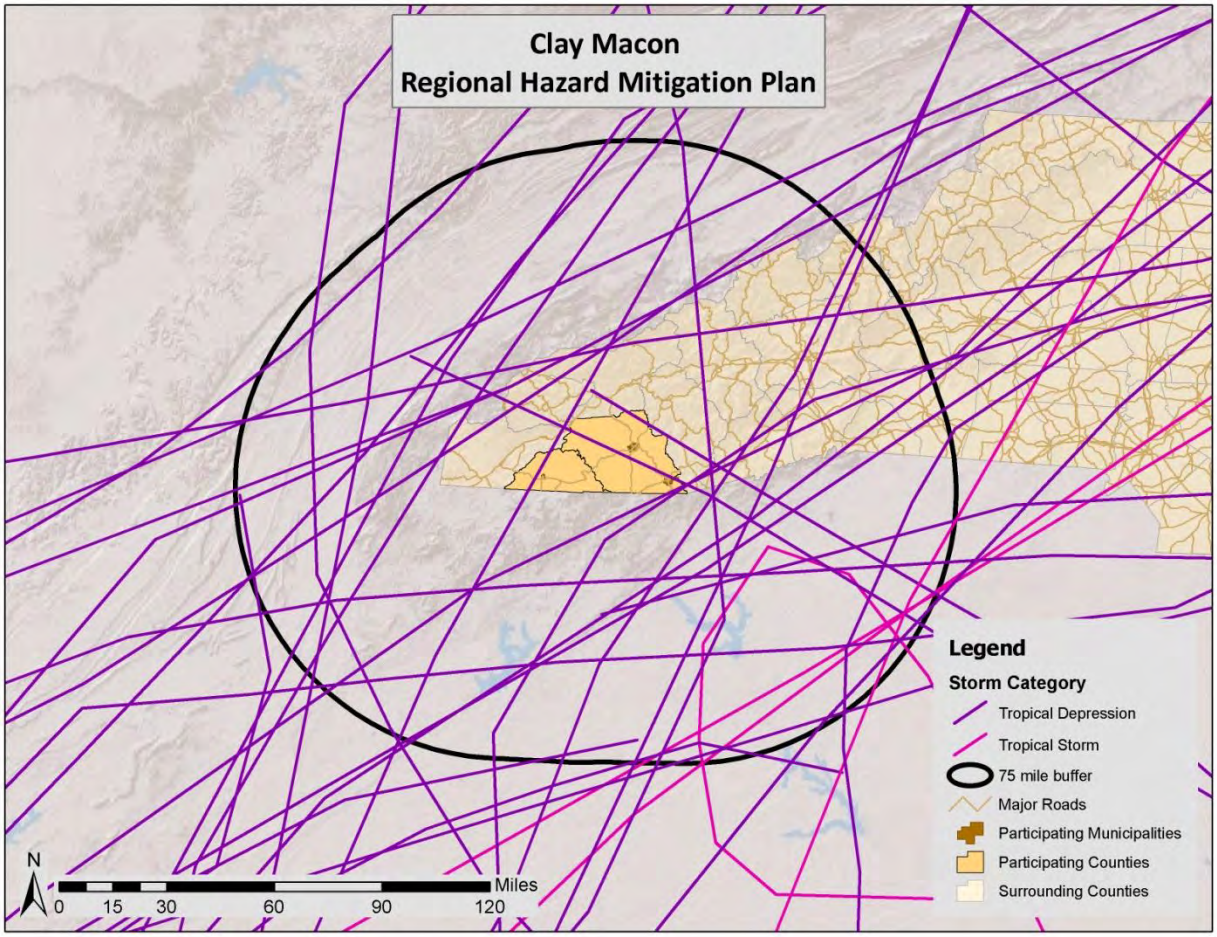
Historical Occurrences

According to the National Hurricane Center's historical storm track records, 34 hurricane or tropical storm tracks have passed within 75 miles of the Clay Macon Region since 1859.[4] This includes 4 tropical storms and 30 tropical depressions.

Of the recorded storm events, five storms have traversed directly through the Clay Macon Region as shown in **Figure B.2**. **Table B.9** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Clay Macon Region) and maximum Category of the storm based on the Saffir-Simpson Scale.

[4] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

FIGURE B.2: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CLAY MACON REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE B.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CLAY MACON REGION (1850–2013)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/17/1859	NOT NAMED	35.2	Tropical Storm
9/11/1882	NOT NAMED	35.2	Tropical Storm
9/11/1882	NOT NAMED	35.2	Tropical Storm
7/8/1896	NOT NAMED	26.4	Tropical Depression
9/28/1901	NOT NAMED	30.8	Tropical Depression
9/15/1900	NOT NAMED	22.0	Tropical Depression
9/23/1907	NOT NAMED	30.8	Tropical Depression
10/11/1905	NOT NAMED	22.0	Tropical Depression
10/11/1902	NOT NAMED	30.8	Tropical Depression
9/16/1903	NOT NAMED	26.4	Tropical Depression
9/18/1906	NOT NAMED	26.4	Tropical Depression
9/4/1913	NOT NAMED	17.6	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/30/1911	NOT NAMED	26.4	Tropical Depression
7/15/1916	NOT NAMED	30.8	Tropical Depression
9/5/1915	NOT NAMED	26.4	Tropical Depression
8/15/1928	NOT NAMED	26.4	Tropical Depression
10/17/1932	NOT NAMED	17.6	Tropical Depression
8/13/1940	NOT NAMED	30.8	Tropical Depression
8/28/1949	NOT NAMED	35.2	Tropical Storm
6/8/1968	CELESTE	22.0	Tropical Depression
9/24/1975	ELOISE	26.4	Tropical Depression
9/8/1977	BABE	22.0	Tropical Depression
8/17/1985	ONE-C	26.4	Tropical Depression
8/28/1992	ANDREW	17.6	Tropical Depression
8/28/1992	IVAN	17.6	Tropical Depression
8/17/1994	BERYL	13.2	Tropical Depression
7/23/1997	DANNY	17.6	Tropical Depression
7/2/2003	DOLORES	17.6	Tropical Depression
9/28/2004	NOT NAMED	17.6	Tropical Depression
9/28/2004	JEANNE	17.6	Tropical Depression
9/8/2004	FRANCES	22.0	Tropical Depression
7/7/2005	CINDY	17.6	Tropical Depression
8/27/2008	FAY	13.2	Tropical Depression
9/6/2011	LEE	30.0	Tropical Depression

Source: National Hurricane Center

The National Climatic Data Center did not report any events associated with a hurricane or tropical storm in Macon County between 1996 and 2014. However, federal records indicate that two disaster declarations were made in 2004 (Tropical Storm Frances and Hurricane Ivan) for the county.[5]

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

Tropical Storm Frances – September 7-8, 2004
Tropical Storm Frances was a slow-moving, relatively large storm that dumped heavy rains over the eastern United States. The remnants of Frances produced a swath of 5 to 15 inches of rain across the North Carolina Mountains with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph along the Appalachian Mountains and thousands of trees were downed. Trees fell on structures, vehicles, and power lines. Flooding also led to numerous landslides in the area which added to the damage of infrastructure and residential and commercial structures. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

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

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

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

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

B.2.5 Lightning

Location and Spatial Extent
Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Macon County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been 14 recorded lightning events in Macon County since 1998, as listed in summary **Table B.10**.[6] These events resulted in more than $2.0 million (2014 dollars) in damages and caused 1 injury.[7] A complete listing of those events can be found in **Table B.11.** Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE B.10: SUMMARY OF LIGHTNING OCCURRENCES IN MACON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Franklin	3	0/1	$236,681
Highlands	7	0/0	$1,360,489

[6] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is certain that additional lightning events have occurred in Macon County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.
[7] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Unincorporated Area	4	0/0	$471,926
MACON COUNTY TOTAL	**14**	**0/1**	**$2,069,096**

Source: National Climatic Data Center

TABLE B.11: HISTORIC LIGHTNING OCCURRENCES IN MACON COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Franklin				
FRANKLIN	4/13/2004	0/1	$0	A 28-year-old woman received minor injuries when lightning struck the building she was in.
FRANKLIN	7/1/2005	0/0	$121,880	Lightning ignited a house fire on Chickadee Trail, causing significant damage.
FRANKLIN	7/26/2007	0/0	$114,801	Lightning ignited a fire that destroyed a house in the Clarks Chapel area.
Highlands				
HIGHLANDS	6/2/1998	0/0	$0	A new water treatment plant in Highlands was put out of commission for 2 days by a severely damaging lightning strike.
HIGHLANDS	6/10/1998	0/0	$0	A lightning strike in Highlands ignited a fire that burned a large house and its contents, including a Corvette. No damage estimates were given.
HIGHLANDS	8/31/2003	0/0	$12,936	Lightning ignited a fire at a house.
HIGHLANDS	6/27/2005	0/0	$12,188	Lightning hit a gas line on Flat Mountain Rd, which caused a nearby house to catch fire.
HIGHLANDS	8/1/2005	0/0	$60,940	Lightning ignited a fire at a house, causing significant damage to the home.
HIGHLANDS	8/1/2005	0/0	$182,820	Lightning ignited a fire at a house, completely destroying the structure.
HIGHLANDS	5/16/2010	0/0	$1,091,605	Lightning ignited a fire at an inn, destroying roughly half of a building with an estimated value of $2.5 million.
Unincorporated Area				
CULLASAJA	6/4/1998	0/0	$73,016	Lightning ignited a fire that destroyed a house and its contents.

	Date	Deaths / Injuries	Property Damage*	Details
SCALY	5/9/2004	0/0	$126,009	Lightning ignited a fire at a residence, destroying the home and its contents.
FRANKLIN ARPT	5/15/2010	0/0	$272,901	Lightning ignited a fire at a home off Pendergrass Rd, causing significant damage.
SEALY MTN	5/27/2010	0/0	$0	Lightning struck a detached garage on Tater Hill Dr, causing extensive damage. Lightning had struck a waterline at this same location 2 weeks earlier.

*Property Damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Although there was not a high number of historical lightning events reported in Macon County via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), Macon County is located in an area of the country that experienced an average of 2 to 4 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

B.2.6 Thunderstorm Wind / High Wind

Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Macon County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Macon County has uniform exposure to an event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms and high winds were at least partially responsible for three disaster declarations in Macon County in 1973, 1995, and 2013.[8] According to NCDC, there have been 102 reported thunderstorm wind and high wind events since 1970 in Macon County.[9] These events caused over $1.4 million (2014 dollars) in damages.[10] There were reports of two injuries. **Table B.12** summarizes this information.

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[9] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1955 through July 2014 and these high wind events are only inclusive of those reported by NCDC from 1996 through July 2014. It is certain that additional thunderstorm and high wind events have occurred in Clay County. As additional local data becomes available, this hazard profile will be amended.
[10] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

Table B.13 presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event.

TABLE B.12: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN MACON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Franklin	26	0/1	$471,908
Highlands	7	0/0	$15,611
Unincorporated Area	69	0/1	$934,275
MACON COUNTY TOTAL	**102**	**0/2**	**$1,421,794**

Source: National Climatic Data Center

TABLE B.13: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN MACON COUNTY

	Date	Type	Magnitude†	Deaths / Injuries	Property Damage*
Franklin					
FRANKLIN	1/5/1997	Thunderstorm Wind	50 kts.	0/0	$0
FRANKLIN	7/4/1997	Thunderstorm Wind	50 kts.	0/0	$370,765
FRANKLIN	6/21/1998	Thunderstorm Wind	50 kts.	0/0	$0
FRANKLIN	2/13/2000	Thunderstorm Wind	55 kts. E	0/0	$0
FRANKLIN	8/10/2000	Thunderstorm Wind	50 kts. E	0/0	$0
FRANKLIN	10/24/2001	Thunderstorm Wind	50 kts. E	0/0	$0
FRANKLIN	10/24/2001	Thunderstorm Wind	50 kts. E	0/0	$2,688
FRANKLIN	7/1/2002	Thunderstorm Wind	50 kts. E	0/0	$0
FRANKLIN	7/1/2002	Thunderstorm Wind	50 kts. E	0/0	$0
FRANKLIN	11/11/2002	Thunderstorm Wind	50 kts. E	0/0	$0
FRANKLIN	5/2/2003	Thunderstorm Wind	50 kts. EG	0/0	$6,468
FRANKLIN	7/13/2003	Thunderstorm Wind	52 kts. EG	0/0	$0
FRANKLIN	5/31/2004	Thunderstorm Wind	55 kts. EG	0/0	$3,780
FRANKLIN	7/17/2004	Thunderstorm Wind	55 kts. EG	0/0	$25,202
FRANKLIN	9/16/2004	Thunderstorm Wind	65 kts. EG	0/1	$63,005
FRANKLIN	6/22/2006	Thunderstorm Wind	50 kts. EG	0/0	$0
FRANKLIN	9/28/2006	Thunderstorm Wind	50 kts. EG	0/0	$0
FRANKLIN	6/14/2007	Thunderstorm Wind	50 kts. EG	0/0	$0
FRANKLIN	6/28/2007	Thunderstorm Wind	50 kts. EG	0/0	$0
FRANKLIN	7/26/2007	Thunderstorm Wind	55 kts. EG	0/0	$0
FRANKLIN	8/3/2007	Thunderstorm Wind	55 kts. EG	0/0	$0
FRANKLIN	5/20/2008	Thunderstorm Wind	50 kts. EG	0/0	$0
FRANKLIN	4/25/2010	Thunderstorm Wind	55 kts. EG	0/0	$0
FRANKLIN	8/13/2010	Thunderstorm Wind	55 kts. EG	0/0	$0
FRANKLIN	7/1/2012	Thunderstorm Wind	55 kts. EG	0/0	$0
FRANKLIN	7/5/2012	Thunderstorm Wind	55 kts. EG	0/0	$0
Highlands					
HIGHLANDS	1/5/1997	Thunderstorm Wind	50 kts.	0/0	$0
HIGHLANDS	7/4/1997	Thunderstorm Wind	50 kts.	0/0	$0
HIGHLANDS	1/23/1999	Thunderstorm Wind	58 kts.	0/0	$14,288

	Date	Type	Magnitude†	Deaths / Injuries	Property Damage*
HIGHLANDS	10/24/2001	Thunderstorm Wind	50 kts. E	0/0	$0
HIGHLANDS	5/13/2002	Thunderstorm Wind	50 kts. E	0/0	$1,323
HIGHLANDS	7/22/2003	Thunderstorm Wind	50 kts. EG	0/0	$0
HIGHLANDS	4/12/2004	Thunderstorm Wind	50 kts. EG	0/0	$0
Unincorporated Area					
MACON CO.	6/20/1970	Thunderstorm Wind	0 kts.	0/0	$0
MACON CO.	1/25/1975	Thunderstorm Wind	0 kts.	0/0	$0
MACON CO.	10/13/1983	Thunderstorm Wind	0 kts.	0/0	$0
MACON CO.	7/26/1986	Thunderstorm Wind	0 kts.	0/0	$0
MACON CO.	8/27/1992	Thunderstorm Wind	0 kts.	0/0	$0
MACON CO.	2/21/1993	Thunderstorm Wind	0 kts.	0/0	$8,236
MACON (ZONE)	12/17/1996	High Wind	50 kts.	0/0	$0
NEAR HIGHLANDS	2/21/1997	Thunderstorm Wind	50 kts.	0/0	$0
BEECHERTOWN	7/4/1997	Thunderstorm Wind	50 kts.	0/0	$0
MACON (ZONE)	1/7/1998	High Wind	50 kts.	0/0	$0
AQUONE	6/21/1998	Thunderstorm Wind	50 kts.	0/0	$0
COWEE	5/6/1999	Thunderstorm Wind	50 kts.	0/0	$14,288
MACON (ZONE)	9/15/1999	High Wind	45 kts.	0/0	$0
MACON (ZONE)	2/13/2000	High Wind	52 kts. E	0/0	$0
KYLE	2/13/2000	Thunderstorm Wind	55 kts. E	0/0	$0
MACON (ZONE)	3/19/2000	High Wind	55 kts. E	0/0	$0
MACON (ZONE)	3/28/2000	High Wind	50 kts. E	0/0	$0
MACON (ZONE)	4/8/2000	High Wind	50 kts. E	0/0	$0
MACON (ZONE)	12/16/2000	High Wind	55 kts. E	0/0	$0
MACON (ZONE)	1/30/2001	High Wind	50 kts. E	0/0	$0
MACON (ZONE)	3/6/2001	High Wind	55 kts. E	0/0	$0
MACON (ZONE)	3/20/2001	High Wind	55 kts. E	0/0	$0
MACON (ZONE)	11/24/2001	High Wind	50 kts. E	0/0	$0
MACON (ZONE)	11/29/2001	High Wind	50 kts. E	0/0	$0
MACON (ZONE)	2/4/2002	High Wind	50 kts. E	0/0	$0
MACON (ZONE)	9/27/2002	High Wind	50 kts. E	0/0	$0
MACON (ZONE)	12/13/2002	High Wind	65 kts. E	0/0	$0
MACON (ZONE)	12/25/2002	High Wind	50 kts. EG	0/0	$0
MACON (ZONE)	2/4/2003	High Wind	60 kts. EG	0/0	$0
MACON (ZONE)	10/14/2003	High Wind	50 kts. EG	0/0	$1,294
MACON (ZONE)	11/18/2003	High Wind	50 kts. EG	0/0	$3,881
MACON (ZONE)	3/5/2004	High Wind	50 kts. EG	0/0	$1,260
MACON (ZONE)	3/7/2004	High Wind	50 kts. EG	0/0	$6,300
COUNTYWIDE	7/5/2004	Thunderstorm Wind	60 kts. EG	0/0	$0
MACON (ZONE)	7/5/2004	High Wind	55 kts. EG	0/0	$1,260
MACON (ZONE)	9/16/2004	High Wind	55 kts. EG	0/1	$126,009
MACON (ZONE)	1/22/2005	High Wind	60 kts. EG	0/0	$0
COUNTYWIDE	2/21/2005	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON (ZONE)	8/30/2005	High Wind	50 kts. EG	0/0	$0
MACON (ZONE)	11/21/2005	High Wind	55 kts. EG	0/0	$0
MACON (ZONE)	1/14/2006	High Wind	60 kts. EG	0/0	$0

	Date	Type	Magnitude†	Deaths / Injuries	Property Damage*
RAINBOW SPGS	5/13/2006	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON (ZONE)	12/1/2006	High Wind	55 kts. EG	0/0	$0
MACON (ZONE)	4/15/2007	High Wind	70 kts. EG	0/0	$0
MACON (ZONE)	4/16/2007	High Wind	60 kts. EG	0/0	$688,807
COWEE	8/24/2007	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON (ZONE)	5/11/2008	High Wind	60 kts. EG	0/0	$0
COWEE	5/20/2008	Thunderstorm Wind	50 kts. EG	0/0	$0
AQUONE	6/11/2009	Thunderstorm Wind	55 kts. EG	0/0	$0
CARTOOGECHAYE	8/13/2009	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON (ZONE)	12/9/2009	High Wind	55 kts. EG	0/0	$0
MACON (ZONE)	12/25/2009	High Wind	50 kts. EG	0/0	$0
DEAN	5/28/2010	Thunderstorm Wind	50 kts. EG	0/0	$0
LEATHERMAN	7/31/2010	Thunderstorm Wind	50 kts. EG	0/0	$0
AQUONE	10/25/2010	Thunderstorm Wind	55 kts. EG	0/0	$0
FLATS	4/4/2011	Thunderstorm Wind	55 kts. EG	0/0	$0
OTTO	6/2/2011	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON CO.	6/15/2011	Thunderstorm Wind	60 kts. EG	0/0	$0
ELLIJAY	6/19/2011	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON CO.	6/19/2011	Thunderstorm Wind	55 kts. EG	0/0	$0
AQUONE	7/3/2011	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON (ZONE)	1/26/2012	Strong Wind	40 kts. EG	0/0	$82,940
BLOSSOMTOWN	3/2/2012	Thunderstorm Wind	55 kts. EG	0/0	$0
FRANKLIN ARPT	3/2/2012	Thunderstorm Wind	50 kts. EG	0/0	$0
KYLE	3/2/2012	Thunderstorm Wind	50 kts. EG	0/0	$0
MACON (ZONE)	12/26/2012	High Wind	50 kts. EG	0/0	$0
KYLE	1/30/2013	Thunderstorm Wind	55 kts. EG	0/0	$0
FRANKLIN ARPT	5/22/2013	Thunderstorm Wind	51 kts. MG	0/0	$0
CULLASAJA	6/26/2013	Thunderstorm Wind	50 kts. EG	0/0	$0

†If known, maximum measured gusts (MG) were recorded; otherwise, estimated gusts (EG) were recorded.
*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county.

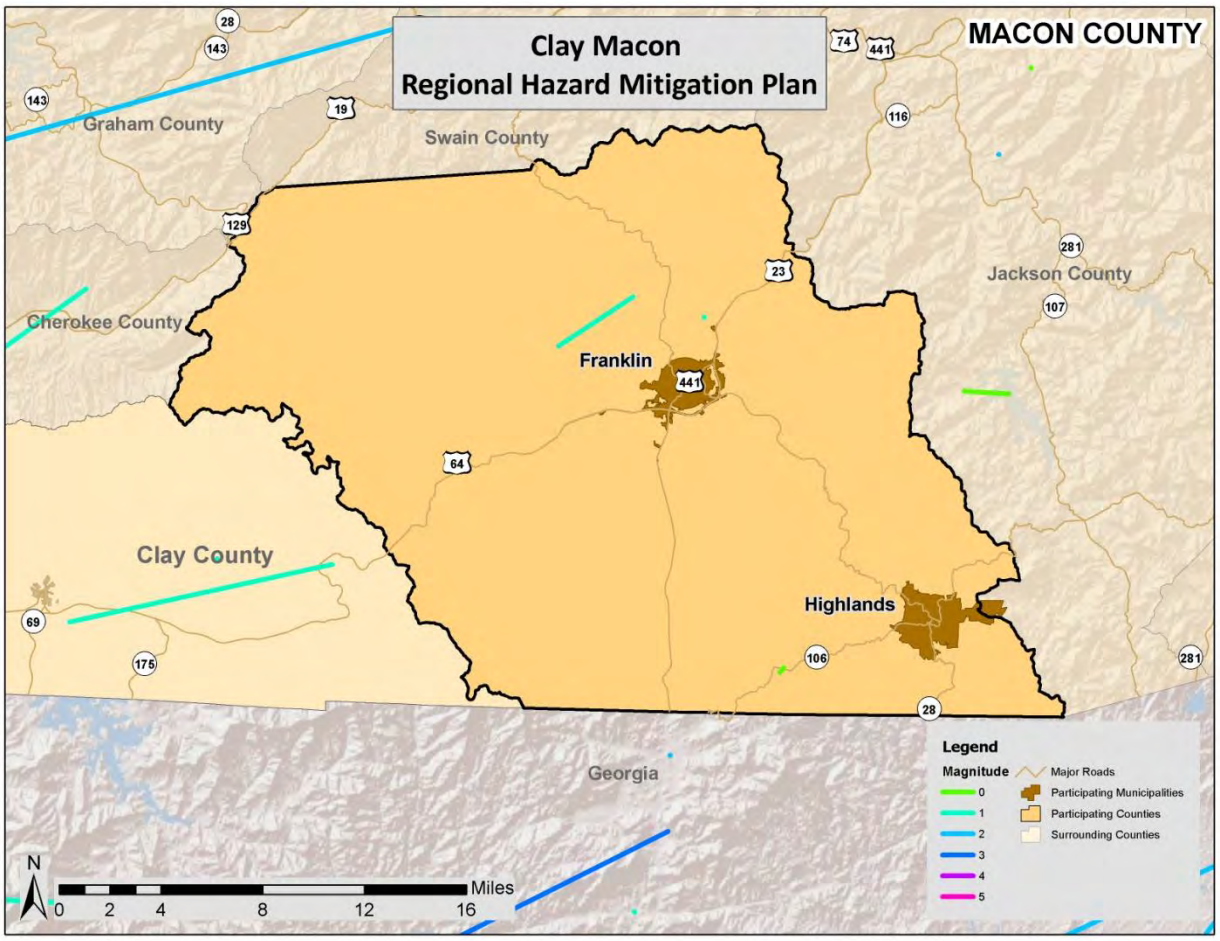
B.2.7 Tornado

Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in Macon County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Macon County is uniformly exposed to this hazard. With that in mind, Figure **B.3** shows tornado track data for many of the major tornado events that have impacted the

county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE B.3: HISTORICAL TORNADO TRACKS IN MACON COUNTY



Source: National Weather Service Storm Prediction Center

Historical Occurrences

Tornadoes are a fairly rare occurrence in mountainous areas. However, they have and do occur in Macon County. According to the National Climatic Data Center, there have been a total of four recorded tornado events in Macon County since 1976 (**Table B.14**), resulting in almost $1.1 million (2014 dollars) in property damages.[11] [12] No injuries or fatalities were reported (**Table B.15**). The magnitude of these tornadoes ranges from F0 to F1 in intensity, although an F2 to F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 64 years.

[11] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1950 through July 2014. It is likely that additional tornadoes have occurred in Macon County. As additional local data becomes available, this hazard profile will be amended.

[12] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

TABLE B.14: SUMMARY OF TORNADO OCCURRENCES IN MACON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Franklin	1	0/0	$0
Highlands	0	0/0	$0
Unincorporated Area	3	0/0	$1,056,288
MACON COUNTY TOTAL	**4**	**0/0**	**$1,056,288**

Source: National Climatic Data Center

TABLE B.15: HISTORICAL TORNADO IMPACTS IN MACON COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Franklin					
FRANKLIN	8/30/2005	F1	0/0	$0	30 to 40 trees down in the area around Old Murphy Rd near Standing Indian Campground.
Highlands					
None Reported	--	--	--	--	--
Unincorporated Area					
MACON CO.	2/18/1976	F1	0/0	$1,045,830	Tornado skipped along southwest and west of Franklin. Damage to inoperative dairy farm, moved 33 lb. well cover, and damage to trees.
MACON CO.	7/29/1976	F1	0/0	$10,458	A tornado hit near Franklin between route 441 and NC highway 28. Damage to trees, utility lines and mobile homes.
SEALY MTN	4/27/2011	EF0	0/0	$0	An area of weak tornado damage began in the Dryman Ridge Rd area of Scaly Mountain. A mobile home was flipped and several trees were downed. The tornado appeared to lift briefly as it moved toward the north northeast, before touching down again briefly just north of highway 106, where the tops of several trees were snapped.

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. Furthermore, the mountainous terrain of the county makes tornadoes a rare occurrence. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Macon County experience a direct tornado strike. The probability of future tornado occurrences affecting Macon County is possible (1 to 10 percent annual probability).

B.2.8 Winter Storm and Freeze

Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Macon County is accustomed to severe winter weather conditions and frequently receives severe winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

Historical Occurrences

Winter weather has resulted in one disaster declaration in Macon County. This includes the Blizzard of 1996.[13] According to the National Climatic Data Center, there have been a total of 135 recorded winter storm events in Macon County since 1996 (**Table B.16**).[14] These events did not result in any recorded damages.[15] Detailed information on the recorded winter storm events can be found in **Table B.17**.

TABLE B.16: SUMMARY OF WINTER STORM EVENTS IN MACON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Macon County	135	0/0	$0

Source: National Climatic Data Center

TABLE B.17: HISTORICAL WINTER STORM IMPACTS IN MACON COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Franklin				
None Reported	--	--	--	--
Highlands				
None Reported	--	--	--	--
Unincorporated Area				
MACON (ZONE)	2/1/1996	Winter Weather	0/0	$0
MACON (ZONE)	2/7/1996	Winter Weather	0/0	$0
MACON (ZONE)	2/11/1996	Winter Weather	0/0	$0
MACON (ZONE)	2/16/1996	Winter Weather	0/0	$0
MACON (ZONE)	12/18/1996	Heavy Snow	0/0	$0
MACON (ZONE)	1/8/1997	Sleet	0/0	$0
MACON (ZONE)	1/9/1997	Ice Storm	0/0	$0
MACON (ZONE)	1/10/1997	Heavy Snow	0/0	$0
MACON (ZONE)	2/13/1997	Winter Weather	0/0	$0
MACON (ZONE)	12/8/1997	Winter Weather	0/0	$0
MACON (ZONE)	12/27/1997	Heavy Snow	0/0	$0

[13] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[14] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is certain that additional winter storm conditions have affected Macon County.
[15] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

	Date	Type of Storm	Deaths / Injuries	Property Damage*
MACON (ZONE)	12/29/1997	Heavy Snow	0/0	$0
MACON (ZONE)	12/29/1997	Heavy Snow	0/0	$0
MACON (ZONE)	1/18/1998	Winter Weather	0/0	$0
MACON (ZONE)	1/18/1998	Heavy Snow	0/0	$0
MACON (ZONE)	1/27/1998	Heavy Snow	0/0	$0
MACON (ZONE)	3/2/1998	Winter Weather	0/0	$0
MACON (ZONE)	3/11/1998	Winter Weather	0/0	$0
MACON (ZONE)	12/23/1998	Sleet	0/0	$0
MACON (ZONE)	1/31/1999	Heavy Snow	0/0	$0
MACON (ZONE)	3/3/1999	Winter Weather	0/0	$0
MACON (ZONE)	3/9/1999	Winter Storm	0/0	$0
MACON (ZONE)	3/26/1999	Heavy Snow	0/0	$0
MACON (ZONE)	11/2/1999	Winter Weather	0/0	$0
MACON (ZONE)	12/24/1999	Winter Weather	0/0	$0
MACON (ZONE)	1/16/2000	Winter Weather	0/0	$0
MACON (ZONE)	1/22/2000	Heavy Snow	0/0	$0
MACON (ZONE)	1/26/2000	Heavy Snow	0/0	$0
MACON (ZONE)	1/29/2000	Winter Weather	0/0	$0
MACON (ZONE)	4/8/2000	Heavy Snow	0/0	$0
MACON (ZONE)	11/19/2000	Heavy Snow	0/0	$0
MACON (ZONE)	12/3/2000	Heavy Snow	0/0	$0
MACON (ZONE)	12/13/2000	Winter Weather	0/0	$0
MACON (ZONE)	12/17/2000	Heavy Snow	0/0	$0
MACON (ZONE)	12/19/2000	Heavy Snow	0/0	$0
MACON (ZONE)	1/1/2001	Heavy Snow	0/0	$0
MACON (ZONE)	3/20/2001	Heavy Snow	0/0	$0
MACON (ZONE)	1/3/2002	Heavy Snow	0/0	$0
MACON (ZONE)	1/6/2002	Heavy Snow	0/0	$0
MACON (ZONE)	2/3/2002	Heavy Snow	0/0	$0
MACON (ZONE)	2/6/2002	Winter Weather	0/0	$0
MACON (ZONE)	12/4/2002	Winter Weather	0/0	$0
MACON (ZONE)	12/22/2002	Winter Weather	0/0	$0
MACON (ZONE)	12/25/2002	Winter Weather	0/0	$0
MACON (ZONE)	1/16/2003	Heavy Snow	0/0	$0
MACON (ZONE)	1/19/2003	Winter Weather	0/0	$0
MACON (ZONE)	2/6/2003	Heavy Snow	0/0	$0
MACON (ZONE)	2/9/2003	Winter Weather	0/0	$0
MACON (ZONE)	3/30/2003	Winter Weather	0/0	$0
MACON (ZONE)	3/30/2003	Heavy Snow	0/0	$0
MACON (ZONE)	3/30/2003	Winter Weather	0/0	$0
MACON (ZONE)	11/28/2003	Winter Weather	0/0	$0
MACON (ZONE)	12/3/2003	Winter Weather	0/0	$0
MACON (ZONE)	12/5/2003	Winter Weather	0/0	$0
MACON (ZONE)	12/18/2003	Heavy Snow	0/0	$0
MACON (ZONE)	12/19/2003	Winter Weather	0/0	$0
MACON (ZONE)	1/25/2004	Heavy Snow	0/0	$0

	Date	Type of Storm	Deaths / Injuries	Property Damage*
MACON (ZONE)	2/2/2004	Winter Weather	0/0	$0
MACON (ZONE)	2/5/2004	Winter Weather	0/0	$0
MACON (ZONE)	2/7/2004	Winter Weather	0/0	$0
MACON (ZONE)	2/12/2004	Winter Weather	0/0	$0
MACON (ZONE)	2/15/2004	Winter Weather	0/0	$0
MACON (ZONE)	2/26/2004	Winter Weather	0/0	$0
MACON (ZONE)	2/26/2004	Heavy Snow	0/0	$0
MACON (ZONE)	3/30/2004	Winter Weather	0/0	$0
MACON (ZONE)	4/13/2004	Winter Weather	0/0	$0
MACON (ZONE)	12/14/2004	Winter Weather	0/0	$0
MACON (ZONE)	12/19/2004	Winter Weather	0/0	$0
MACON (ZONE)	1/22/2005	Winter Weather	0/0	$0
MACON (ZONE)	2/2/2005	Winter Weather	0/0	$0
MACON (ZONE)	2/2/2005	Winter Weather	0/0	$0
MACON (ZONE)	4/2/2005	Winter Weather	0/0	$0
MACON (ZONE)	4/23/2005	Winter Weather	0/0	$0
MACON (ZONE)	11/21/2005	Winter Weather	0/0	$0
MACON (ZONE)	12/3/2005	Winter Weather	0/0	$0
MACON (ZONE)	1/14/2006	Winter Weather	0/0	$0
MACON (ZONE)	2/8/2006	Winter Weather	0/0	$0
MACON (ZONE)	2/11/2006	Winter Weather	0/0	$0
MACON (ZONE)	2/11/2006	Heavy Snow	0/0	$0
MACON (ZONE)	3/22/2006	Winter Weather	0/0	$0
MACON (ZONE)	1/9/2007	Winter Weather	0/0	$0
MACON (ZONE)	1/21/2007	Winter Weather	0/0	$0
MACON (ZONE)	2/1/2007	Heavy Snow	0/0	$0
MACON (ZONE)	2/17/2007	Winter Weather	0/0	$0
MACON (ZONE)	1/1/2008	Winter Weather	0/0	$0
MACON (ZONE)	1/16/2008	Heavy Snow	0/0	$0
MACON (ZONE)	1/19/2008	Winter Weather	0/0	$0
MACON (ZONE)	1/22/2008	Winter Weather	0/0	$0
MACON (ZONE)	1/31/2008	Winter Weather	0/0	$0
MACON (ZONE)	2/1/2008	Winter Weather	0/0	$0
MACON (ZONE)	10/27/2008	Winter Weather	0/0	$0
MACON (ZONE)	11/21/2008	Winter Weather	0/0	$0
MACON (ZONE)	12/1/2008	Winter Weather	0/0	$0
MACON (ZONE)	1/17/2009	Winter Weather	0/0	$0
MACON (ZONE)	1/19/2009	Winter Weather	0/0	$0
MACON (ZONE)	2/2/2009	Winter Weather	0/0	$0
MACON (ZONE)	3/1/2009	Winter Weather	0/0	$0
MACON (ZONE)	10/17/2009	Winter Weather	0/0	$0
MACON (ZONE)	12/12/2009	Winter Weather	0/0	$0
MACON (ZONE)	12/18/2009	Winter Storm	0/0	$0
MACON (ZONE)	12/30/2009	Winter Weather	0/0	$0
MACON (ZONE)	1/18/2010	Winter Weather	0/0	$0
MACON (ZONE)	1/29/2010	Heavy Snow	0/0	$0

	Date	Type of Storm	Deaths / Injuries	Property Damage*
MACON (ZONE)	2/4/2010	Winter Weather	0/0	$0
MACON (ZONE)	2/10/2010	Winter Weather	0/0	$0
MACON (ZONE)	2/12/2010	Heavy Snow	0/0	$0
MACON (ZONE)	2/15/2010	Winter Weather	0/0	$0
MACON (ZONE)	2/15/2010	Winter Weather	0/0	$0
MACON (ZONE)	3/2/2010	Heavy Snow	0/0	$0
MACON (ZONE)	3/22/2010	Winter Weather	0/0	$0
MACON (ZONE)	12/12/2010	Winter Weather	0/0	$0
MACON (ZONE)	12/15/2010	Winter Weather	0/0	$0
MACON (ZONE)	12/25/2010	Heavy Snow	0/0	$0
MACON (ZONE)	1/7/2011	Winter Weather	0/0	$0
MACON (ZONE)	1/10/2011	Heavy Snow	0/0	$0
MACON (ZONE)	1/11/2011	Winter Weather	0/0	$0
MACON (ZONE)	1/24/2011	Winter Weather	0/0	$0
MACON (ZONE)	2/9/2011	Winter Weather	0/0	$0
MACON (ZONE)	11/29/2011	Winter Weather	0/0	$0
MACON (ZONE)	1/2/2012	Winter Weather	0/0	$0
MACON (ZONE)	10/29/2012	Winter Weather	0/0	$0
MACON (ZONE)	11/5/2012	Winter Weather	0/0	$0
MACON (ZONE)	1/25/2013	Winter Weather	0/0	$0
MACON (ZONE)	2/2/2013	Winter Weather	0/0	$0
MACON (ZONE)	2/19/2013	Winter Weather	0/0	$0
MACON (ZONE)	3/2/2013	Winter Weather	0/0	$0
MACON (ZONE)	3/6/2013	Winter Weather	0/0	$0
MACON (ZONE)	3/20/2013	Winter Weather	0/0	$0
MACON (ZONE)	3/25/2013	Winter Weather	0/0	$0
MACON (ZONE)	11/26/2013	Winter Weather	0/0	$0
MACON (ZONE)	1/2/2014	Winter Weather	0/0	$0
MACON (ZONE)	1/21/2014	Winter Weather	0/0	$0
MACON (ZONE)	1/28/2014	Winter Weather	0/0	$0
MACON (ZONE)	2/12/2014	Winter Storm	0/0	$0
MACON (ZONE)	3/24/2014	Winter Weather	0/0	$0

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

There have been several severe winter weather events in Macon County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

1996 Winter Storm

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

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and

power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

Probability of Future Occurrences

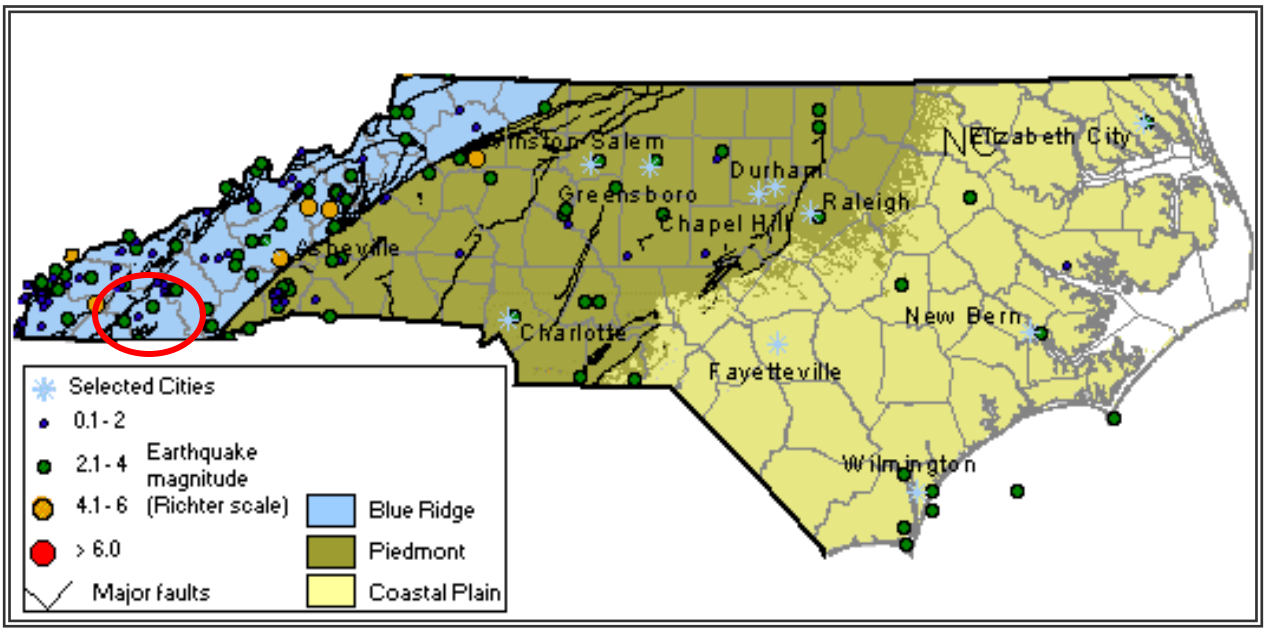
Winter storm events will remain a regular occurrence in Macon County due to its location in the western part of the state. According to historical information, Macon County generally experiences several winter storm events each year. Therefore, the annual probability is highly likely (100 percent).

B.2.9 Earthquake

Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure B.4** is a map showing geological and seismic information for North Carolina.

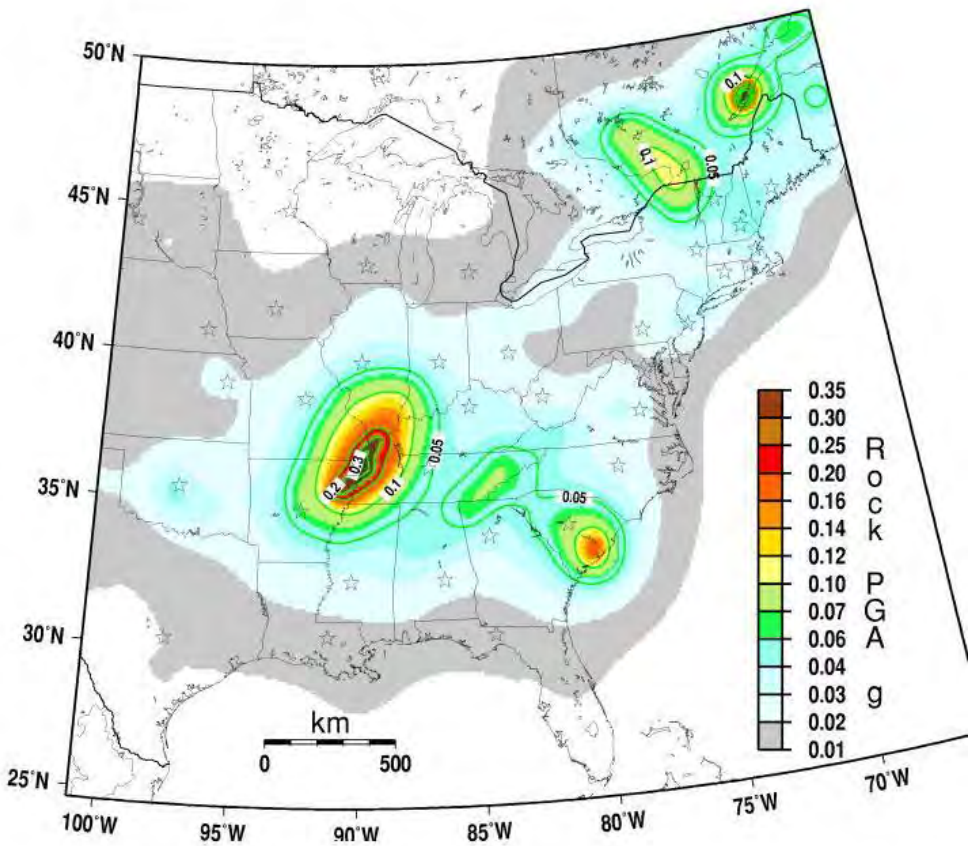
FIGURE B.4: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure B.5 shows the intensity level associated with Macon County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Macon County lies within an approximate zone of level "5" to "7" ground acceleration. This indicates that the county exists within an area of moderate seismic risk.

FIGURE B.5: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: United States Geological Survey, 2008

Historical Occurrences

At least 32 earthquakes are known to have affected Macon County since 1916. The strongest of these measured a V on the Modified Mercalli Intensity (MMI) scale. **Table B.18** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table B.19** presents a detailed occurrence of each event including the date, distance for the epicenter, magnitude, and Modified Mercalli Intensity (if known). [16]

TABLE B.18: SUMMARY OF SEISMIC ACTIVITY IN MACON COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Franklin	12	V	< 4.8
Highlands	4	V	< 4.8
Unincorporated Area	16	V	< 4.8
MACON COUNTY TOTAL	**32**	**V**	**< 4.8**

Source: National Geophysical Data Center

[16] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

TABLE B.19: SIGNIFICANT SEISMIC EVENTS IN MACON COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Franklin				
Franklin	2/21/1916	87.0 km	--	--
Franklin	11/3/1928	115.0 km	--	III
Franklin	1/1/1935	23.0 km	--	IV
Franklin	1/1/1935	23.0 km	--	V
Franklin	9/7/1956	66.0 km	--	IV
Franklin	11/24/1957	27.0 km	--	V
Franklin	11/9/1968	554.0 km	5.3	IV
Franklin	7/13/1969	106.0 km	3.5	III
Franklin	12/13/1969	35.0 km	--	IV
Franklin	10/9/1971	80.0 km	3.4	III
Franklin	11/30/1973	86.0 km	4.7	V
Franklin	7/27/1980	335.0 km	5.1	IV
Highlands				
Highlands	2/21/1916	80.0 km	--	V
Highlands	10/18/1916	325.0 km	--	III
Highlands	11/30/1973	108.0 km	4.7	IV
Highlands	8/26/1979	24.0 km	3.7	IV
Unincorporated Area				
Nantahala	10/18/1916	305.0 km	--	III
Aquone	1/1/1935	10.0 km	--	IV
Cullasaja	1/1/1935	27.0 km	--	III
Etna	1/1/1935	24.0 km	--	III
Otto	1/1/1935	22.0 km	--	IV
Wests Mill	1/1/1935	25.0 km	--	IV
Gneiss	11/24/1957	24.0 km	--	IV
Nantahala	11/24/1957	35.0 km	--	IV
Otto	11/24/1957	12.0 km	--	IV
Scaly	11/24/1957	17.0 km	--	III
Aquone	11/30/1973	72.0 km	4.7	V
Otto	11/30/1973	97.0 km	4.7	V
Scaly Mountain	11/30/1973	105.0 km	4.7	IV
Aquone	8/13/1979	68.0 km	3.7	IV
Otto	8/26/1979	40.0 km	3.7	IV
Scaly Mountain	8/26/1979	33.0 km	3.7	IV

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Macon County is unlikely. However, it is likely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 10 and 100 percent (likely).

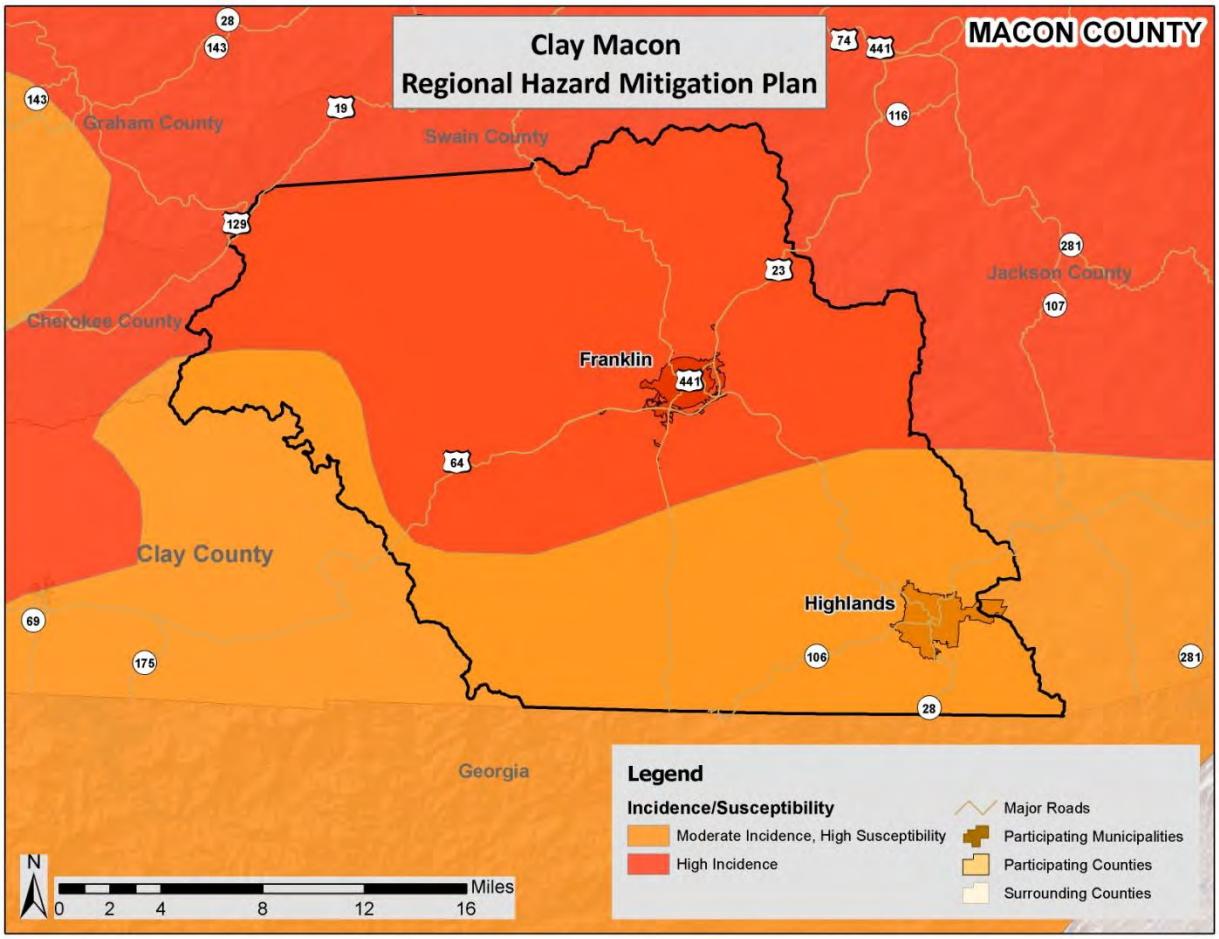
B.2.10 Landslide

Location and Spatial Extent

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

According to **Figure B.6** below, the majority of the county has high landslide activity. The remaining portion of the county, mostly in the southern half, has a moderate incidence occurrence rate. It should also be noted that there is high susceptibility throughout the county.

FIGURE B.6: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF MACON COUNTY



Source: United States Geological Survey

Historical Occurrences

Steep topography throughout Macon County makes the planning area susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. **Table B.20** presents a summary of the landslide occurrence events as

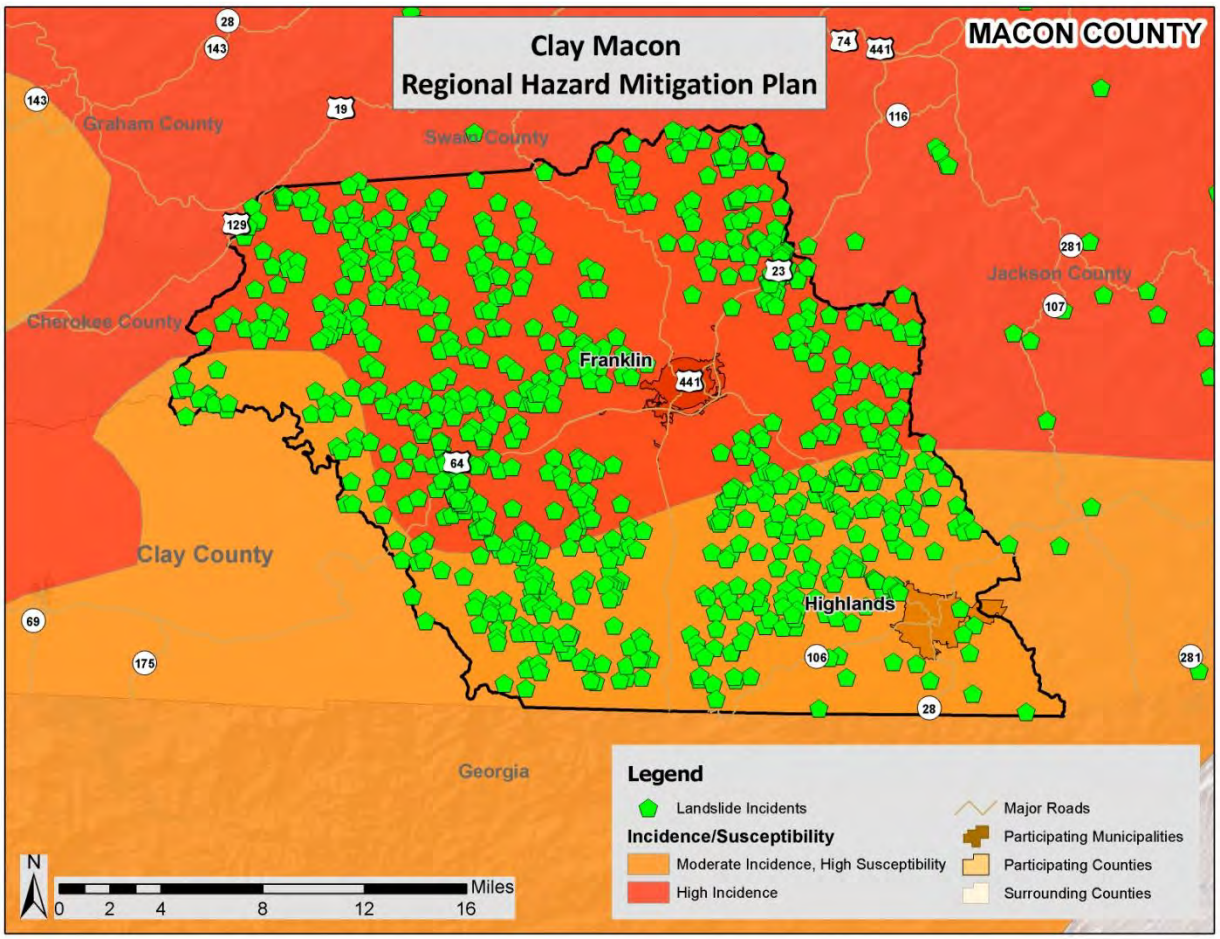
provided by the North Carolina Geological Survey.[17] The georeferenced locations of the landslide events presented in the aforementioned tables are presented in **Figure B.7**. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Macon County.

TABLE B.20: SUMMARY OF LANDSLIDE ACTIVITY IN MACON COUNTY

Location	Number of Occurrences
Franklin	0
Highlands	1
Unincorporated Area	809
MACON COUNTY TOTAL	**810**

Source: North Carolina Geological Survey

FIGURE B.7: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN MACON COUNTY



Source: North Carolina Geological Survey

[17] It should be noted that the North Carolina Geological Survey (NCGS) emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

Landslides and mudslides were at least partially responsible for one disaster declaration in Macon County in 2013.[18] The National Climatic Data Center also reported two landslide events in the Clay Macon Region.

Macon County — September 16, 2004
Following the moderate to heavy rainfall associated with the remnants of Hurricane Ivan, a landslide (debris flow) began at the top of Fishhawk Mountain and flower through the Peeks Creek valley. The slide, consisting of water, boulders, trees, mud, and other debris, destroyed or severely damaged 20 to 30 homes and mobile homes and resulted in $2,016,144 (2014 dollars) in property damage.[19] Four people and an unborn child were killed and nine people were injured as their homes were overwhelmed by the debris. This landslide is often referred to as the Peeks Creek disaster and it is the largest landslide in North Carolina state history.

Brendletown, Macon County — January 15, 2013
Over a four-day period, rainfall amounts ranged from 4 to 10 inches across the southern Appalachians. The prolonged heavy rain resulted in several landslides across the North Carolina mountains, including a landslide that heavily damaged a garage at a residence in Brendletown near the Jackson County line. This resulted in $10,218 (2014 dollars) in property damage.[20]

There was no additional historical information reported in the previous county hazard mitigation plan.

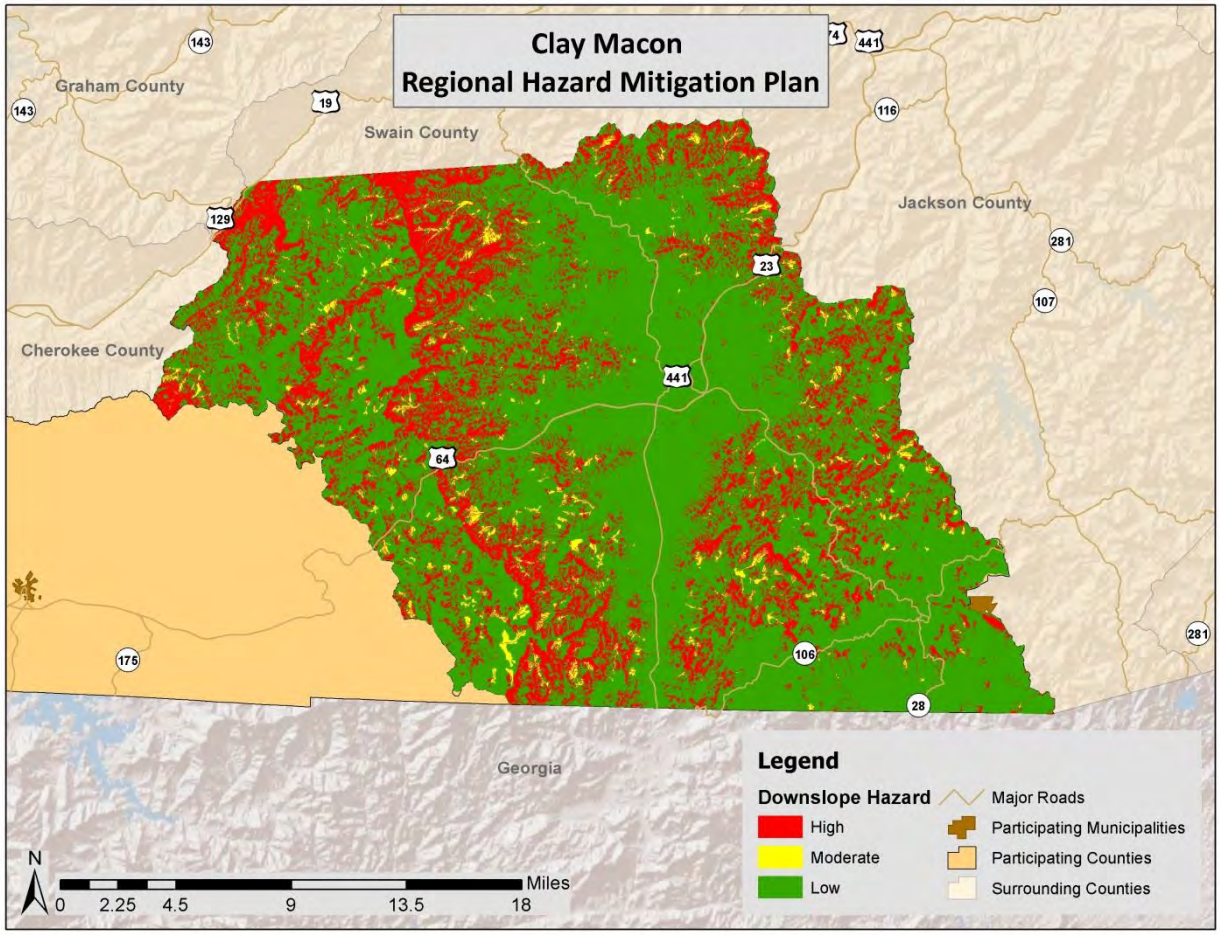
Probability of Future Occurrences

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 heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Macon County have greater risk than others given factors such as steepness on slope and modification of slopes.

Some additional predictive modeling of the landslide hazard was carried out in Macon County specifically which was intended to identify the risk of areas to shallow, translational slope movements (i.e. debris/earth slides and flows). **Figure B.8** shows three levels of risk to this hazard (high, moderate, low). In areas of high risk, it is recommended that additional analysis be carried out prior to ground disturbing activities.

[18] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[19] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.
[20] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

FIGURE B.8: DOWNSLOPE HAZARD RISK FOR MACON COUNTY



Source: North Carolina Department of Natural Resources

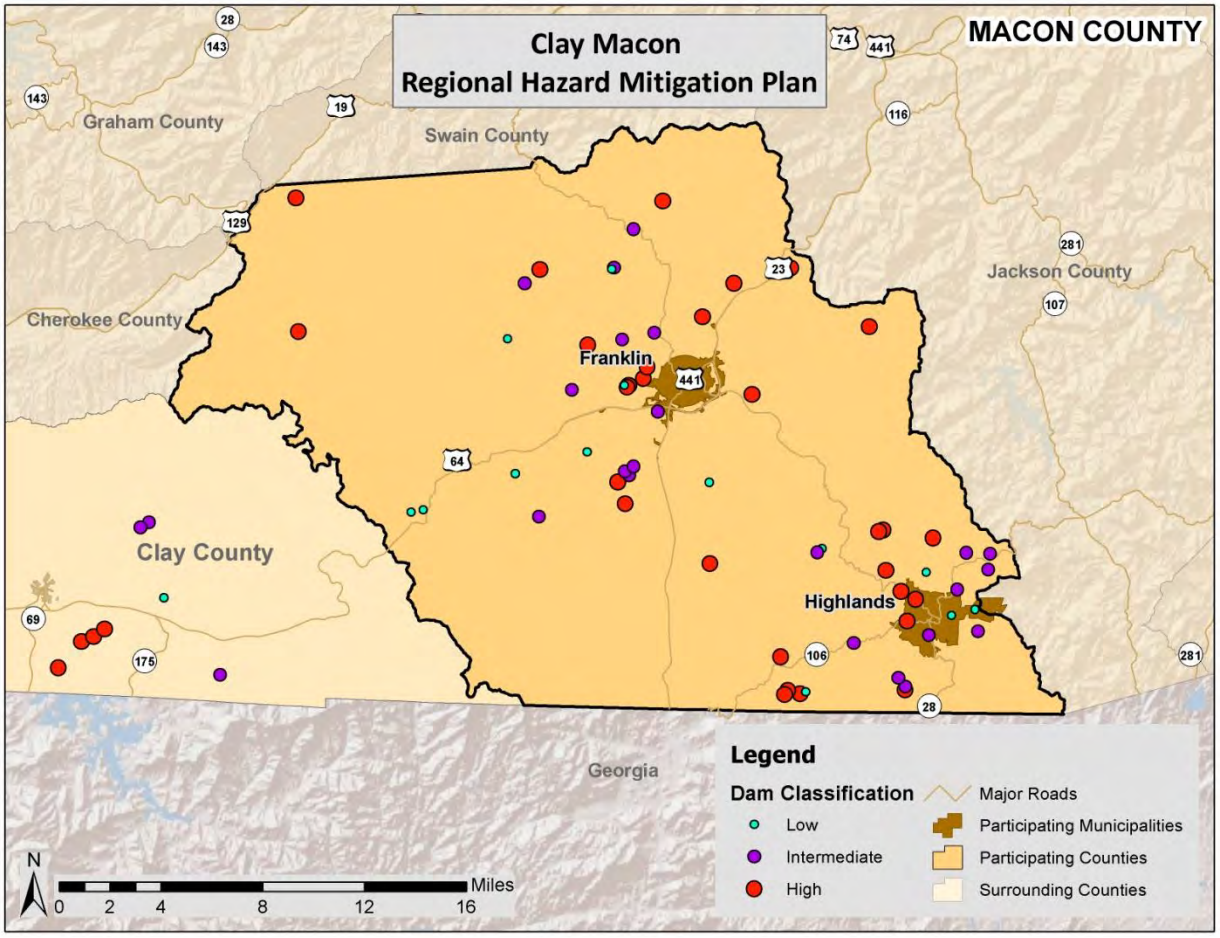
B.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division of Land Management there are 65 dams in Macon County.[21] **Figure B.9** shows the dam location and the corresponding hazard ranking for each. Of these dams, 29 are classified as high hazard potential. These high hazard dams are listed in **Table B.21**.

[21] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

FIGURE B.9: MACON COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources, 2013

TABLE B.21: MACON COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Macon County				
Sequoyah Dam	High	54.0	2,376	Local Gov
Franklin Dam	High		2,282	Utility
Mirror Lake Dam	High	27.0	230	Local Gov
Queens Creek Dam	High	30.0	1,332	Utility
Nantahala Lake Dam	High		138,730	Utility
R.S. Jones Jr Upper Dam	High	1.5	12	Private
R.S. Jones Jr Lower Dam	High	1.0	6	Private
White/Myatt Dam	High	3.7	60	Private
Vitale Orchard Dam	High	3.0	54	Private
Osage Lake Dam	High	16.5	211	Private
Burningtown Lake Dam	High	4.0	56	Private
Wilson Creek Lower Dam	High		80	Federal

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Watauga Vista Dam	High	2.0	31	Private
Palmisano Dam	High	1.7	12	Private
W. S. Jones Lake	High	1.5	14	Private
Lake Charles Dam	High	1.5	16	Private
Houston Dam	High	4.5	22	Local Gov
Cliffside Lake Dam	High	8.0	175	Federal
Club Lake Dam	High	9.1	55	Private
Brush Creek Upper Dam	High	8.0	40	Private
Brush Creek Lower Dam	High	8.0	215	Private
Tritonia Dam	High	1.5	15	Private
Trimont Mtn. Dam	High	1.5	21	Private
Echo Valley Pond	High	1.0	0	Private
Browns Lake Dam	High	3.0	27	Private
Cobb Lake Dam	High	2.0	16	Private
Rocky Knob Dam	High	4.0	43	Private
Fisher Pond Dam	High	2.5	21	Private
Rogers Dam	High	1.3	0	Private

Source: North Carolina Division of Land Resources, 2013

It should also be noted that the North Carolina dam classification regulations were recently updated. As a result of the change, more dams are generally classified as high hazard.

Historical Occurrences

There have been two dam breaches reported in Macon County, but there is no record of property damage, injuries, or fatalities associated with the events. However, it should be noted that several break scenarios in the county could be catastrophic.

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

Macon County

There have been two dam breaches in Macon County: the Echo Valley Pond dam on Coon Creek and the Balfour Lake Lower Dam on Stephens Creek. There is no record of damage to property, deaths, or injuries due to dam failure in Macon County's recent history.

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

B.2.12 Erosion

Location and Spatial Extent

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

Historical Occurrences

Several sources were vetted to identify areas of erosion in Macon County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Erosion was addressed in the previous Macon County hazard mitigation plan; however, a detailed risk assessment was not completed due to the lower level of risk and/or vulnerability to this hazard within the area as a whole compared with other hazards. The information below identified historical information presented in the plan.

Macon County

Erosion could take place along steep slopes in the area, but no significant historical erosion evidence exists in Macon County and the county has not been mapped to show erosion risk. Since meaningful historical data was limited, annualized potential losses for erosion is assumed to be negligible.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Macon County, and it will continue to occur. The annual probability level assigned for erosion is likely (between 10 and 100 percent).

B.2.13 Flood

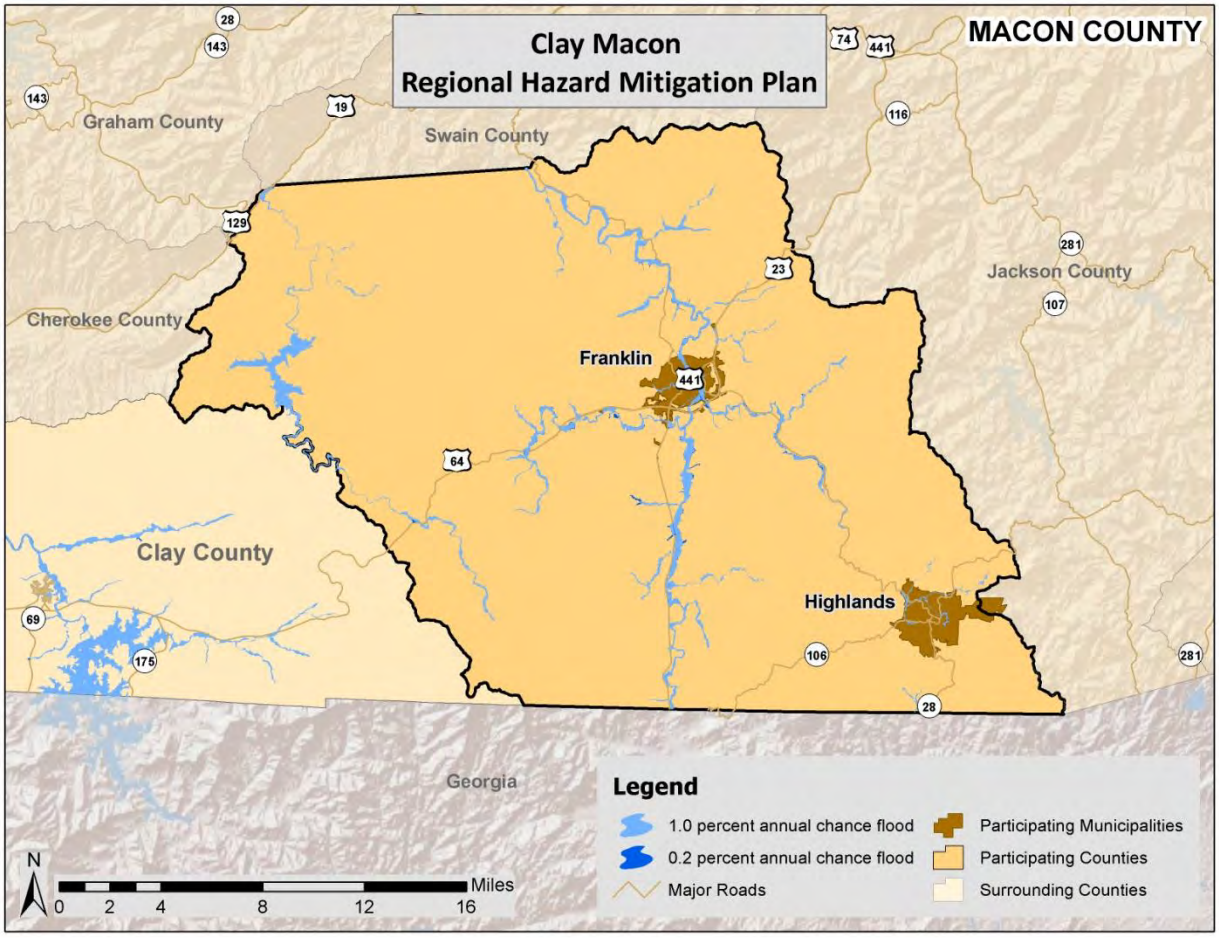
Location and Spatial Extent

There are areas in Macon County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[22] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 520 square miles that make up Macon County, there are 13.7 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 0.6 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 2.8 percent of the total land area in Macon County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure B.10**, **Figure B.11**, and **Figure B.12** illustrate the location and extent of currently mapped special flood hazard areas for Macon County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

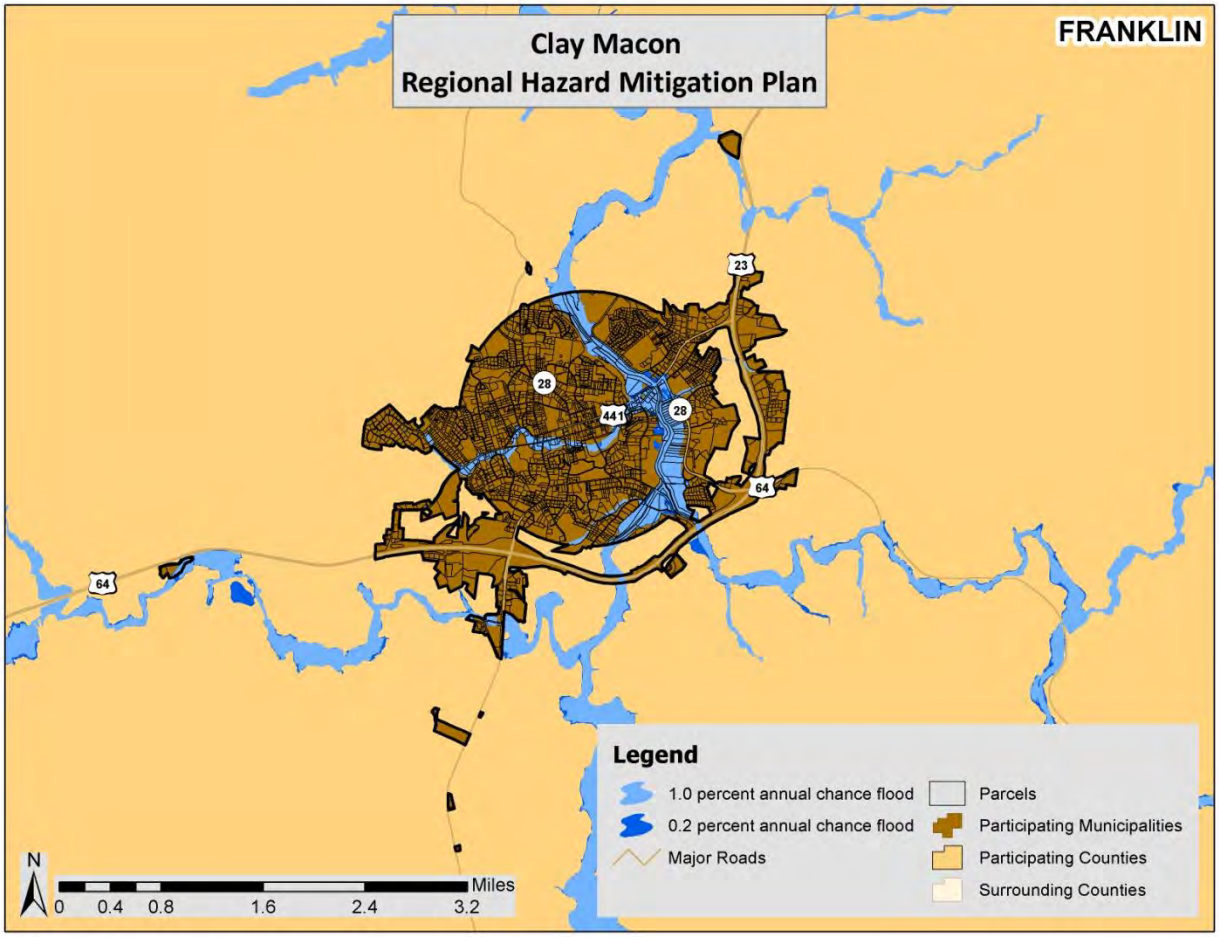
[22] The county-level DFIRM data used for Macon County were updated in 2010..

FIGURE B.10: SPECIAL FLOOD HAZARD AREAS IN MACON COUNTY



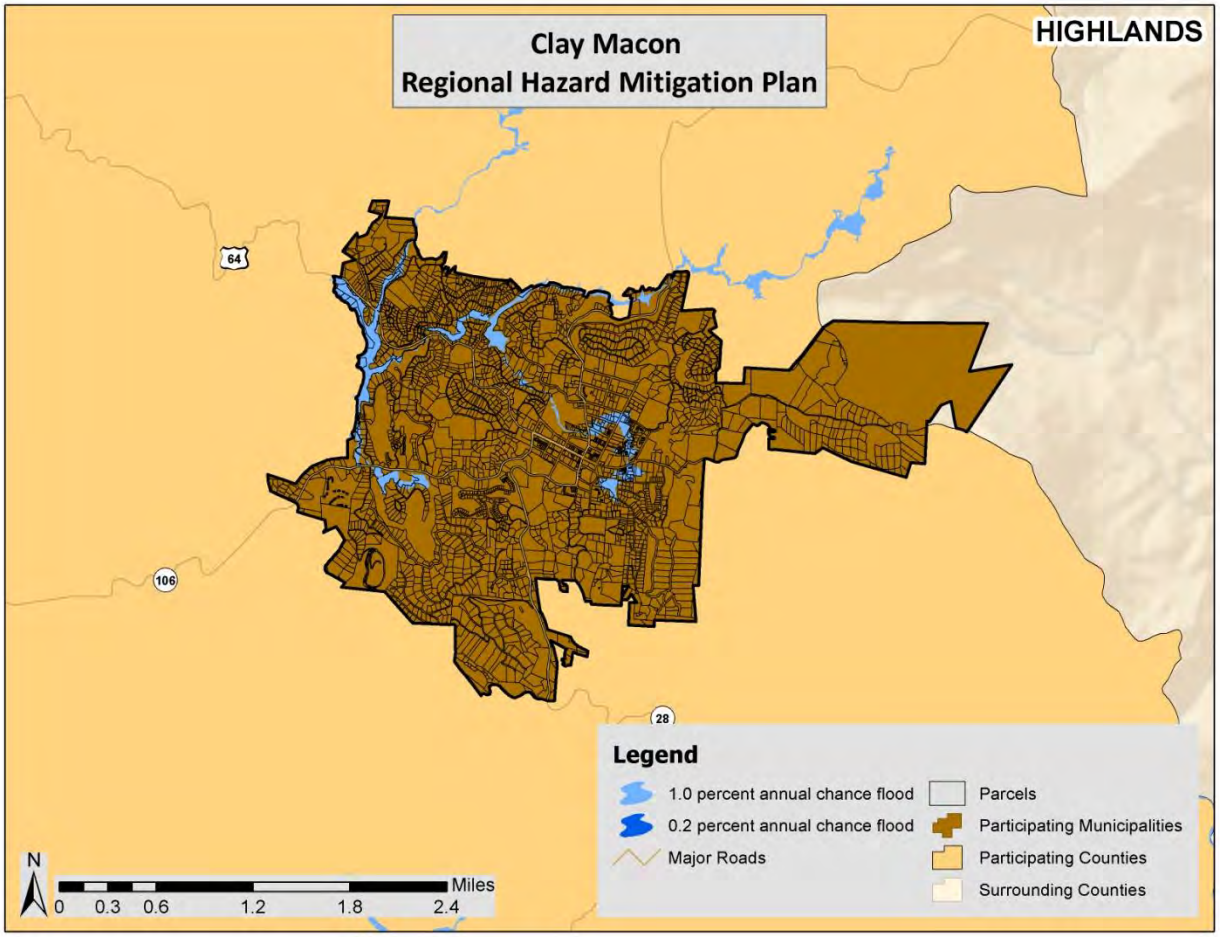
Source: Federal Emergency Management Agency

FIGURE B.11: SPECIAL FLOOD HAZARD AREAS IN FRANKLIN



Source: Federal Emergency Management Agency

FIGURE B.12: SPECIAL FLOOD HAZARD AREAS IN HIGHLANDS



Source: Federal Emergency Management Agency

Historical Occurrences

Flooding was at least partially responsible for three presidential disaster declarations in Macon County in 1973, 1995, and 2013.[23] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 30 events in Macon County since 1996.[24] A summary of these events is presented in **Table B.22**. These events accounted for over $5.2 million (2014 dollars) in property damage in the county.[25] Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in **Table B.23**.

TABLE B.22: SUMMARY OF FLOOD OCCURRENCES IN MACON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Franklin	5	0/0	$57,401

[23] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[24] These flood events are only inclusive of those reported by the National Climatic Data Center (NCDC) from 1996 through July 2014. It is likely that additional occurrences have occurred and have gone unreported.
[25] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2014, the September 2014 monthly index value was used.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Highlands	2	0/0	$0
Unincorporated Area	23	0/0	$5,164,247
MACON COUNTY TOTAL	**30**	**0/0**	**$5,221,648**

Source: National Climatic Data Center

TABLE B.23: HISTORICAL FLOOD EVENTS IN MACON COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Franklin				
FRANKLIN	6/20/1997	Flash Flood	0/0	$0
FRANKLIN	1/7/1998	Flash Flood	0/0	$0
FRANKLIN	6/26/2001	Flash Flood	0/0	$0
FRANKLIN	11/29/2005	Flash Flood	0/0	$0
FRANKLIN	7/26/2007	Flash Flood	0/0	$57,401
Highlands				
HIGHLANDS	3/14/1997	Flash Flood	0/0	$0
HIGHLANDS	6/18/2005	Flash Flood	0/0	$0
Unincorporated Area				
MACON (ZONE)	1/18/1996	Flood	0/0	$0
MACON (ZONE)	1/19/1996	Flood	0/0	$0
MACON (ZONE)	1/26/1996	Flood	0/0	$0
MACON (ZONE)	9/28/1996	Flood	0/0	$0
OTTO	3/3/1997	Flash Flood	0/0	$0
COUNTYWIDE	10/26/1997	Flash Flood	0/0	$0
MACON (ZONE)	9/27/2002	Flood	0/0	$0
MACON (ZONE)	5/6/2003	Flood	0/0	$0
NORTH PORTION	5/6/2003	Flash Flood	0/0	$0
CENTRAL PORTION	5/7/2003	Flash Flood	0/0	$0
MACON (ZONE)	5/7/2003	Flood	0/0	$0
MACON (ZONE)	7/1/2003	Flood	0/0	$0
MACON (ZONE)	11/19/2003	Flood	0/0	$12,936
MACON (ZONE)	9/7/2004	Flood	0/0	$126,009
MACON (ZONE)	9/16/2004	Flood	0/0	$4,914,351
MACON (ZONE)	6/12/2005	Flood	0/0	$0
MACON (ZONE)	7/11/2005	Flood	0/0	$0
OLIVE HILL	9/21/2009	Flood	0/0	$110,951
LEATHERMAN	5/28/2010	Flash Flood	0/0	$0
GNEISS	11/28/2011	Flash Flood	0/0	$0
OTTO	7/14/2012	Flash Flood	0/0	$0
BURNING TOWN	1/16/2013	Flood	0/0	$0
STILES	12/23/2013	Flood	0/0	$0

*Property damage is reported in 2014 dollars; All damage may not have been reported.
Source: National Climatic Data Center

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of September 2014, there have been 28 flood losses reported in Macon County through the National Flood Insurance Program (NFIP) since 1978, totaling nearly $873,000 in claims payments. A summary of these figures for the county is provided in **Table B.24**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Macon County were either uninsured, denied claims payment, or not reported.

TABLE B.24: SUMMARY OF INSURED FLOOD LOSSES IN MACON COUNTY

Location	Flood Losses	Claims Payments
Franklin*	--	--
Highlands	0	$0
Unincorporated Area	28	$872,997
MACON COUNTY TOTAL	**28**	**$872,997**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: Federal Emergency Management Agency; National Flood Insurance Program

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 July 2013, there are 3 non-mitigated repetitive loss property located in Macon County, which accounted for 6 losses and more than $250,000 in claims payments under the NFIP. The average claim amount for these properties is $44,468. All three of the properties are single-family residential. Without mitigation these property will likely continue to experience flood losses. **Table B.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Macon County.

TABLE B.25: REPETITIVE LOSS PROPERTIES IN MACON COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Franklin*	--	--	--	--	--	--	--
Highlands	0	--	0	$0	$0	$0	$0
Unincorporated Area	3	3 single-family residential	6	$200,630	$66,176	$266,806	$44,468
MACON COUNTY TOTAL	**3**		**6**	**$200,630**	**$66,176**	**$266,806**	**$44,468**

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

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Macon County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdictions and unincorporated areas of the county have risk to flooding, though not all areas will

experience floods. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

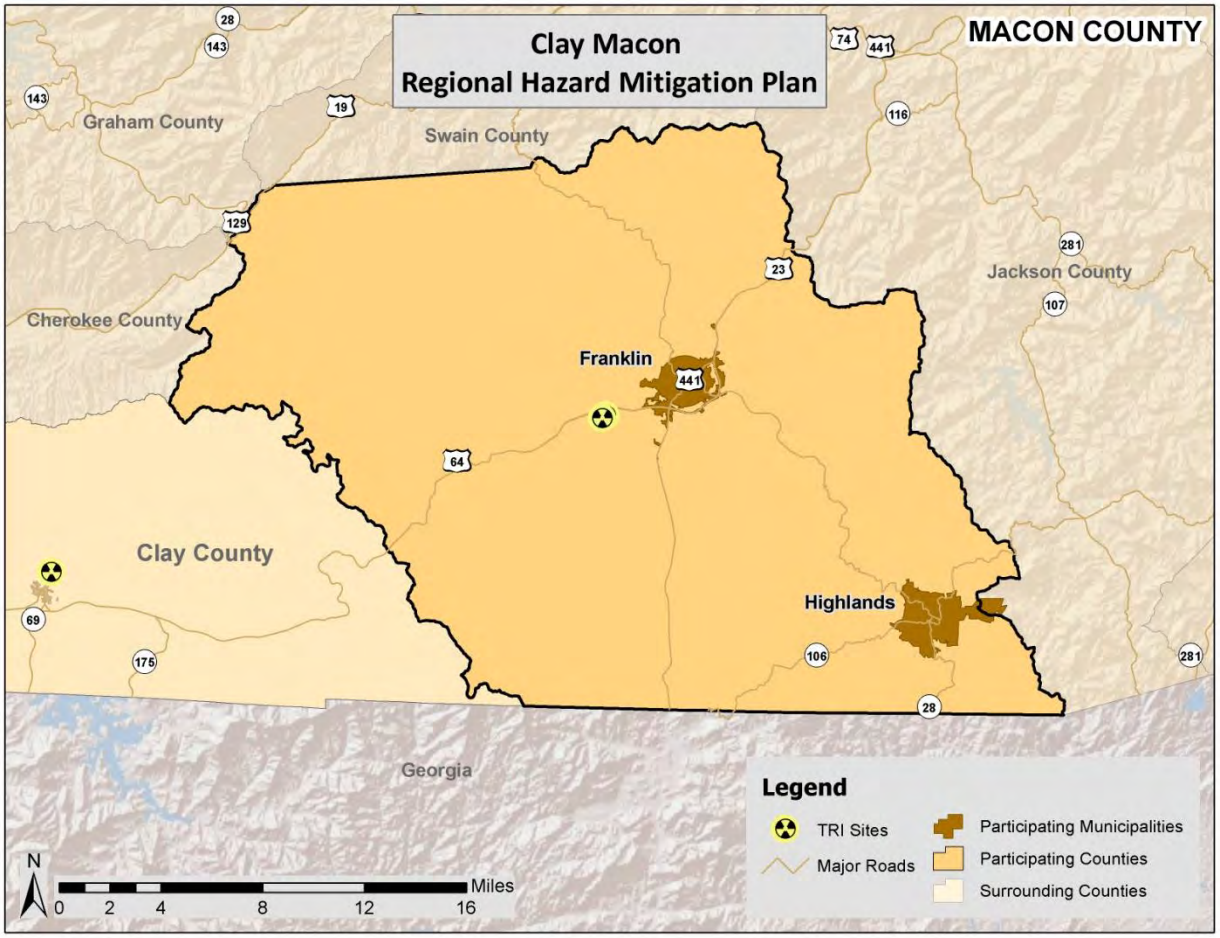
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Franklin has more floodplain and thus a higher risk of flood than the Highlands and the unincorporated county. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

B.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Macon County has two TRI sites. These sites are shown in **Figure B.13.**

FIGURE B.13: TOXIC RELEASE INVENTORY (TRI) SITES IN MACON COUNTY



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are narrow and winding, making hazardous material

transport in the area especially treacherous. All roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of 10 recorded HAZMAT incidents in Macon County since 1979 (**Table B.26**). These events resulted in more than $4,000 (2014 dollars) in property damages. **Table B.27** presents detailed information on historic HAZMAT incidents in Macon County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

TABLE B.26: SUMMARY OF HAZMAT INCIDENTS IN MACON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2014)
Franklin	6	0/0	$0
Highlands	0	0/0	$0
Unincorporated Area	4	0/0	$4,306
MACON COUNTY TOTAL	**10**	**0/0**	**$4,306**

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE B.27: HAZMAT INCIDENTS IN MACON COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Franklin							
I-1980010440	12/27/1979	FRANKLIN	Highway	Yes	0/0	$0	8,000 LGA
I-1987050261	4/23/1987	FRANKLIN	Highway	No	0/0	$0	40 SLB
I-2006081451	7/31/2006	FRANKLIN	Highway	No	0/0	$0	0.25 LGA
I-2008020342	2/22/2008	FRANKLIN	Highway	No	0/0	$0	0.125 LGA
I-2009040374	4/9/2009	FRANKLIN	Highway	No	0/0	$0	0.5 LGA
I-2009120153	12/1/2009	FRANKLIN	Highway	No	0/0	$0	0.4375 SLB
Highlands							
None Reported	--	--	--	--	--	--	--
Unincorporated Area							
I-1993081302	8/12/1993	OTTO	Highway	No	0/0	$0	10 LGA
I-2007070095	2/16/2007	SCALY MOUNTAIN	Highway	Yes	0/0	$308	3,500 LGA
I-2007070095	2/16/2007	SCALY MOUNTAIN	Highway	Yes	0/0	$308	1,500 LGA
E-2007110145	11/11/2007	GREENVILLE	Highway	No	0/0	$0	2 LGA

*Property damage is reported in 2014 dollars.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Probability of Future Occurrences

Given the location of two toxic release inventory sites in Macon County and prior roadways incidents, it is possible that a hazardous material incident may occur in the county (between 1 and 10 percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence. The county may also be impacted by neighboring counties which also face risk due to TRI sites.

B.2.15 Wildfire

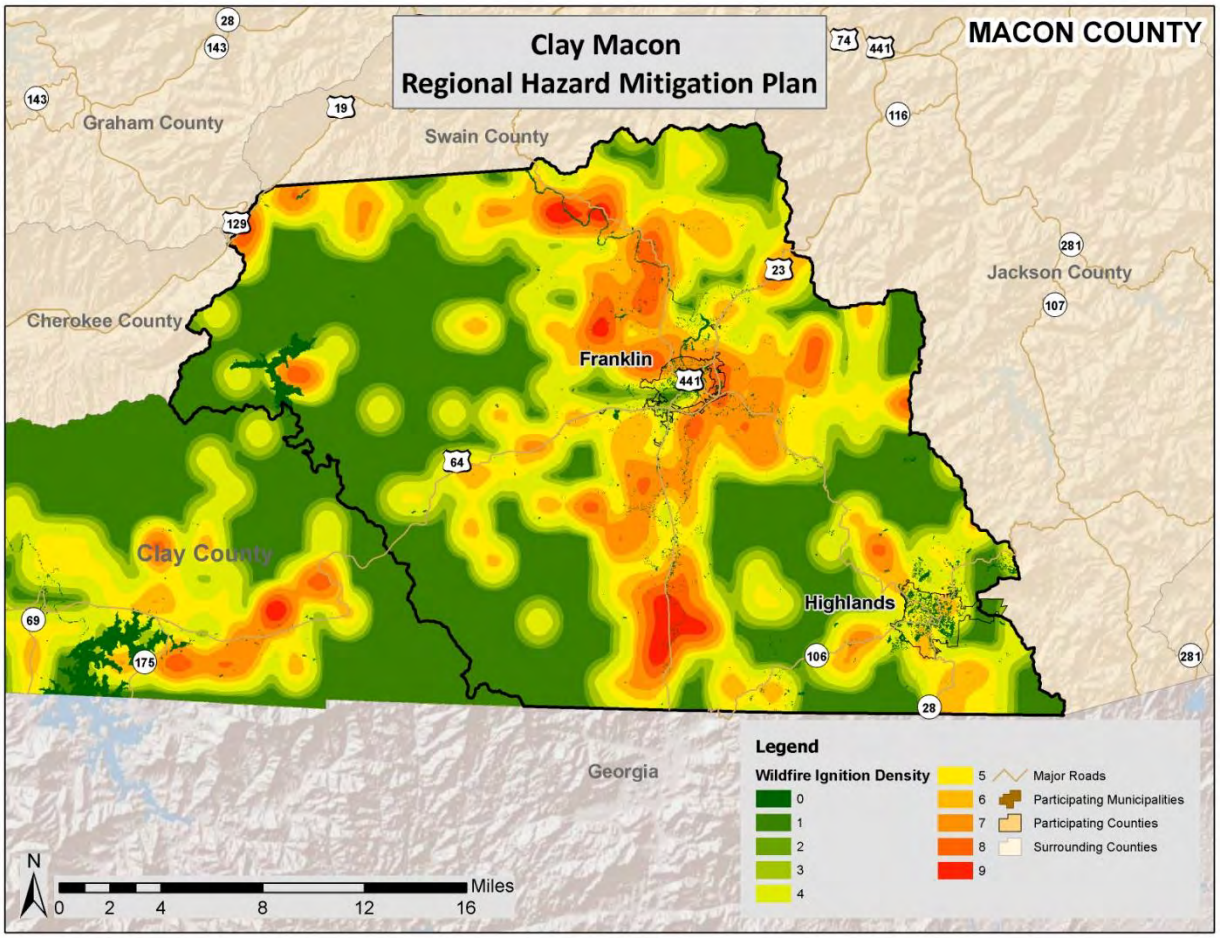
Location and Spatial Extent

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Wildfire Ignition Density shown in the figure below gives an indication of historic location.

Historical Occurrences

Figure B.14 shows the Wildfire Ignition Density in Macon County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.[26]

FIGURE B.14: WILDFIRE IGNITION DENSITY IN MACON COUNTY



Source: Southern Wildfire Risk Assessment

[26] Southern Wildfire Risk Assessment, 2014.

Based on data from the North Carolina Division of Forest Resources from 2004 to 2013, Macon County experienced an average of 37 wildfires annually which burn an average of 165 acres per year. The data indicates that most of these fires are relatively small, averaging four acres per fire. **Table B.28** lists the number of reported wildfire occurrences in the county between the years 2004 and 2013.

TABLE B.28: HISTORICAL WILDFIRE OCCURRENCES IN MACON COUNTY

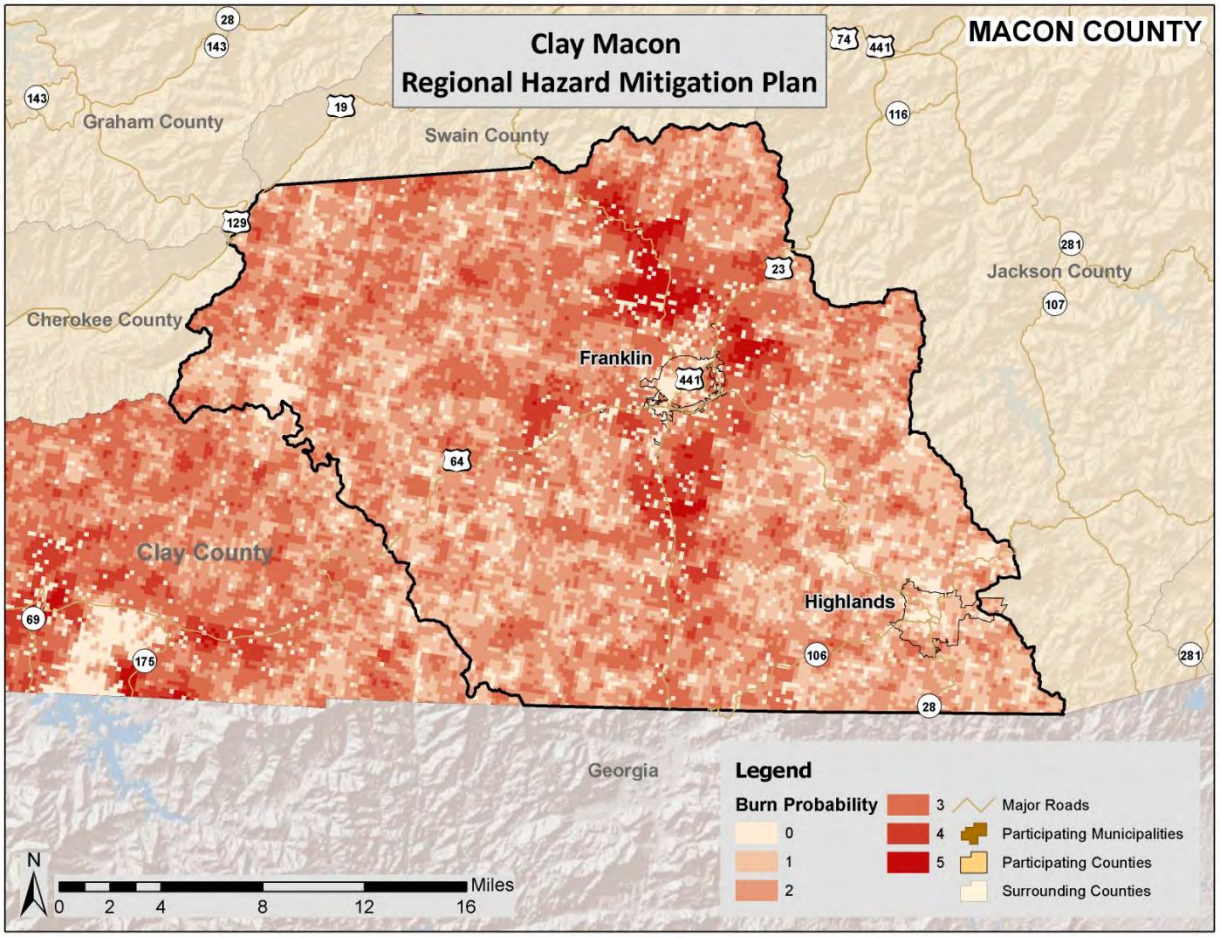
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Macon County										
Number of Fires	44	48	47	51	55	9	30	21	18	26
Number of Acres	93.4	170.3	62.0	262.0	229.8	498.0	198.2	95.2	16.2	27.5

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Macon County. **Figure B.15** shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. In this case, Franklin appears to have a slightly lower risk compared to the surrounding areas. The probability assigned to Macon County for future wildfire events is likely (10 to 100 percent annual probability).

FIGURE B.15: BURN PROBABILITY IN CLAY COUNTY



Source: Southern Wildfire Risk Assessment

B.2.16 Conclusions on Hazard Risk

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

Hazard Extent

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

TABLE B.29: EXTENT OF MACON COUNTY HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the PDSI classifications which include Extremely Moist, Very Moist, Mid-Range, Moderate Drought, Severe Drought, and Extreme Drought classifications (pages 5:5-5:6). According to the PDSI classifications, the most severe drought condition is Extreme. Macon County has received this ranking twice over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in Macon County was 101 degrees Fahrenheit on July 29, 1952.
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Macon County was 2.75 inches (reported on March 28, 1984). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through Macon County was an Unnamed Storm in 1916. This storm carried tropical depression force winds of 31 knots (approximately 36 mph) upon arrival in Clay County. However, it should be noted that stronger storm could impact the county without a direct hit.
Lightning	According to the Vaisala flash density map (Figure 5.5), Macon County is located in an area that experiences 2 to 4 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 59-year history from the National Climatic Data Center, the strongest recorded wind event in Macon County was reported on April 15, 2007 at 70 knots (approximately 81 mph). It should be noted that future events may exceed this historical occurrence.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.15 and 5.16). The greatest magnitude reported in the county was an F1 (last reported on August 30, 2005).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in Macon County was 25.5 inches on March 3, 1993. Due to extreme variations in elevation throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from Macon County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was V (slightly strong) with a correlating Richter Scale measurement of approximately 4.8 (reported on November 30, 1973). The epicenter of this earthquake was located 72.0 km away.

Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is high across the majority of Macon County (there is moderate incidence in the southern part of the county). There is also high susceptibility throughout the county.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 65 dams in Macon County, 29 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Macon County.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 2.8 percent of the total land area in Macon County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the county. While a gage does not exist within each participating jurisdictions in Macon County, there is one at or near many areas. The greatest peak discharge was recorded at Little Tennessee River at Iotla on August 30, 1940. Water reached a discharge of 19,600 cubic feet per second and the maximum stream crest height was recorded at 13.50 feet.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 8,000 LGA released on the highway on December 27, 1979. It should be noted that larger events are possible.
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2004-2013. The greatest number of fires to occur in Macon County in any year was 55 in 2008. The greatest number of acres to burn in the county in a single year occurred in 2009 when 498 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Macon County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.18.2.

Table B.30 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE B.30: SUMMARY OF PRI RESULTS FOR MACON COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Unlikely	Minor	Large	More than 24 hours	Less than 1 week	**1.8**
Hailstorm	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Hurricane and Tropical Storm	Possible	Limited	Large	More than 24 hours	Less than 24 hours	**2.3**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm / High Wind	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	**3.1**
Tornado	Possible	Critical	Small	Less than 6 hours	Less than 6 hours	**2.4**
Winter Storm and Freeze	Highly Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.3**
Geologic Hazards						
Earthquake	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Landslide	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**3.0**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Erosion	Likely	Minor	Small	More than 24 hours	More than 1 week	**2.1**
Flood	Likely	Critical	Small	6 to 12 hours	Less than 1 week	**2.8**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.3**

B.2.17 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Macon County, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table B.31**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Macon County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section B.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE B.31: CONCLUSIONS ON HAZARD RISK FOR MACON COUNTY

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

B.3 MACON COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Macon County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

B.3.1 Asset Inventory

Table B.32 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Macon County and its participating jurisdictions (study area of vulnerability assessment).[27]

[27] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

TABLE B.32: IMPROVED PROPERTY IN MACON COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings[28]	Total Assessed Value of Improvements
Franklin	2,496	$665,125,250	2,228	$439,412,670
Highlands	2,897	$1,814,159,140	1,765	$934,478,420
Unincorporated Area	38,991	$8,028,340,448	23,948	$3,916,690,040
MACON COUNTY TOTAL	**44,384**	**$10,507,624,838**	**27,941**	**$5,290,581,130**

Table B.33 lists the fire stations, EMS stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in Macon County Local county GIS departments supplied the critical facility data, though other local officials contributed information as well. It should be noted that some counties did not have digital data available for some of the critical facility categories. Therefore, information provided may be incomplete. In addition, **Figure B.16** shows the locations of essential facilities in Macon County. **Table B.45**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the county.

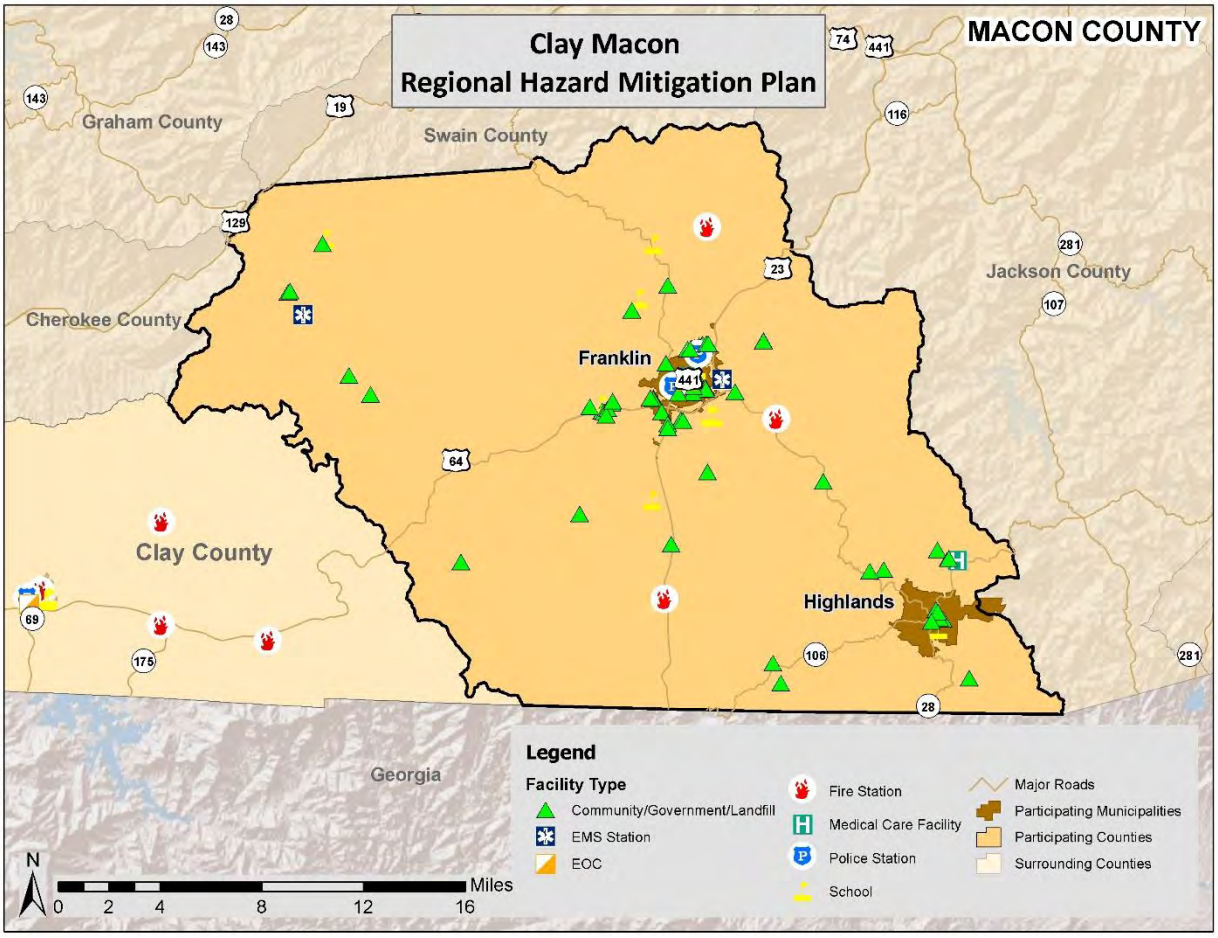
TABLE B.33: CRITICAL FACILITY INVENTORY IN MACON COUNTY

Location	Fire Stations	EMS Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Franklin	2	0	1	1	0	2	18
Highlands	0	0	0	0	0	1	5
Unincorporated Area	1	3	1	1	0	8	43
MACON COUNTY TOTAL	**3**	**3**	**2**	**2**	**1**	**11**	**66**

Source: Local Government GIS Departments

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

FIGURE B.16: CRITICAL FACILITY LOCATIONS IN MACON COUNTY



Source: Local Government GIS Departments

B.3.2 Social Vulnerability

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

Table B.34 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Macon County according to Census data is 33,922 persons. Additional population estimates are presented above in Section B.1.

TABLE B.34: TOTAL POPULATION IN MACON COUNTY

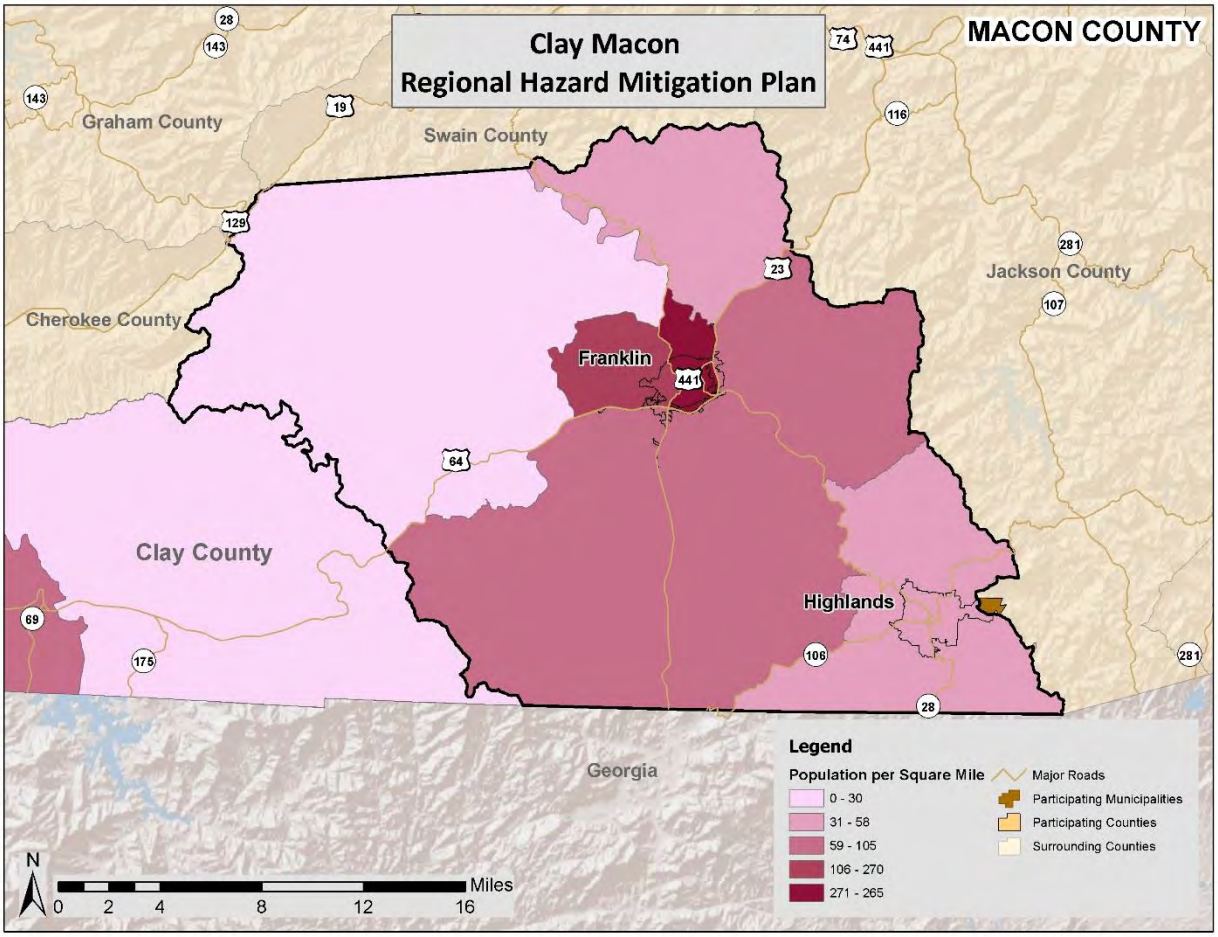
Jurisdiction	2010 Census Population
Macon County	**33,922**
Town of Franklin	3,845

Jurisdiction	2010 Census Population
Town of Highlands	924

Source: United States Census 2010

In addition, **Figure B.17** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE B.17: POPULATION DENSITY IN MACON COUNTY



Source: United States Census Bureau, 2010

B.3.3 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Macon County, are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (erosion, dam and levee failure). The total county exposure, and thus risk, was presented in **Table B.32**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table B.44.**

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

Hurricane and Tropical Storm

Historical evidence indicates that Macon County has a significant risk to the hurricane and tropical storm hazard. There have been two disaster declarations due to hurricanes (Hurricane Ivan and Tropical Storm Frances) in the county. Several tracks have come near or traversed through the county, as shown and discussed in Section B.2.4.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the county as shown below in **Table B.35.** Only losses to buildings are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE B.35: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Macon County	$40,000

Source: Hazus-MH 2.1

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

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

Location	50-year event	100-year event	500-year event	1,000-year event
Franklin	51.3	60.6	78.3	85.8
Highlands	51.6	61.2	79.0	86.2
Unincorporated Area	51.6	61.2	79.0	86.2
MAXIMUM WIND SPEED REPORTED	**51.6**	**61.2**	**79.0**	**86.2**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across Macon County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities,

to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Macon County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for Macon County. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table B.37** summarizes the findings.

TABLE B.37: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Macon County	$177,000

Source: Hazus-MH 2.1

Social Vulnerability

It can be assumed that all existing future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table B.45**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Macon County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

Landslide

In order to complete the vulnerability assessment for landslides in Macon County, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section B.2.10), county level tax parcel data, and GIS analysis. **Table B.38** presents the potential at-risk property where available. All of Macon County is identified as either moderate or high incidence areas by the USGS landslide data and all areas of the county are also of high landslide susceptibility. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE B.38: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk		Number of Improvements At Risk		Total Value of Improvements At Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Franklin	0	2,496	0	2,228	$0	$439,412,670
Highlands	2,897	0	1,765	0	$934,478,420	$0
Unincorporated Area	13,140	26,045	7,429	16,528	$2,028,442,460	$1,903,427,240
MACON COUNTY TOTAL	16,037	28,541	9,194	18,756	$2,962,920,880	$2,342,839,910

Source: United States Geological Survey

Social Vulnerability

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

Critical Facilities

All critical facilities in Macon County are located in a high susceptibility area. Additionally, 5 community buildings, 3 EMS stations, 1 EOC, 2 fire stations, 36 government facilities, 9 landfill/convenience centers, 2 police stations, and 10 schools are in the high incidence area. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in Macon County, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for county assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

Flood

Historical evidence indicates that Macon County is susceptible to flood events. A total of 30 flood events have been reported by the National Climatic Data Center resulting in almost $6.5 million (2014 dollars) in damages. On an annualized level, these damages amounted to $367,413 for Macon County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for the county. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table B.39** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

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

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Franklin	301	136	$66,573,470	200	69	$41,081,990
Highlands	354	59	$123,553,400	56	14	$14,275,230

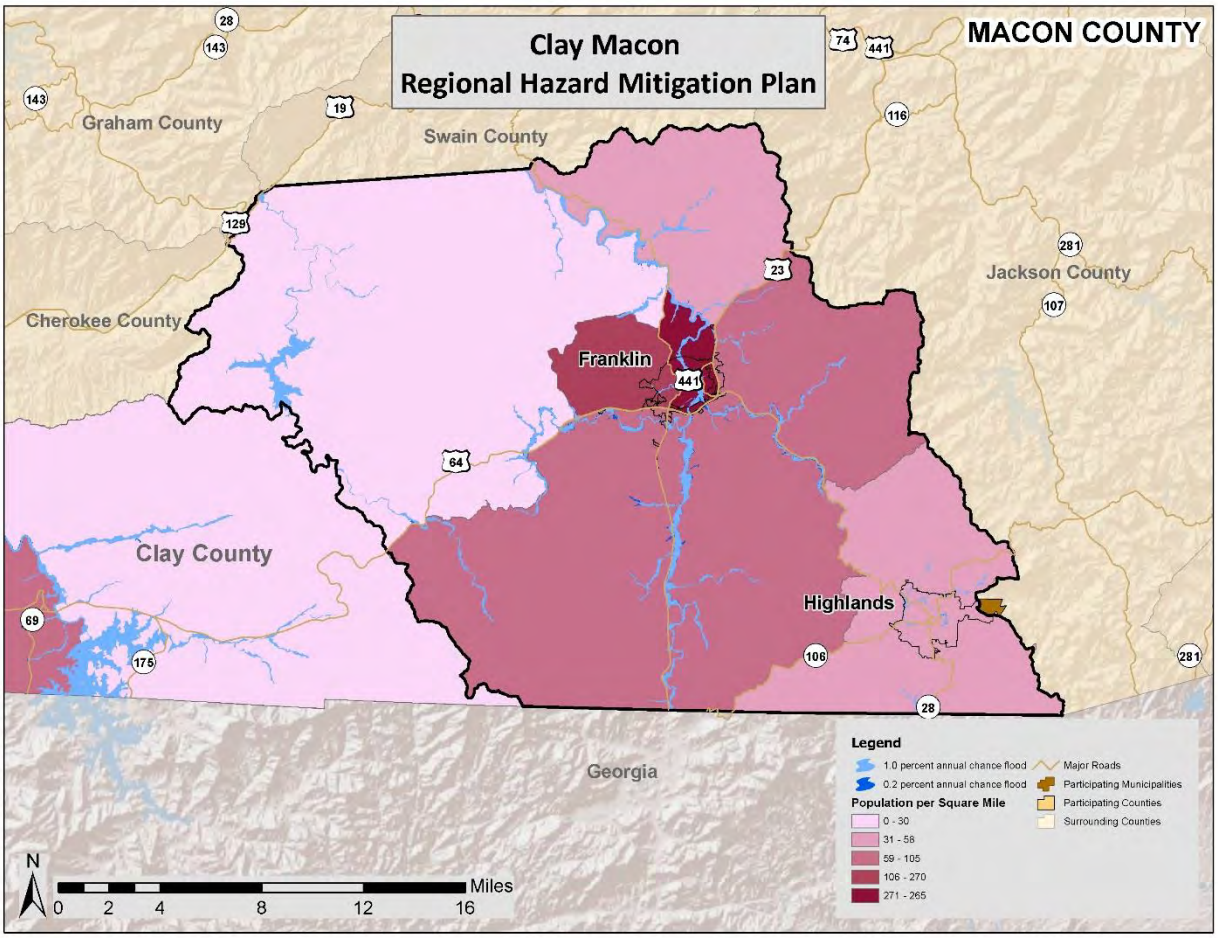
Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Unincorporated Area	2,922	481	$341,669,820	887	171	$111,174,690
MACON COUNTY TOTAL	**3,577**	**676**	**$531,796,690**	**1,143**	**254**	**$166,531,910**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability

Since 2010 population was only available at the tract level, it was difficult to determine a reliable figure on population at-risk to flood due to tract level population data. **Figure B.18** is presented to gain a better understanding of at risk population.

FIGURE B.18 : POPULATION DENSITY NEAR FLOODPLAINS



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are six critical facilities located in the Macon County 1.0-percent annual chance floodplain and 0.2-percent annual chance floodplain based on FEMA DFIRM

boundaries and GIS analysis. The analysis indicates 2 government facilities, 2 landfill/convenience centers, and 1 police station are located in the 100 year floodplain. There is also 1 government facility in the 0.2 percent annual chance floodplain. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Macon County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Hazardous Materials Incident

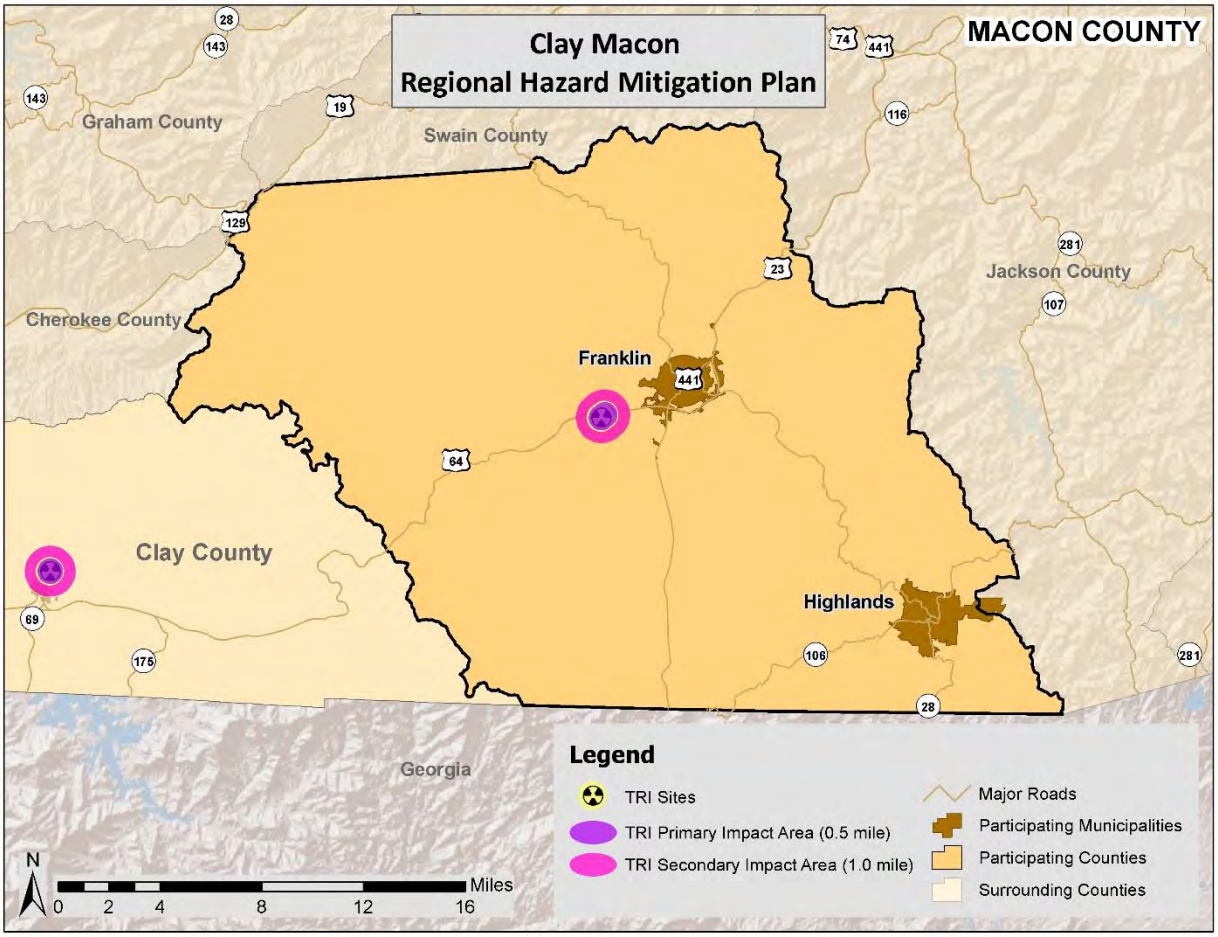
Historical evidence indicates that Macon County is susceptible to hazardous materials events. A total of 10 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration, resulting in $4,306 (2014 dollars) in property damage. On an annualized level, these damages amount to $615 for Macon County.

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

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[29] In both scenarios, two sizes of buffers—0.5 and 1.0 miles—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in Macon County, along with buffers, were used for analysis as shown in **Figure B.19**. For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure B.20** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table B.40** (fixed sites), **Table B.41** (mobile road sites), and **Table B.42** (mobile railroad sites).[30]

[29] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an event).
[30] Note that parcels included in the 0.5-mile analysis are also included in the 1.0-mile analysis.

FIGURE B.19 : TRI SITES WITH BUFFERS IN MACON COUNTY



Source: Environmental Protection Agency

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

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Franklin	2	5	$284,480	2	5	$284,480
Highlands	0	0	$0	0	0	$0
Unincorporated Area	329	194	$45,467,210	1,025	688	$107,655,540
MACON COUNTY TOTAL	**331**	**199**	**$45,751,690**	**1,027**	**693**	**$107,940,020**

FIGURE B.20 : MOBILE HAZMAT BUFFERS IN MACON COUNTY

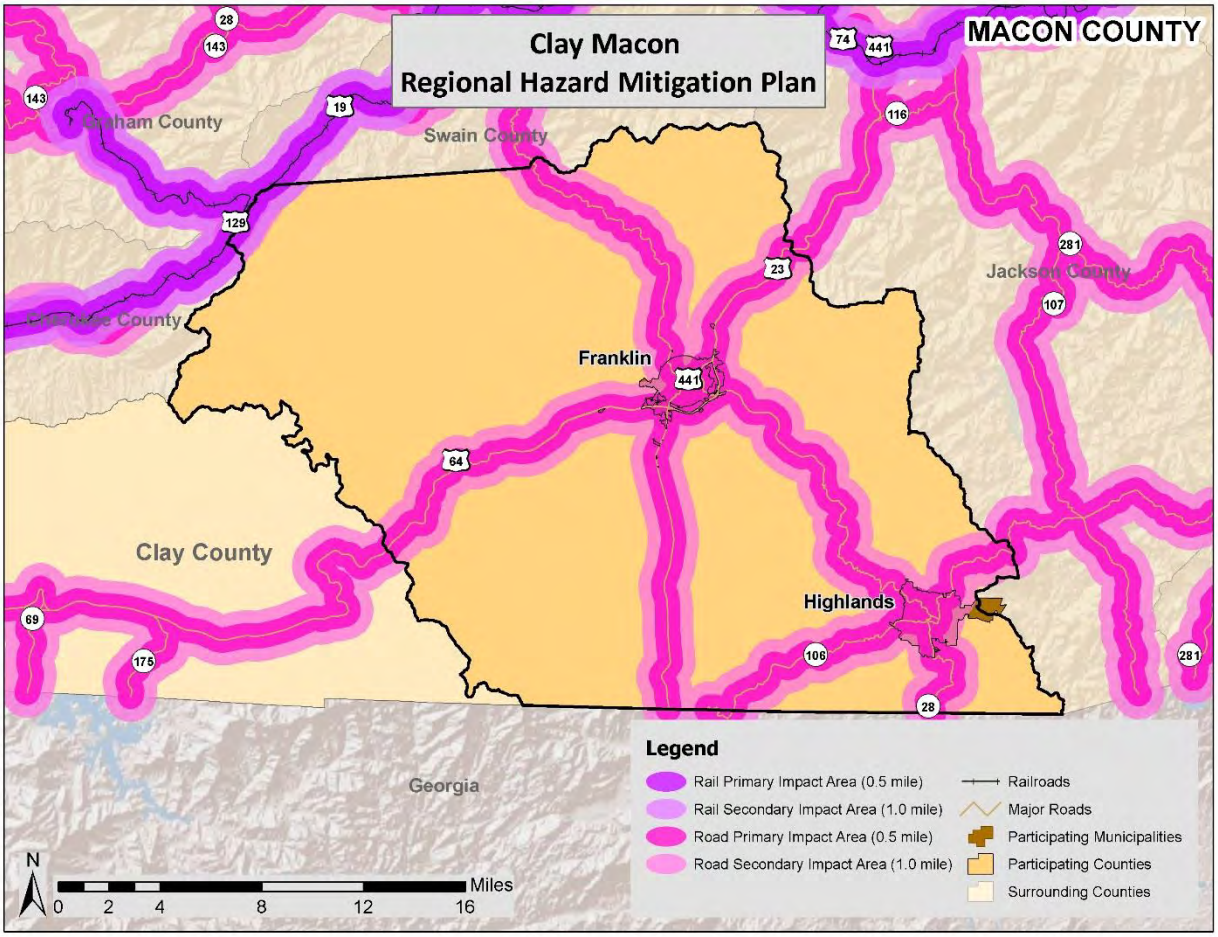


TABLE B.41: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

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
Franklin	2,225	1,528	$400,103,980	2,492	2,217	$438,153,440
Highlands	2,556	1,973	$778,991,990	2,831	1,709	$896,298,360
Unincorporated Area	13,910	9,622	$1,787,527,410	22,367	14,803	$2,773,757,290
MACON COUNTY TOTAL	**18,691**	**13,123**	**$2,966,623,380**	**27,690**	**18,729**	**$4,108,209,090**

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

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Franklin	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
Highlands	0	0	$0	0	0	$0
Unincorporated Area	91	83	$7,903,630	168	90	$9,606,510
MACON COUNTY TOTAL	**91**	**83**	**$7,903,630**	**168**	**90**	**$9,606,510**

Social Vulnerability

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

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are eight Macon County facilities located in a HAZMAT risk zone. Five facilities are located in the primary impact zone, including four government facilities and one school. Additionally, the secondary, 1.0-mile zone includes one community building and two landfill/convenience centers. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Macon County revealed that there are 74 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and no critical facilities located in the railroad HAZMAT buffer areas. The 1.0-mile road buffer area (worst case scenario modeled) includes the following critical facilities in Macon County: 4 community buildings, 2 EMS stations, 1 EOC, 2 fire stations, 39 government facilities, 12 landfill/convenience centers, 2 medical care facilities, 2 police stations, and 10 schools. It should be noted that many of the facilities located in the buffer areas for road are also located in the buffer areas for the fixed site analysis. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

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

Wildfire

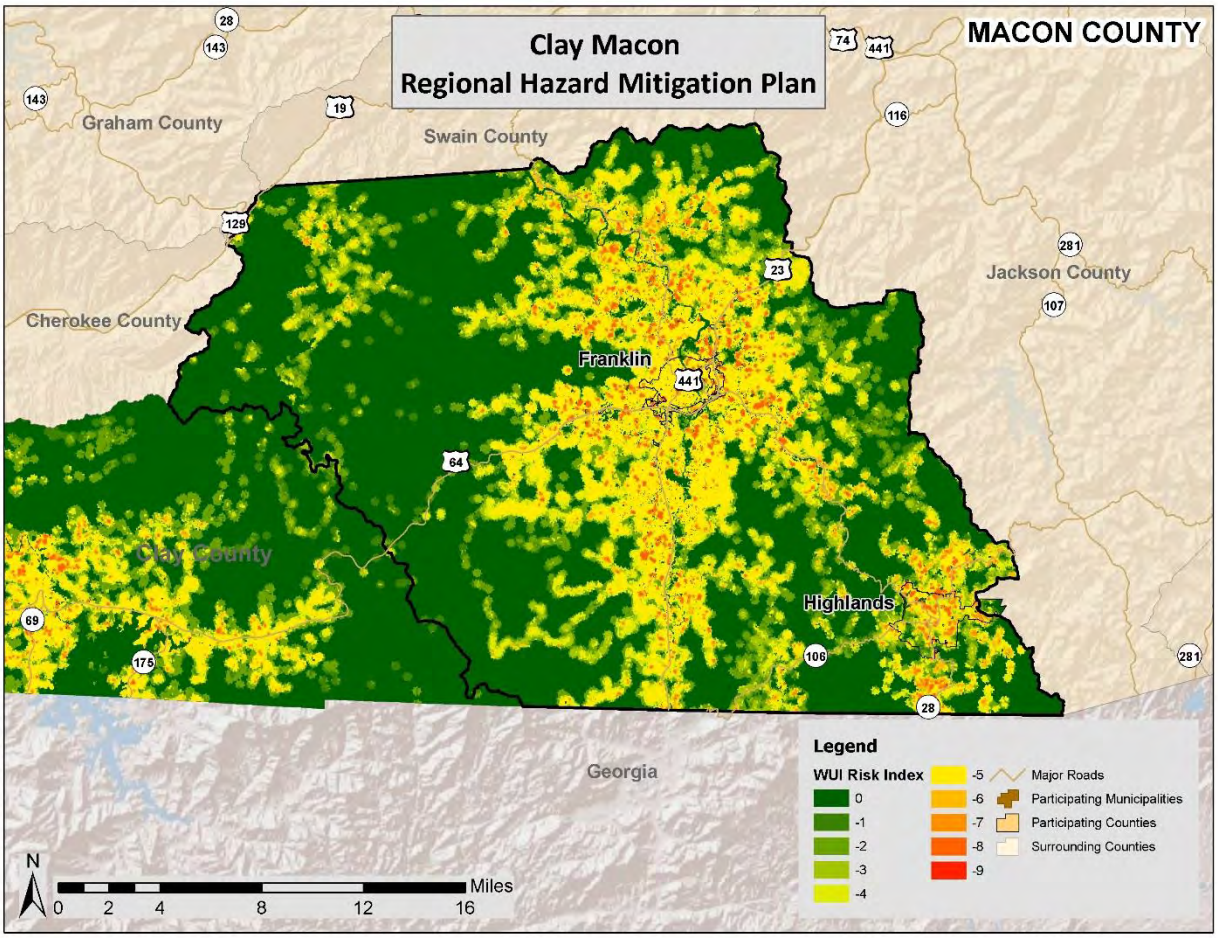
Although historical evidence indicates that Macon County is susceptible to wildfire events, there are few reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the county.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure B.21** shows the Wildland Urban Interface Risk Index (WUIRI) data which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per acre) consistent with Federal

Register National standards. The location of people living in the Wildland Urban Interface and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to -9 with lower values being most severe (as noted previously, this is only a measure of relative risk). **Figure B.22** shows the areas of analysis where any grid cell is less than -5. Areas with a value below -5 were chosen to be displayed as areas of risk because this showed the upper echelon of the scale and the areas at highest risk.

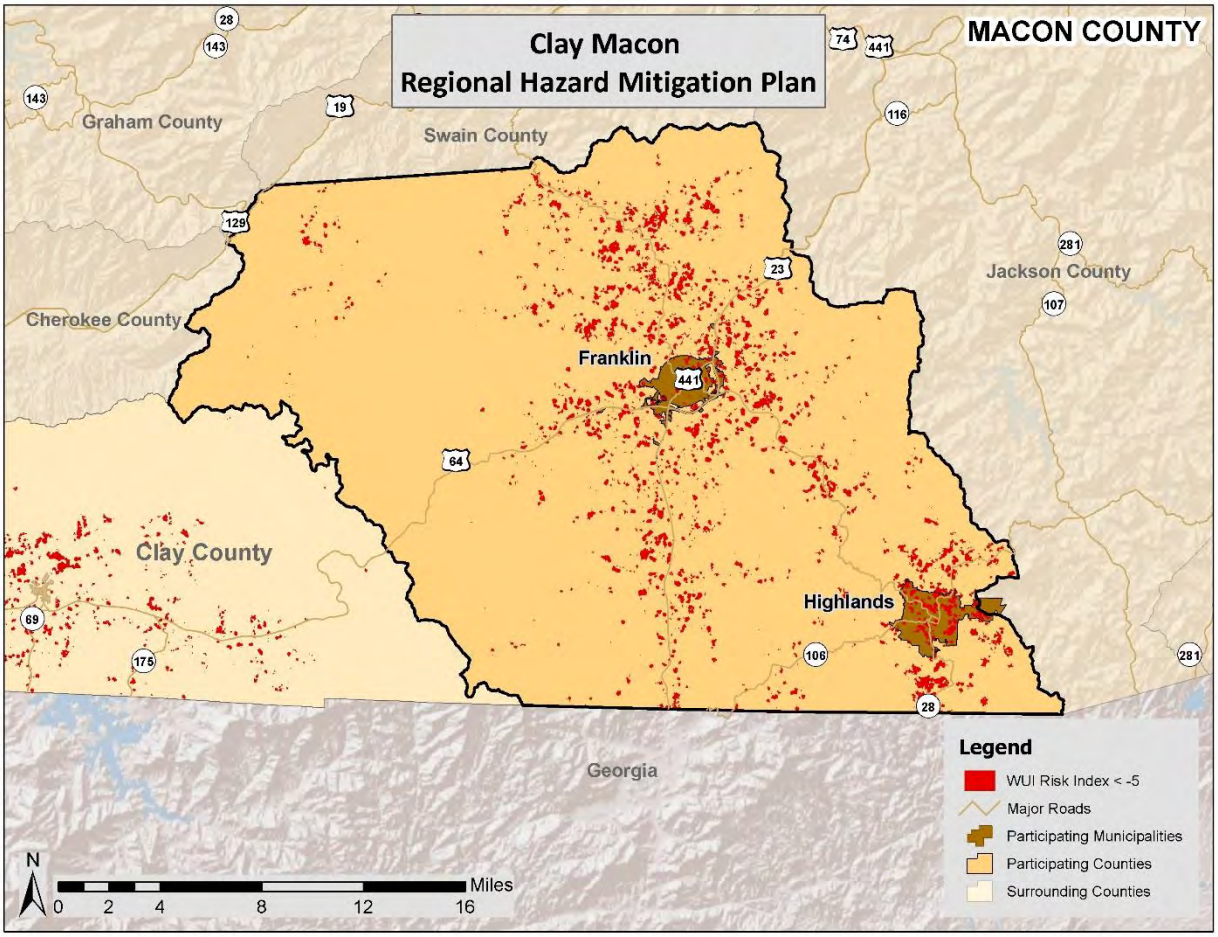
Table B.43 shows the results of the analysis.

FIGURE B.21: WUI RISK INDEX AREAS IN MACON COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE B.22: WILDFIRE RISK AREAS IN MACON COUNTY



Source: Southern Wildfire Risk Assessment Data

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

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Franklin	388	242	$89,193,200
Highlands	1,124	489	$332,958,450
Unincorporated Area	10,237	3,684	$1,204,956,990
MACON COUNTY TOTAL	**11,749**	**4,415**	**$1,627,108,640**

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire county. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are eight critical facilities located in wildfire areas of concern. These facilities include 3 government facilities, 3 landfill/convenience centers, 1 police station,

and 1 medical care facility. It should also be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Macon County.

Conclusions on Hazard Vulnerability

Table B.44 presents a summary of annualized loss for each hazard in Macon County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

TABLE B.44: ANNUALIZED LOSS FOR MACON COUNTY

Event	Chatham County
Atmospheric Hazards	
Drought	Negligible
Extreme Heat	Negligible
Hailstorm	$221
Hurricane & Tropical Storm	$40,000
Lightning	$138,194
Severe Thunderstorm / High Wind	$49,911
Tornado	$27,797
Winter Storm & Freeze	Negligible
Geologic Hazards	
Earthquake	$177,000
Landslide	$202,636
Hydrologic Hazards	
Dam Failure	Negligible
Erosion	Negligible
Flood	$290,279
Other Hazards	
HAZMAT Incident	$615
Wildfire	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme heat, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table B.45** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE B.45: AT-RISK CRITICAL FACILITIES IN MACON COUNTY

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
MACON COUNTY																				
Clarks Chapel Community Center	Community Building	X	X	X	X	X	X	X	X	X										
Macon County Rec Park	Community Building	X	X	X	X	X	X	X	X	X						X	X			
Carson Community Center	Community Building	X	X	X	X	X	X	X	X	X					X	X	X			
Holly Springs Community Center	Community Building	X	X	X	X	X	X	X	X	X										
Pine Grove Community Center/Pine Grove School	Community Building	X	X	X	X	X	X	X	X		X					X	X			
Scaly Mtn Community Center	Community Building	X	X	X	X	X	X	X	X		X					X	X			
Upper Cartoogechaye Community Ctr/Gillespie Chapel	Community Building	X	X	X	X	X	X	X	X	X										
EMS/911 Dispatch	EMS Station	X	X	X	X	X	X	X	X	X						X	X			
Future EMS Base	EMS Station	X	X	X	X	X	X	X	X	X						X	X			
Nantahala EMS Base	EMS Station	X	X	X	X	X	X	X	X	X										
Macon County EOC	EOC	X	X	X	X	X	X	X	X	X						X	X			
Cowee Fire Dept.	Fire Station	X	X	X	X	X	X	X	X	X										
Cullasaja Gorge Fire Dept.	Fire Station	X	X	X	X	X	X	X	X	X						X	X			
Otto Fire Dept.	Fire Station	X	X	X	X	X	X	X	X		X					X	X			
Airport	Government Facility	X	X	X	X	X	X	X	X	X										

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Animal Control	Government Facility	X	X	X	X	X	X	X	X	X							X			
Annex	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Buck Creek Park	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Chamber of Commerce	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Cliffside Lake Rec Area	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Courthouse	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Dirty John Shooting Range	Government Facility	X	X	X	X	X	X	X	X	X										
Driving Range	Government Facility	X	X	X	X	X	X	X	X	X		X		X	X	X	X			
Driving Range	Government Facility	X	X	X	X	X	X	X	X	X				X	X	X	X			
Enviromental Resource Center	Government Facility	X	X	X	X	X	X	X	X	X							X			
Health Dept./Building Insp.	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Highlands Library	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Highlands Post Office	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Highlands Rec. Park	Government Facility	X	X	X	X	X	X	X	X		X					X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Highlands Town Hall	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Humane Society	Government Facility	X	X	X	X	X	X	X	X	X						X	X			X
Incubator Building	Government Facility	X	X	X	X	X	X	X	X	X				X	X	X	X			
Industrial Park	Government Facility	X	X	X	X	X	X	X	X	X		X		X	X	X	X			
Landfill Office	Government Facility	X	X	X	X	X	X	X	X	X							X			
Library	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Macon County Fairgrounds	Government Facility	X	X	X	X	X	X	X	X	X			X			X	X			
Macon County Garage	Government Facility	X	X	X	X	X	X	X	X	X							X			
Macon County Horse Club Camp	Government Facility	X	X	X	X	X	X	X	X	X										
Macon County Transit	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Macon County Veterans Memorial & Recreation Park	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Macon Housing/ Old Bus Garage	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
MCH	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
MPP	Government Facility	X	X	X	X	X	X	X	X	X						X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Nantahala Rec. Park	Government Facility	X	X	X	X	X	X	X	X	X										
NC Coor. Extension	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
NC State Maintenance Dept.	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
New Town Hall	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Old Town Hall	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Post Office	Government Facility	X	X	X	X	X	X	X	X	X						X	X			X
SCC	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
School Board	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
School Bus Garage	Government Facility	X	X	X	X	X	X	X	X	X						X	X			X
Senior Services	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Soil & Water	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Standing Indian Campground	Government Facility	X	X	X	X	X	X	X	X		X									
Vanhook Glade Campground	Government Facility	X	X	X	X	X	X	X	X		X					X	X			
Veteran's Clinic	Government Facility	X	X	X	X	X	X	X	X	X						X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Wesley's Park	Government Facility	X	X	X	X	X	X	X	X	X						X	X			
Behind Garage	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X							X			
Buck Creek Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X						X			
Carson Community Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X					X	X	X			
Driving Range	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X					X	X	X			
Foreman Rd.	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X					X	X			X
Highlands RD. Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X						X	X			
Highlands Soccer Field	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X					X	X			
Highlands Transfer Station	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X						X			
Holly Springs Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X										

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
Iotla Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X		X				X	X			X
Junaluska Rd Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X		X								
Landfill	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X							X			
Otto Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X					X	X			X
Scaly Mountain Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X		X						X			
Wayah Rd Convenience Center	Landfill/ Convenience Center	X	X	X	X	X	X	X	X	X										
Angel Medical Center	Medical Care Facility	X	X	X	X	X	X	X	X	X						X	X			
Highlands/Cashiers Hospital	Medical Care Facility	X	X	X	X	X	X	X	X		X					X	X			X
Franklin Police	Police Station	X	X	X	X	X	X	X	X	X		X				X	X			
Sheriff's Office/Jail	Police Station	X	X	X	X	X	X	X	X	X						X	X			X
Cartoogechaye Elem.	School	X	X	X	X	X	X	X	X	X				X	X	X	X			
Cowee School	School	X	X	X	X	X	X	X	X	X						X	X			
Cullasaja Elem.	School	X	X	X	X	X	X	X	X	X						X	X			

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
		Drought	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5-mile	Fixed HAZMAT 1.0-mile	Mobile HZMT 0.5-mile(road)	Mobile HZMT 1.0-mile (road)	Mobile HZMT 0.5-mile (rail)	Mobile HZMT 1.0-mile (rail)	Wildfire
East Franklin Elem	School	X	X	X	X	X	X	X	X	X						X	X			
Franklin High	School	X	X	X	X	X	X	X	X	X						X	X			
Highlands School	School	X	X	X	X	X	X	X	X		X					X	X			
Iotla Elem.	School	X	X	X	X	X	X	X	X	X							X			
Macon 5-6 School	School	X	X	X	X	X	X	X	X	X						X	X			
Macon Middle School	School	X	X	X	X	X	X	X	X	X							X			
Nantahala School	School	X	X	X	X	X	X	X	X	X										
South Macon Elem.	School	X	X	X	X	X	X	X	X	X							X			

B.4 MACON COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Macon County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

B.4.1 Planning and Regulatory Capability

Table B.46 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Macon County. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Clay Macon Regional Hazard Mitigation Plan.

TABLE B.46: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
MACON COUNTY	✓	✓		✓				✓	✓			✓	✓		✓		✓			✓	✓	✓	
Franklin	✓	✓			✓			✓	✓			✓			✓	✓	✓	✓		✓	✓		
Highlands	✓	✓		✓	✓			✓	✓			✓			✓	✓	✓	✓		✓	✓	✓	

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

Emergency Management

Hazard Mitigation Plan
Macon County has previously adopted a hazard mitigation plan. The Towns of Franklin and Highlands were also included in this plan.

Emergency Operations Plan
The Macon County Emergency Management Office maintains a countywide emergency operations plan for the county and its incorporated municipalities.

Continuity of Operations Plan
Macon County has not adopted a continuity of operations plan; however, the county addresses continuity of operations in its emergency operations plan.

General Planning

Comprehensive Land Use Plan
Macon County, the Town of Franklin, and the Town of Highlands have each adopted a comprehensive land use plan. Each jurisdiction's plan is intended to help guide short- and long-range change, growth, and development.

Capital Improvements Plan
In Macon County, each department in the county has developed a 6-year capital improvements plan. The Town of Franklin has also implemented a 20-year water capital improvement plan and the Town of Highlands has developed a wastewater collection system capital improvement plan.

Zoning Ordinance
Macon County does not have a zoning ordinance. However, the Towns of Franklin and Highlands include zoning regulations as part of their local unified development ordinances.

Subdivision Ordinance
Macon County has adopted subdivision regulations. The Towns of Franklin and Highlands include subdivision regulations as part of their local unified development ordinances.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Macon County enforces the building code and performs inspections in the county and both the Towns of Franklin and Highlands.

Floodplain Management

Table B.47 provides NFIP policy and claim information for each participating jurisdiction in Macon County.

TABLE B.47: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
MACON COUNTY†	06/01/01	04/19/10	167	$41,359,100	28	$872,997
Franklin*	--	--	--	--	--	--
Highlands	10/28/09	04/19/10	26	$7,367,000	0	$0

† Includes unincorporated areas of county only
*Community does not participate in the NFIP
Source: NFIP Community Status information as of 12/9/14; NFIP claims and policy information as of 9/30/14

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

The Town of Franklin does not participate in the NFIP due to lack of available funding and political support. The community was suspended from the program in 1978.

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Macon County and the Town of Highlands both participate in the NFIP and have adopted flood damage prevention regulations. Although the Town of Franklin does not participate in the NFIP, the town has adopted a floodways ordinance which regulates artificial obstructions in floodways.

Open Space Management Plan
Macon County has adopted a parks and recreation master plan and the Town of Highlands has adopted a greenway plan.

Stormwater Management Plan
Macon County and the Towns of Franklin and Highlands do not have stormwater management plans in place. However, Franklin and Highlands had adopted stormwater management regulations through their respective unified development ordinances. Macon County also includes some regulations related to stormwater management in various local ordinances.

B.4.2 Administrative and Technical Capability

Table B.48 provides a summary of the capability assessment results for Macon County with regard to relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

TABLE B.48: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
MACON COUNTY	✓	✓		✓	✓		✓	✓	✓	
Franklin	✓	✓		✓			✓	✓	✓	
Highlands	✓	✓		✓	✓		✓	✓	✓	

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

B.4.3 Fiscal Capability

Table B.49 provides a summary of the results for Macon County with regard to relevant fiscal resources. A checkmark (✓) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds) according to the previous county hazard mitigation plan.

TABLE B.49: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: HMGP, FMAP, PDM, and other federal, state, local and non-governmental funding sources, etc.
MACON COUNTY	✓	✓							✓	✓
Franklin	✓	✓							✓	✓
Highlands	✓	✓							✓	✓

B.4.4 Political Capability

The previous hazard mitigation plan indicates that Macon County has completed numerous projects across the county, mainly targeting stormwater flooding hazards. These include channel excavations and improvements to local creeks and drainage ditches, roadway and culvert improvements, and the creation of detention basins. Additionally, the county is currently a participant in the NFIP and has adopted the required flood damage prevention ordinance. Macon County has also adopted Watershed Protection, Soil Erosion and Sedimentation Control, and Subdivision Ordinances. All of this demonstrates to some extent both favorable political support and willingness to adopted hazard mitigation efforts in an active manner.

B.4.5 Conclusions on Local Capability

Table B.50 shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its municipalities is 33.7, which falls into the moderate capability ranking.

TABLE B.50: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
MACON COUNTY	38	Moderate

Jurisdiction	Overall Capability Score	Overall Capability Rating
Franklin	28	Moderate
Highlands	35	Moderate

B.5 MACON COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Macon County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Planning Committee and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

B.5.1 Mitigation Goals

Macon County developed six mitigation goals in coordination with the other participating Clay Macon Region jurisdictions. The regional mitigation goals are presented in **Table B.51**.

TABLE B.51: CLAY MACON REGIONAL MITIGATION GOALS

	Goal
Goal #1	Prevent or lessen the negative impacts caused by natural disasters and/or technological and manmade incidents.
Goal #2	Increase the response capability in the region, especially to unexpected emergencies that have never experienced before.
Goal #3	Protect public and private property and other assets from the damage that results from hazard events.
Goal #4	Increase public awareness of natural and technological/manmade hazards.
Goal #5	Reduce the impact of hazards by preserving or restoring the function of natural systems.
Goal #6	Lessen the impact of hazards by responsibly modifying the environment, hardening existing or proposed structures, and implementing projects that have a positive effect on reducing the negative impact of hazards.

B.5.2 Mitigation Action Plan

The mitigation actions proposed by Macon County, the Town of Franklin, and the Town of Highlands are listed in the following individual Mitigation Action Plans.

Macon County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Review and update the floodplain ordinance and insure that new infrastructure is not built in the flood prone areas.	Flood	High	Macon County Planning, Permitting & Development	Local	2020	Deferred. The county has reviewed the floodplain ordinance, but this is something that will need to take place again during the next 5 years, so it will remain in place.
P-2	Continue identifying potential floodplain areas to submit requests for map updates.	Flood	High	Macon County Planning, Permitting & Development	Local	2020	Deferred. The county has identified some areas to submit requests for map updates, however, the county would like to continue to look into and evaluate areas of the floodplain going forward.
Property Protection							
PP-1	Elevate access road (Arthur Drake Road) "above" the floodway.	Flood	Moderate	Macon County Emergency Management	HMGP, PDM	2020, As funds become available	Deferred. The county has attempted to implement this project, but it has not received grant funding and would not be able to fund it with local funding alone. Estimated cost $1,000,000. The county will continue to try to move this project forward over the next 5 years.
PP-2	Work with town to remove Franklin Fire Department from flood plain.	Flood	High	Macon County Emergency Management	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	New action.
PP-3	Protect bridge in the main part of town at the intersection of East Main Street and Highway 64 East from debris coming downstream during flood events.	Flood	High	Macon County Public Works; USACE	HMGP, PDM, USACE	2020, As soon as funds become available	Deferred. NCDOT is in the process of replacing the old town bridge which will help move towards completion of this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-4	Protect sewage treatment plant from flood damage by erecting a concrete flood wall around the plant.	Flood	High	Macon County Public Works	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	Deferred. There has not been any action taken to protect sewage treatment plants from flood damage via a floodwall. Estimated cost $1,000,000. The county will continue to look into funding for this project.
PP-5	Replace inadequately sized water mains and tanks to a size adequate for fire protection.	Wildfire	High	Macon County Public Works	Local	2020, When funding becomes available	Deferred. Water mains have not been replaced. The county would still like to address this action, but will need to find funding to do so. Estimated cost $6.7 million.
PP-6	Ensure all homes are secured properly and that building codes are followed as directed to minimize risk of hazards.	All	High	Macon County Planning, Permitting & Development	Local	2020, When funding becomes available	Deferred. The county continually works to ensure that building codes are followed and that homes are secured to the greatest extent possible. However, this is an action that will still need to be carried out in the future, so it will remain in the plan.
Natural Resource Protection							
NRP-1	Work to increase total area of open space throughout the county, which will have a dual role of reducing risks to many hazards (examples: flooding, tropical storms, etc) and will also serve as space for recreational purposes.	All	Moderate	Macon County Emergency Management and Administration	Local	2020	New action.
NRP-2	Purchase tub grinder for the disposal of storm debris	All	High	Macon County Landfill	Local; PA	2020, As soon as funds become available	Deferred. The county has not purchased a tub grinder for disposal of debris. Estimated cost $1,000,000. The county will continue to try to allocate funding for such a purpose.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Structural Projects							
SP-1	Remove the Fire Department (Burningtown) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	Deleted	Deleted. The county has worked to try to acquire funding to remove this fire department from the floodway, but have not received assistance. Estimated cost $500,000. The county will likely not be able to complete this project due to an issue with the Burningtown FD deed.
SP-2	Remove the Fire Department (West Macon) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	Completed	Completed. The county removed this fire department from the floodway in 2006.
SP-3	Work with Southwestern Community College Division of Public Safety Training Center to pursue funding to relocate the Live Fire Training Center outside of flood-prone area.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	2020, or as soon as funds become available	New action.
Emergency Services							
ES-1	Obtain and install a second source of electricity for public buildings and emergency services buildings to continue operations after unexpected loss of power during a disaster.	All	High	Macon County Emergency Management	State grant	2020, or as soon as funds become available	Deferred. The county has not been able to secure a secondary source of electricity for public/emergency services buildings in the event of an unexpected power loss. The county will continue to look for ways to fund this type of project.
Public Education and Awareness							
PEA-1	The county will work to improve its outreach by utilizing online surveys to get input from the public.	All	High	Macon County Emergency Management	Local	2020	New action.
PEA-2	The county will push information out to the public in a number of ways such as at live outreach events, through paper materials such as brochures, and online.	All	High	Macon County Emergency Management	Local	2020	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-3	Include emergency information in the website to inform and educate citizens about potential risks from hazards and opportunities to mitigate them, as they pertain to the jurisdiction.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized its website to inform and educate citizens about potential risks to hazards and how to mitigate these risks. Going forward, the county will continue to post pertinent information on its website, so this action will remain in place.
PEA-4	Make flyers and information sheets available in public buildings to educate citizens on potential risks from hazards and potential ways to mitigate them as well as safety measures to be conducted during a hazard event.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized flyers and information sheets as a way of reaching out the public and has placed these in public buildings, making them available to the public. The county will need to update these flyers and sheets as better information becomes available, so this action will remain in place.

Town of Franklin Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Town of Franklin to join the NFIP.	Flood	High	Franklin Public Works	Local	2017	New action.
PP-2	Ensure all homes are secured properly and that building codes are followed as directed to minimize risk of hazards.	All	High	Macon County Planning, Permitting & Development; Franklin Administration	Local	2020, When funding becomes available	Deferred. The county continually works to ensure that building codes are followed and that homes are secured to the greatest extent possible. However, this is an action that will still need to be carried out in the future, so it will remain in the plan.
Property Protection							
PP-1	Elevate access road (Arthur Drake Road) "above" the floodway.	Flood	Moderate	Macon County Emergency Management	HMGP, PDM	2020, As funds become available	Deferred. The county has attempted to implement this project, but it has not received grant funding and would not be able to fund it with local funding alone. Estimated cost $1,000,000. The county will continue to try to move this project forward over the next 5 years.
PP-2	Protect bridge in the main part of town at the intersection of East Main Street and Highway 64 East from debris coming downstream during flood events.	Flood	High	Franklin Public Works; USACE	HMGP, PDM, USACE	2020, As soon as funds become available	Deferred. NCDOT is in the process of replacing the old town bridge which will help move towards completion of this action.
PP-3	Protect sewage treatment plant from flood damage by erecting a concrete flood wall around the plant.	Flood	High	Franklin Public Works	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	Deferred. There has not been any action taken to protect sewage treatment plants from flood damage via a floodwall. Estimated cost $1,000,000. The town will continue to look into funding for this project.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PP-4	Remove Franklin Fire Department and Police Station from flood plain.	Flood	High	Franklin Public Works	HMGP, USACE, 406 Mitigation	2020, As soon as funds become available	New action.
Natural Resource Protection							
NRP-1	Increase size/capacity of waste water treatment plant.	Drought	High	Franklin Public Works	CDBG; EPA; USDA	Completed	Completed. The capacity of the wastewater treatment plant was expanded.
NRP-2	Develop new water source/build new water treatment plant to meet the demands of continued growth.	Drought	High	Franklin Public Works	CDBG; EPA, USDA	2020, As soon as funds become available.	Deferred. In the process of increasing capacity with an estimated completion of 2020. Estimated cost $8,000,000.
NRP-3	Purchase tub grinder for the disposal of storm debris	All	High	Macon County Landfill	Local; PA	2020, As soon as funds become available	Deferred. The town has not purchased a tub grinder for disposal of debris. Estimated cost $1,000,000. The town will continue to try to allocate funding for such a purpose.
NRP-4	Work with county to increase total area of open space throughout the county, which will have a dual role of reducing risks to many hazards (examples: flooding, tropical storms, etc) and will also serve as space for recreational purposes.	All	Moderate	Macon County Emergency Management and Administration; Franklin Administration	Local	2020	New action.
Structural Projects							
SP-1	Remove the Fire Department (Burningtown) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	2020, As funds become available	Deferred. The county has worked to try to acquire funding to remove this fire department from the floodway, but have not received assistance. Estimated cost $500,000. The county will continue to try to move this project forward over the next 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
SP-2	Remove the Fire Department (West Macon) from the floodway.	Flood	High	Macon County Emergency Management	HMGP, PDM, 406 Mitigation	2020, As funds become available	Deferred. The county has worked to try to acquire funding to remove this fire department from the floodway, but have not received assistance. Estimated cost $500,000. The county will continue to try to move this project forward over the next 5 years.
SP-3	Remove sewer pump station from floodplain at Little Tennessee River and E Main St.	Flood	High	Public Works	HMGP, PDM, 406 Mitigation	2020, As funds become available	New Action.
SP-4	Have public works clean out storm drains, ditches and culverts to help with flow of storm water.	Flood	High	Public Works	Local	2020, As funds become available	New Action.
Emergency Services							
ES-1	Obtain and install a second source of electricity for public buildings and emergency services buildings to continue operations after unexpected loss of power during a disaster.	All	High	Macon County Emergency Management, Franklin Administration	State grant	2020, or as soon as funds become available	Deferred. The town has not been able to secure a secondary source of electricity for public/emergency services buildings in the event of an unexpected power loss. The county will continue to look for ways to fund this type of project.
Public Education and Awareness							
PEA-1	Improve outreach by utilizing online surveys to get input from the public.	All	High	Macon County Emergency Management	Local	2020	New action.
PEA-2	Push information out to the public in a number of ways such as at live outreach events, through paper materials such as brochures, and online.	All	High	Macon County Emergency Management	Local	2020	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-3	Include emergency information in the website to inform and educate citizens about potential risks from hazards and opportunities to mitigate them, as they pertain to the jurisdiction.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized its website to inform and educate citizens about potential risks to hazards and how to mitigate these risks. Going forward, the county will continue to post pertinent information on its website, so this action will remain in place.
PEA-4	Make flyers and information sheets available in public buildings to educate citizens on potential risks from hazards and potential ways to mitigate them as well as safety measures to be conducted during a hazard event.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized flyers and information sheets as a way of reaching out the public and has placed these in public buildings, making them available to the public. The county will need to update these flyers and sheets as better information becomes available, so this action will remain in place.

Town of Highlands Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
Prevention							
P-1	Replace roadway culvert on Laurel Street with a bridge to alleviate flooding caused by Mill Creek.	Flood	High	Highlands Public Works	HMGP, PDM, 406 Mitigation	2020, When funding becomes available	Deferred. This action is in process and mitigation funds are expected. Estimated cost $250,000.
PP-2	Ensure all homes are secured properly and that building codes are followed as directed to minimize risk of hazards.	All	High	Macon County Planning, Permitting & Development; Highlands Administration	Local	2020, When funding becomes available	Deferred. The county continually works to ensure that building codes are followed and that homes are secured to the greatest extent possible. However, this is an action that will still need to be carried out in the future, so it will remain in the plan.
Property Protection							
PP-1	Upgrade water treatment plant to one that does not use chlorine (the existing container of chlorine gas could rupture during a seismic event).	Earthquake	High	Highlands Public Works	Local	2020, When funding becomes available	Deferred. This action has not been started so the town will work on this action going forward. Estimated cost $800,000.
PP-2	Replace inadequately sized water mains and tanks to a size adequate for fire protection.	Wildfire	High	Highlands Public Works	Local	2020, When funding becomes available	Deferred. Water mains have not been replaced. The town would still like to address this action, but will need to find funding to do so. Estimated cost $6.7 million.
Natural Resource Protection							
NRP-1	Build fence around water plant.	Terrorism	High	Highlands Public Works	Local	Deleted	Deleted. This action was removed from the plan as Terrorism was not addressed in the plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
NRP-2	Work with county to increase total area of open space throughout the county, which will have a dual role of reducing risks to many hazards (examples: flooding, tropical storms, etc) and will also serve as space for recreational purposes.	All	Moderate	Macon County Emergency Management and Administration; Franklin Administration	Local	2020	New action.
Structural Projects							
SP-1	Build storm water controls, such as culverts and floodwalls, in flood prone areas and continue compliance with NFIP.	Flood	High	Town of Highlands Administration	State	2020	Deferred. The town has not generally built many stormwater controls in flood prone areas. This will be a continued area of focus going forward so this action will remain in the plan.
Emergency Services							
ES-1	Obtain and install a second source of electricity for public buildings and emergency services buildings to continue operations after unexpected loss of power during a disaster.	All	High	Macon County Emergency Management, Highlands Administration	State grant	2020, or as soon as funds become available	Deferred. The town has not been able to secure a secondary source of electricity for public/emergency services buildings in the event of an unexpected power loss. The county will continue to look for ways to fund this type of project.
Public Education and Awareness							
PEA-1	Improve outreach by utilizing online surveys to get input from the public.	All	High	Macon County Emergency Management	Local	2020	New action.
PEA-2	Push information out to the public in a number of ways such as at live outreach events, through paper materials such as brochures, and online.	All	High	Macon County Emergency Management	Local	2020	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2015)
PEA-3	Include emergency information in the website to inform and educate citizens about potential risks from hazards and opportunities to mitigate them, as they pertain to the jurisdiction.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized its website to inform and educate citizens about potential risks to hazards and how to mitigate these risks. Going forward, the county will continue to post pertinent information on its website, so this action will remain in place.
PEA-4	Make flyers and information sheets available in public buildings to educate citizens on potential risks from hazards and potential ways to mitigate them as well as safety measures to be conducted during a hazard event.	All	High	Macon County Emergency Management	Local	2020	Deferred. The county has utilized flyers and information sheets as a way of reaching out the public and has placed these in public buildings, making them available to the public. The county will need to update these flyers and sheets as better information becomes available, so this action will remain in place.
Previously Completed Mitigation Actions							
	Thorough inspection and testing of Sequoia Dam and Mirror Lake Dam.	Dam Failure	High	Highlands Public Works		Completed	Completed. This action was completed during the last update and will be removed.

Appendix A
Plan Adoption

This appendix includes the local adoption resolutions for each of the participating jurisdictions.

Appendix B
Planning Tools

This appendix includes the following:

1. Blank Public Participation Survey
2. GIS Data Inventory Sheet
3. Scoring Criteria for Capability Assessment
4. Blank Mitigation Action Worksheet
5. Public Participation Survey Advertisements

PUBLIC PARTICIPATION SURVEY
FOR HAZARD MITIGATION PLANNING

We need your help!

The Counties of Clay and Macon are currently engaged in a planning process to become less vulnerable to natural disasters, and your participation is important to us!

The Counties, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional *Hazard Mitigation Plan*. The purpose of this Plan is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks. Upon completion, the Plan will represent a comprehensive multi-jurisdictional *Hazard Mitigation Plan* for the two-county region.

This survey questionnaire provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events.

Please help us by completing this survey by March 31, 2015 and returning it to:

Sara Reynolds, Atkins
1616 E Millbrook Road, Suite 310
Raleigh, NC 27609

Surveys can also be faxed to: (919) 876-6848 or emailed to sara.reynolds@atkinsglobal.com

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development of the *Clay Macon Regional Hazard Mitigation Plan*, please contact Atkins, planning consultant for the project. You may reach Nathan Slaughter (Atkins) at 919-431-5251 or by email at nathan.slaughter@atkinsglobal.com.

1. Where do you live?

- ❑ Unincorporated Clay County
- ❑ Unincorporated Macon County
- ❑ Franklin
- ❑ Hayesville
- ❑ Highlands
- ❑ Other: _____

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

   - ❑ Yes
   - ❑ No

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

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

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

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

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

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

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

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

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

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

- ❑ Yes
- ❑ No
- ❑ I don't know

8. **Do you have flood insurance?**

- ❑ Yes
- ❑ No
- ❑ I don't know

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

   - ❑ Not located in floodplain
   - ❑ Too expensive
   - ❑ Not necessary because it never floods
   - ❑ Not necessary because I'm elevated or otherwise protected
   - ❑ Never really considered it
   - ❑ Other (please explain): _____

9. **Have you taken any actions to make your home or neighborhood more resistant to hazards?**

- ❑ Yes
- ❑ No

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

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

- ❑ Yes
- ❑ No

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

- ❑ Yes
- ❑ No

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

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

13. 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?

14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

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

Category	Very Important	Somewhat Important	Not Important
1. Prevention Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.	❑	❑	❑
2. Property Protection Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.	❑	❑	❑
3. Natural Resource Protection Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.	❑	❑	❑
4. Structural Projects Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls, and storm sewers.	❑	❑	❑
5. Emergency Services Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.	❑	❑	❑
6. Public Education and Awareness Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.	❑	❑	❑

THANK YOU FOR YOUR PARTICIPATION!

This survey may be submitted anonymously; however, if you provide us with your name and contact information below we will have the ability to follow up with you to learn more about your ideas or concerns (optional):

Name: _____

Address: _____

_____

Phone: _____ **E-Mail:** _____

GIS Data Request Sheet
Clay Macon Regional Hazard Mitigation Plan

Data requested	Available?	Received?	Potential Sources
Tax Parcel Data			Tax Assessor
including replacement value			
Building Footprints			Tax Assessor/GIS office
Critical Facilities (in GIS or list form with addresses)			Tax Assessor/GIS office
examples include:			
government buildings			
hospitals			
senior care			
police/fire/EMS/EOC			
locally significant buildings			
schools			
Local hazard studies			public works, natural resources, planning
examples include:			
Flood Studies (HEC-RAS, Risk MAP)			
Local Hazard History Articles			
Areas of Concern Studies			

If you have any questions, please contact:

Ryan Wiedenman
ryan.wiedenman@atkinsglobal.com
919-431-5295

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 Clay and Macon Counties 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.

Please return all completed worksheets no later than May 12, 2015 to:

Ryan Wiedenman, Project Manager Atkins
Electronic copies may be e-mailed to: ryan.wiedenman@atkinsglobal.com
Hard copies may be faxed to: 919-876-6848 (Attn: Ryan Wiedenman)

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

http://maconnc.org/index.html

Welcome to Macon Count...

MACON COUNTY

Franklin • Highlands • Nantahala • Otto, NORTH CAROLINA

Wednesday, January 7, 2015

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MOST POPULAR RESOURCES

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EMPLOYEE EMAIL

Advisory Boards & Committees

Welcome to the Official Website of Macon County, North Carolina.

As one of the fastest growing counties in North Carolina, **Macon County** strives to serve our citizens, business community and those visiting the area with the most up-to-date resources possible. Macon County Government is dedicated to continually seeking ways to improve the services we provide to our community. Our website is one of those services.

This **online portal to Macon County North Carolina Government** will allow you to learn more about our agencies, download an official form, search for map, open a business or visit us, it's all here at MaconNC.org.

Use the menu at the top of the page to browse through the many resources provided. Our most popular links are located to the left and provide you a quick way to navigate to these services and resources.

Thank you for visiting and come back soon as the content of this website is updated often.

There are many downloadable resources on our site that require Adobe Acrobat Reader. If you need this program, click here for a free download.

Macon & Clay County Hazard Mitigation Notice
Please Click for the Notice and a link to participate in an important on-line survey.

Ebola Information Line (1-844-836-8714)
Click for NCDHHS Ebola Information

Si le gustaria ver esta pagina en espanol, haga un clic aqui para cambiarla.

Mobile Menus

5 West Main Street • Franklin, NC 28734
Phone: 828-349-2000

MACON COUNTY

Franklin • Highlands • Nantahala • Otto, NORTH CAROLINA

Wednesday, January 7, 2015

CONTACT:

Macon County NC Government
5 West Main Street
Franklin, NC 28734
Phone: (828) 349-2000

MACON COUNTY BOARD OF COMMISSIONERS

Click This link for the
Schedule of Regular Meetings

MACON COUNTY SURPLUS REAL PROPERTY FOR SALE

- **Click here for Real Property List**

Macon County Tax Department

PURPOSED 2015 Macon Schedule of Values

Click this link to View / Save the Document.

Three-year Update to the Solid Waste Management Plan for Macon County,

Public Notices & Announcements

PRESS RELEASE
Public Survey Available for Hazard Mitigation Plan

The Counties of Clay and Macon are currently engaged in a planning process to become less vulnerable to natural disasters, and your participation is important to us!

The Counties, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional Hazard Mitigation Plan. The purpose of this Plan is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks. Upon completion, the Plan will represent a comprehensive multi-jurisdictional Hazard Mitigation Plan for the two-county region.

A survey questionnaire is available that provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events.

The survey is available at the following location. http://www.surveygizmo.com/s3/1947288/Public-Participation-Survey-for-Hazard-Mitigation-Planning-Clay-Macon
Any questions about the plan can be directed to:

Rick Lancaster - Clay County Emergency Management
828-389-1233
claycountyemergencyservices@gmail.com

Warren Cabe - Macon County Emergency Management
828-349-2067
wcabe@maconnc.org

Nathan Slaughter Project Consultant
919-431-5251
nathan.slaughter@atkinsglobal.com

Click here for a pdf copy of the Clay / Macon Kickoff Report

Macon County North Carolina

ADDENDUM #1

Public Survey Available for Hazard Mitigation Plan

Tuesday January 13, 2015 - PRESS RELEASE
Public Survey Available for Hazard Mitigation Plan

The Counties of Clay and Macon are currently engaged in a planning process to become less vulnerable to natural disasters, and your participation is important to us!

The Counties, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional Hazard Mitigation Plan. The purpose of this Plan is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks. Upon completion, the Plan will represent a comprehensive multi-jurisdictional Hazard Mitigation Plan for the two-county region.

A survey questionnaire is available that provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events.

The survey is available here: **Online Survey**

Any questions about the plan can be directed to:

Rick Lancaster - Clay County Emergency Management
828-389-1233
claycountyemergencyservices@gmail.com

Warren Cabe - Macon County Emergency Management
828-349-2067
wcabe@maconnc.org

Nathan Slaughter Project Consultant
919-431-5251
nathan.slaughter@atkinsglobal.com

Back to News

Government Services

Clay County Manager

... GO

View All Services

Contact Clay County

P.O. Box 118
33 Main Street,
Hayesville, NC 28904
Phone: 828-389-0089
Fax: 828-389-9749
» Contact Us

Appendix C
Local Mitigation Plan Review Tool

Appendix D
Planning Process Documentation

This appendix includes:

1. Meeting Agendas
2. Meeting Minutes
3. Meeting Sign-In Sheets
4. Public Survey Summary Results

AGENDA

Clay Macon Regional Hazard Mitigation Plan
Kickoff Meeting

January 6, 2015
10:00 AM – Noon
Clay County Social Services Building
119 Courthouse Dr., Hayesville, NC 28904

1) **Introductions**

2) **Overview of Mitigation**
   a) **Ice Breaker Exercise**

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

4) **Data Collection**

5) **Roles & Responsibilities**

6) **Next Steps**

7) **Questions, Issues, or Concerns**

ATKINS

AGENDA

Clay Macon Regional Hazard Mitigation Plan
Mitigation Strategy Meeting

April 21, 2015
10:00 AM – Noon
Clay County Social Services Building
119 Courthouse Dr., Hayesville, NC 28904

1) **Introductions**

2) **Mitigation Refresher**

3) **Project Schedule**

4) **Risk Assessment Findings**
   a) Hazard History and Profiles
   b) Conclusions on Risk: PRI

5) **Capability Assessment Findings**
   a) Indicators
   b) Results

6) **Public Involvement Activities**

7) **Mitigation Strategy**
   a) Current Goals/Actions
   b) New Actions
   c) Discussion

8) **Next Steps**
   a) Mitigation Actions
   b) Continue Public Outreach

9) **Questions, Issues, or Concerns**

ATKINS

Meeting Minutes
Clay Macon Regional Hazard Mitigation Plan
Project Kickoff Meeting
January 6, 2015

Nathan Slaughter of Atkins (project consulting team), started the meeting by welcoming the representatives from the County, participating municipal jurisdictions, and other stakeholders.

Mr. Slaughter led the kickoff meeting and began by providing an overview of the items to be discussed at the meeting and briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, project description, and presentation slides). He then provided a brief overview of mitigation and discussed the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

He gave a list of the participating jurisdictions for the regional plan, noting all local governments in the County are participating in the existing county-level hazard mitigation plan. The planning grant expires in August of 2015, so the planning team will work to develop a draft to submit to FEMA by June of 2015.

Mr. Slaughter then explained the six different categories of mitigation techniques (emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection) and gave examples of each. This explanation culminated with an Ice Breaker Exercise for the attendees.

Mr. Slaughter instructed attendees on how to complete the exercise. Attendees were divided into small groups and given an equal amount of fictitious FEMA money and asked to spend it in the various mitigation categories. Money could be thought of as grant money that communities received towards mitigation. Attendees were asked to target their money towards areas of mitigation that are of greatest concern for their community. Ideally, the exercise helps pinpoint areas of mitigation that the community may want to focus on when developing mitigation grants. Mr. Slaughter then presented the Ice Breaker Exercise results which were:

- Emergency Services- 70
- Prevention- 63
- Natural Resource Protection- 34
- Public Education and Awareness- 22
- Property Protection- 19
- Structural Projects- 12

Mr. Slaughter then discussed the key objectives and structure of the planning process, explaining the specific tasks to be accomplished for this project, including the planning process, risk assessment, vulnerability assessment, capability assessment, mitigation strategy and action plan, plan maintenance procedures, and documentation. The project schedule was presented along with the project staffing chart, which demonstrates the number of experienced individuals that will be working on this project.
The data collection needs and public outreach efforts were also discussed.

Mr. Slaughter then reviewed the roles and responsibilities of Atkins, participating jurisdictions, and stakeholders. The presentation concluded with a discussion of the next steps to be taken in the project

development, which included discussing data collection efforts, continuing public outreach, and the next meeting for the HMPT.

Mr. Slaughter thanked everyone for attending and made himself available for any questions or issues. The meeting was adjourned.

Meeting Minutes
Clay Macon Regional Hazard Mitigation Plan
Mitigation Strategy Meeting
April 21, 2015

Nathan Slaughter of Atkins (project consultant) welcomed everyone to the meeting. He then initiated the meeting with a review of the handouts, which included an agenda, presentation slides, proposed goals for the plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions. Mr. Slaughter then reviewed the project schedule and stated that a draft of the Hazard Mitigation Plan would be presented to the Hazard Mitigation Planning team in June.

He then passed the meeting over to Ryan Wiedenman of Atkins, who presented the findings of the risk assessment, starting with a review of the Presidential Disaster Declarations that have impacted the counties. He then explained the process for preparing Hazard Profiles and discussed how each hazard falls into one of four categories: Atmospheric, Geologic, Hydrologic, and Other. He indicated that each hazard must be evaluated and then profiled and assessed to determine a relative risk for each hazard.

Mr. Wiedenman reviewed the Hazard Profiles and the following bullets summarize the information presented:

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

- EXTREME HEAT. There have been no recorded extreme heat events reported by NCDC since 1950; however, the greatest extent of reported heat in the region was 101 degrees which indicates that extreme heat can be a hazard of concern for the region, though future occurrences are relatively unlikely.

- HAILSTORM. There have been 84 recorded events since 1984. Future occurrences are highly likely.

- LIGHTNING. There have been 14 recorded lightning events since 1998, causing one injury and approximately $138,194 in reported property damages. Future occurrences are highly likely.

- TORNADOES. There have been 9 recorded tornado events reported in the region since 1965. $1.3 million in property damages. No deaths or injuries have been reported. Future occurrences are possible.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that 34 storm tracks have come within 75 miles of the Clay Macon Region since 1859. Future occurrences are likely.

- SEVERE THUNDERSTORM WINDS. There have been 160 severe thunderstorm events reported since 1970 with $1.9 million in reported property damages. 2 injuries have been reported. Future occurrences are highly likely.

- WINTER STORM. There have been 155 recorded winter events in the Clay Macon Region since 1996. Future occurrences are highly likely.

- EARTHQUAKES. There have been 46 recorded earthquake events in the Clay Macon Region since 1913. The strongest had a recorded magnitude of V MMI. Future occurrences are likely.

- LANDSLIDE. There have been 811 recorded landslide events in the Clay Macon Region. Future occurrences are highly likely.

- DAM FAILURE. There are 76 dams in the Clay Macon Region, 34 of which are classified as high hazard dams. There have been two reported significant failures (Echo Valley Pond and Balfour Lake Lower Dam). Future occurrences are unlikely.

- EROSION. Erosion was included in the previous Macon County plan but impacts are minimal. It was not included in the Clay County plan. Future occurrences are possible.

- FLOOD. There have been 35 flood events recorded in the Clay Macon Region since 1996. There have been 28 NFIP losses since 1978 and approximately $1 million in claims. 3 repetitive loss properties in the region account for 6 of the recorded losses. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS. There have been 10 reported hazardous materials events reported in the region. Future occurrences are possible.

- WILDFIRE. There is an average of 56 fires per year reported in the Clay Macon Region with an average of 248 acres burned annually. Future occurrences are likely.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Winter Storm and Freeze followed by Thunderstorm/High Wind, Landslide, and Flooding.

In concluding the review of Hazard Profiles, Mr. Wiedenman stated if anyone had additional information for the hazard profiles, or had concerns with any of the data presented, they should call or email him.

Mr. Wiedenman then presented the Capability Assessment Findings. Atkins has developed a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, Community Rating System (CRS) participation, and the Local Capability Assessment Survey conducted by Atkins.

Mr. Wiedenman reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions are in the low to moderate range for Planning and Regulatory Capability and in the limited range for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability planners. Based upon the scoring methodology developed by Atkins, it was determined that most of the

participating jurisdictions have moderate capability to implement hazard mitigation programs and activities.

Mr. Wiedenman also discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 32 responses had been received. Mr. Wiedenman explained that the survey would close soon, so the HMPT could make one final push to get the survey out to the public. Based on the survey results, respondents felt that severe thunderstorm/high wind posed the greatest threat to their neighborhood, followed by flood and landslide. 81 percent of the respondents were interested in making their homes more resistant to hazards. However, 74 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Wiedenman then reminded team members of the results of the icebreaker exercise from the first Hazard Mitigation Team meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

- Emergency Services- 70
- Prevention- 63
- Natural Resource Protection- 34
- Public Education and Awareness- 22
- Property Protection- 19
- Structural Projects- 12

Mr. Wiedenman gave an overview of Mitigation Strategy Development and presented the existing goals for the plans and explained how Atkins developed recommended goals by combining previous goals. The Hazard Mitigation Team accepted the recommended goals for the plan. Mr. Wiedenman then provided an overview and examples of suggested mitigation actions tailored for the Clay Macon region. Mr. Wiedenman then asked each county and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by May 12, 2015. Mr. Wiedenman also asked planning team members to include any new mitigation actions by May 12, 2015.

Mr. Wiedenman thanked the group for taking the time to attend and explained that if team members had any issues or questions about the planning process or their next steps, they could contact him. The meeting was adjourned.

Clay Macon Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

January 6, 2015
10:00 AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Todd Seagle	Macon Co E.M.	Franklin	828 349-2067	tseagle@maconnc.org
Warren Cabe	Macon Co EM	Franklin	828 349 2067	wcabe@maconnc.org
MATT MASON	MACON CO PLANNING	FRANKLIN	828 371. 2571	MMASON @ MACONNC.ORG
Justin Setser	Town of Franklin	Franklin	828-371-0990	jsetser@maconnc.com
Jimmy Teen	Macon County EM	Franklin	828-349-2069	Jteen@maconnc.org
PAUL LEEK	Clay County	Hayesville	828-389-0089	manager@clayconc.com

Clay Macon Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

January 6, 2015

10:00 AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Ricky Lancaster	Clay Co EM	Hayesville	828-389-1233	clay county emergency services@gmail.com
Pam Crisp	Clay Co EM	Hayesville	828-389-1233	pamacrisp@gmail.com
Randy Nichols	Commissioner	Hayesville	828-361-4196	rnichols@claync.org
CLAY LOGAN	COMMISSIONER	HAYESVILLE	828-371-4807	CLOGAN@CLAYNC.ORG
Danny Gee	NCEM	Arden	828-712-0630	danny.gee@ncdps.gov
Sam R. Beck II	Building Dept / Clay Co. Flood Plan Admin	Hayesville	828-389-0274	sbeck@claync.org
Dr. Rob Peck	Commissioner	Hayesville	828-361-411	rpeck@claync.org

Clay Macon Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting

April 21, 2015

10:00 AM - Noon

Name	Agency	City	Phone Number	E-mail Address
MATT MASON	MACON Co. PLANNING	Franklin	828. 349. 2072	MMASON@MACONNC.ORG
Justin Setser	Town of Franklin	Franklin	828 524-2516	jsetser@franklinnc.com
Todd Seagle	Macon Co EM	Franklin	828-349-2067	tseagle@maconnc.org
Jimmy Teem	Macon Co EM	Franklin	828-349-2067	jteem@maconnc.org
Danny Gee	NCEM	State	828-712-0636	danny.gee@ncdps.g

Clay Macon Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting

April 21, 2015

10:00 AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Pam Crisp	Clay Co EM	Hayesville, NC	828-389-1233	pamacrisp@gmail.com
Ricky Lancaster	Clay Co EM	Hayesville, NC	828-389 1233	Claycountyemergenagservices@gmail
Paul Leeb	Clay County	Hayesville, NC	828-389-0089	manager@clayclerk.com

Peeks Creek Landslide, Macon County, NC
Photo Source: Wikipedia

Clay Macon
Regional Hazard Mitigation Plan

Public Participation Survey Results

ATKINS

Public Participation Survey

- Provides an opportunity for the public to share opinions and participate in the planning process
- Link to survey posted on County websites
- 32 completed surveys received

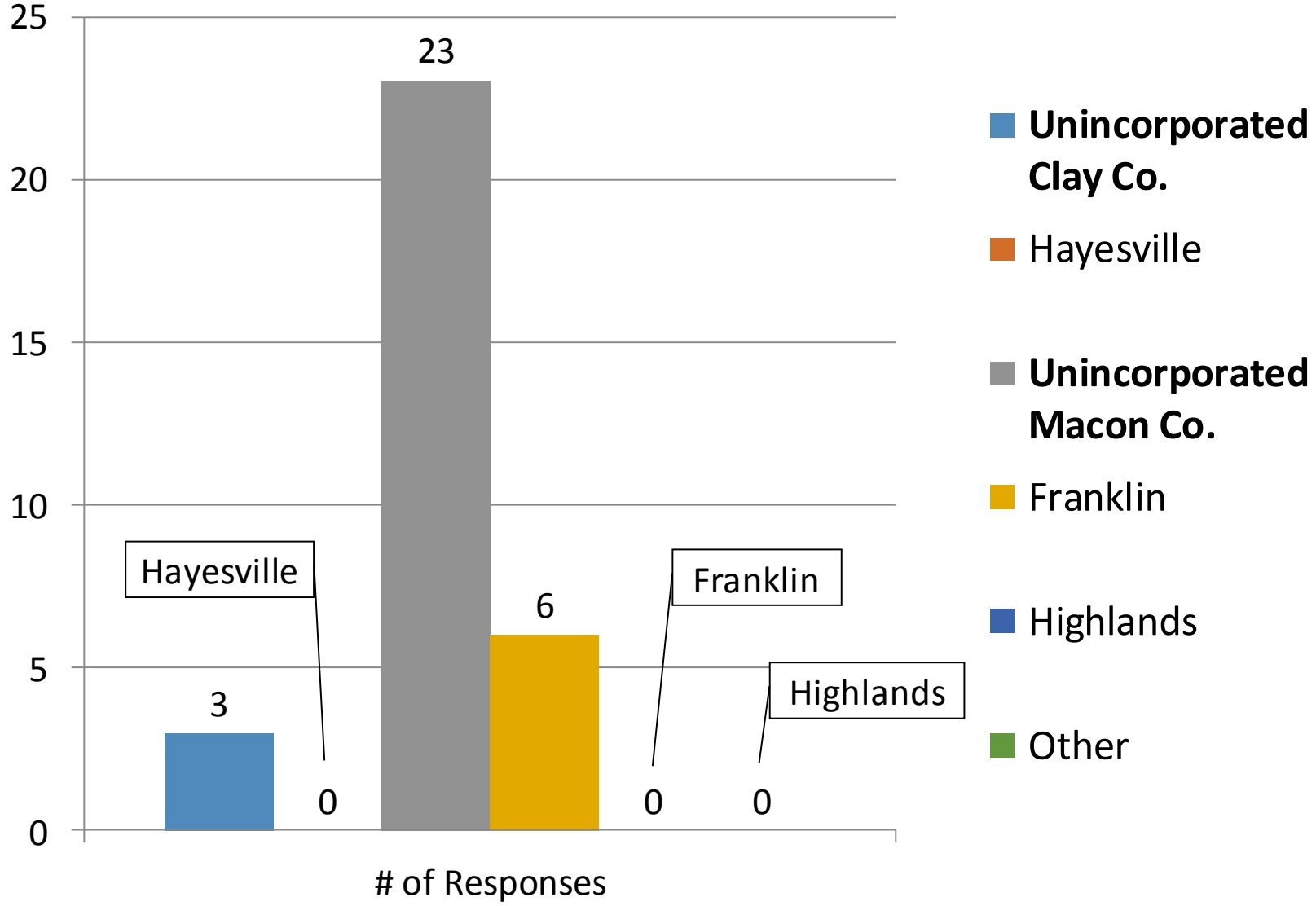
ATKINS

Public Participation Survey Highlights

- 81% of respondents are interested in making their homes more resistant to hazards
- 45% have already taken action to make their homes more hazard resistant
- 74% do not who to contact regarding risk reduction

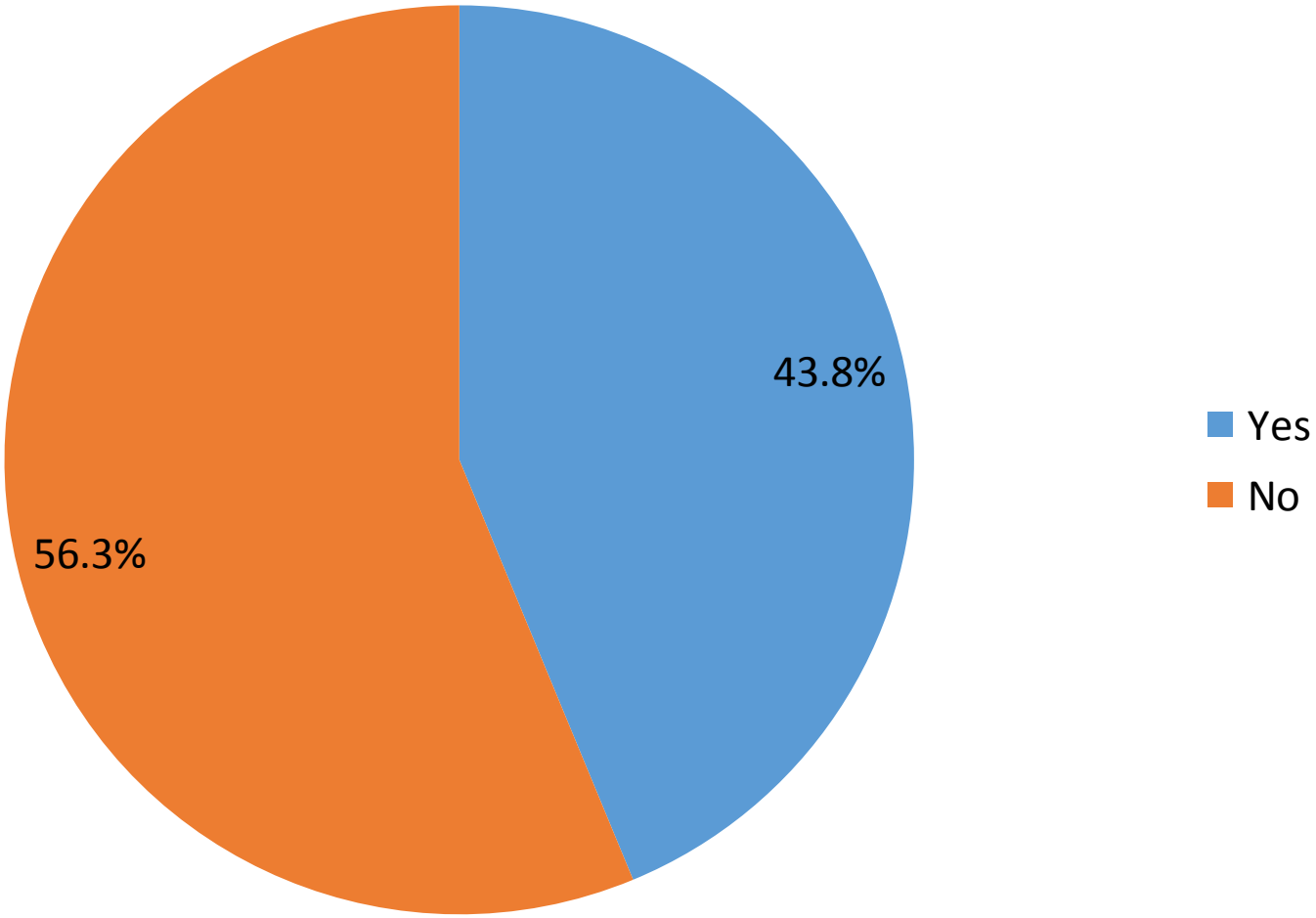
ATKINS

1. Where do you live?



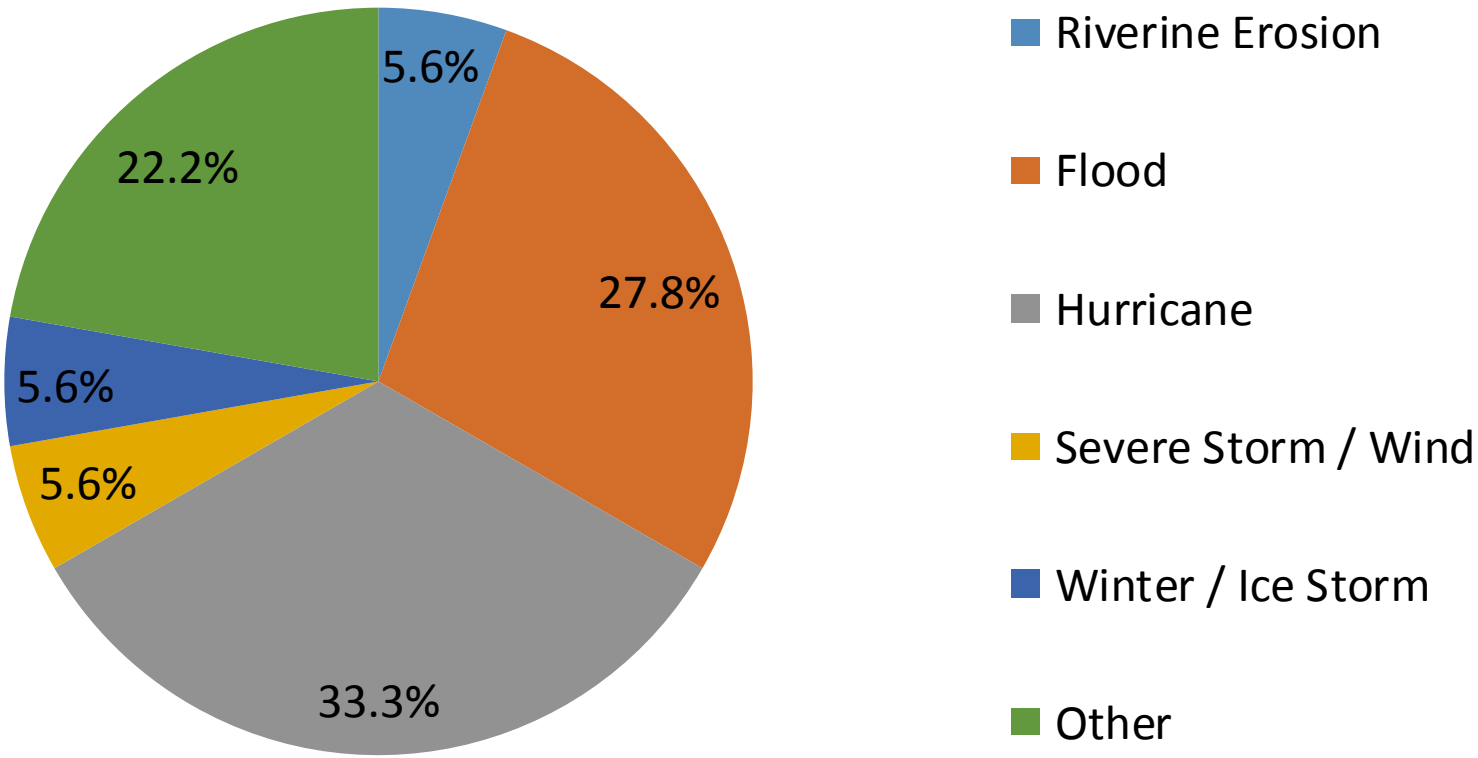
ATKINS

2. Have you experienced a disaster?



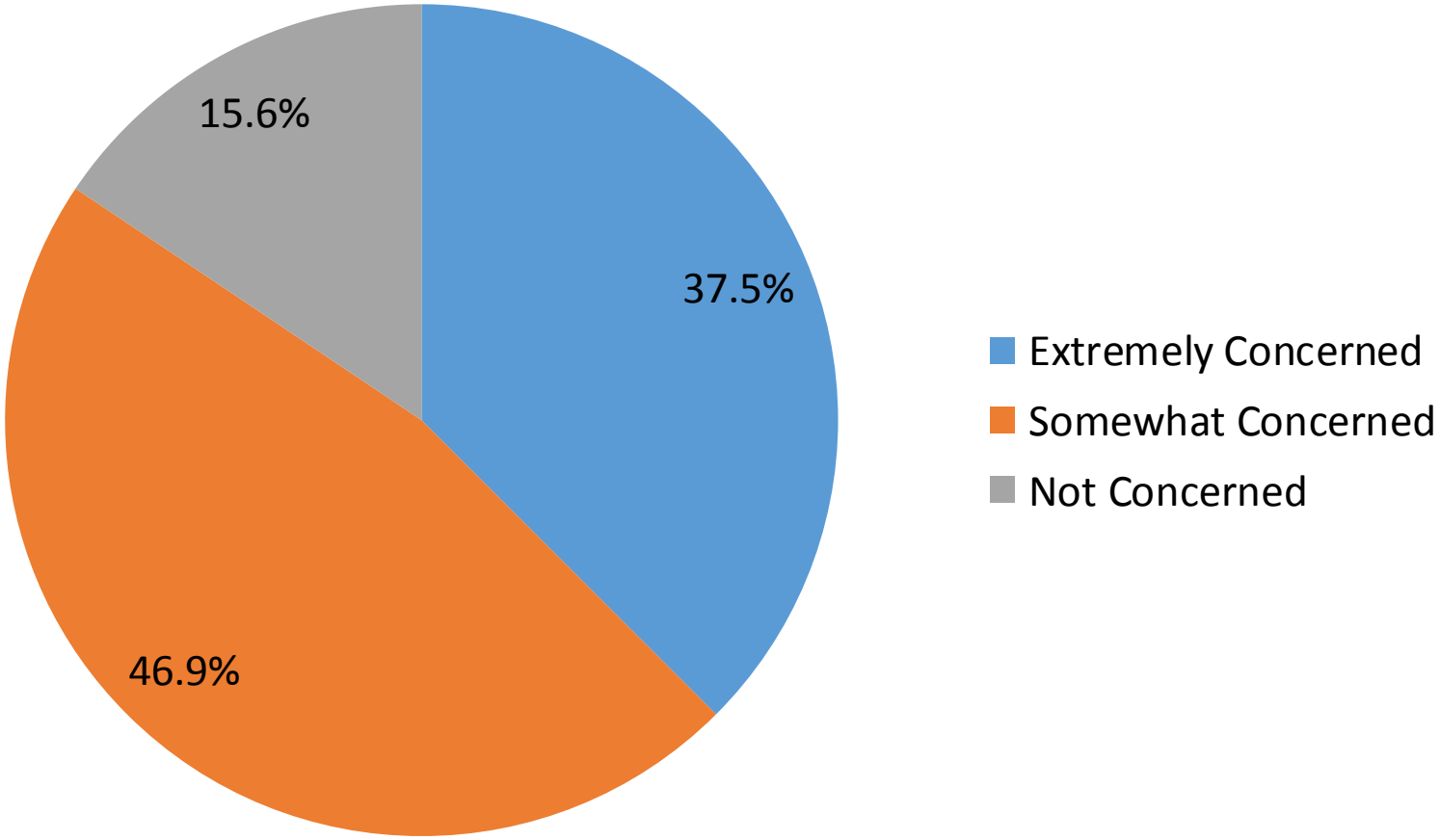
ATKINS

2. Examples of disasters experienced



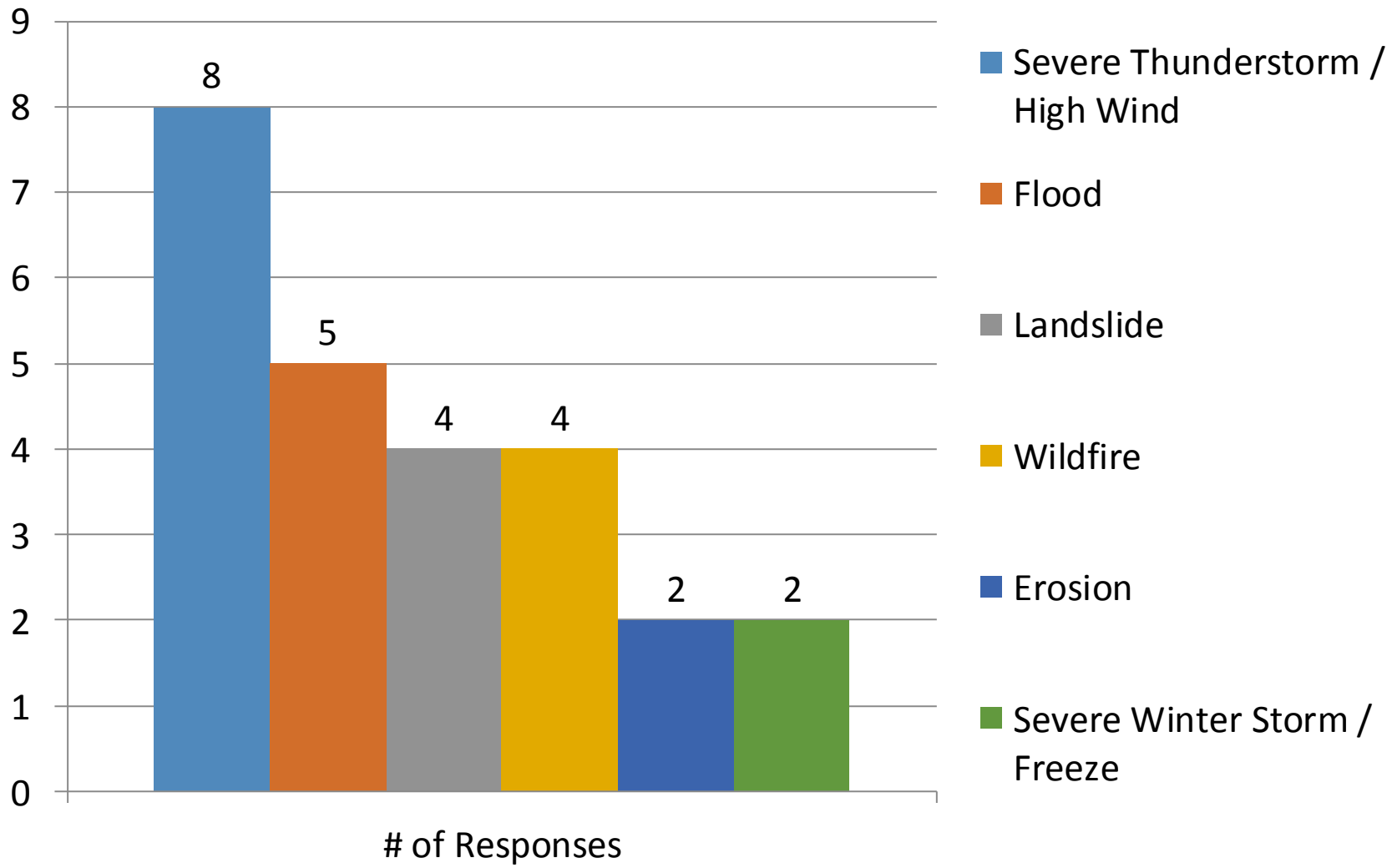
ATKINS

3. How concerned about possibility of disaster?



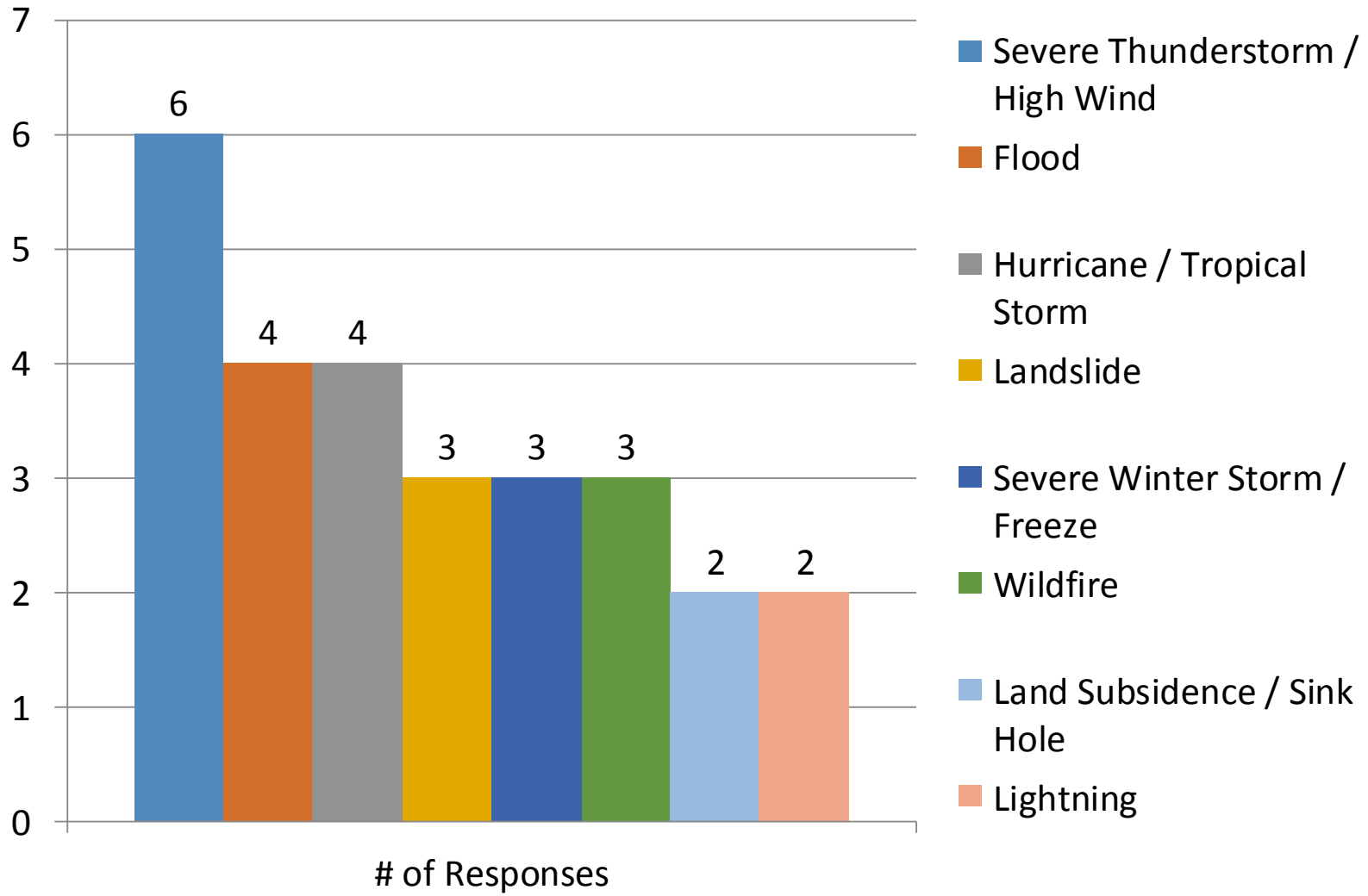
ATKINS

4. Highest hazard threat?



ATKINS

5. Second highest hazard threat?



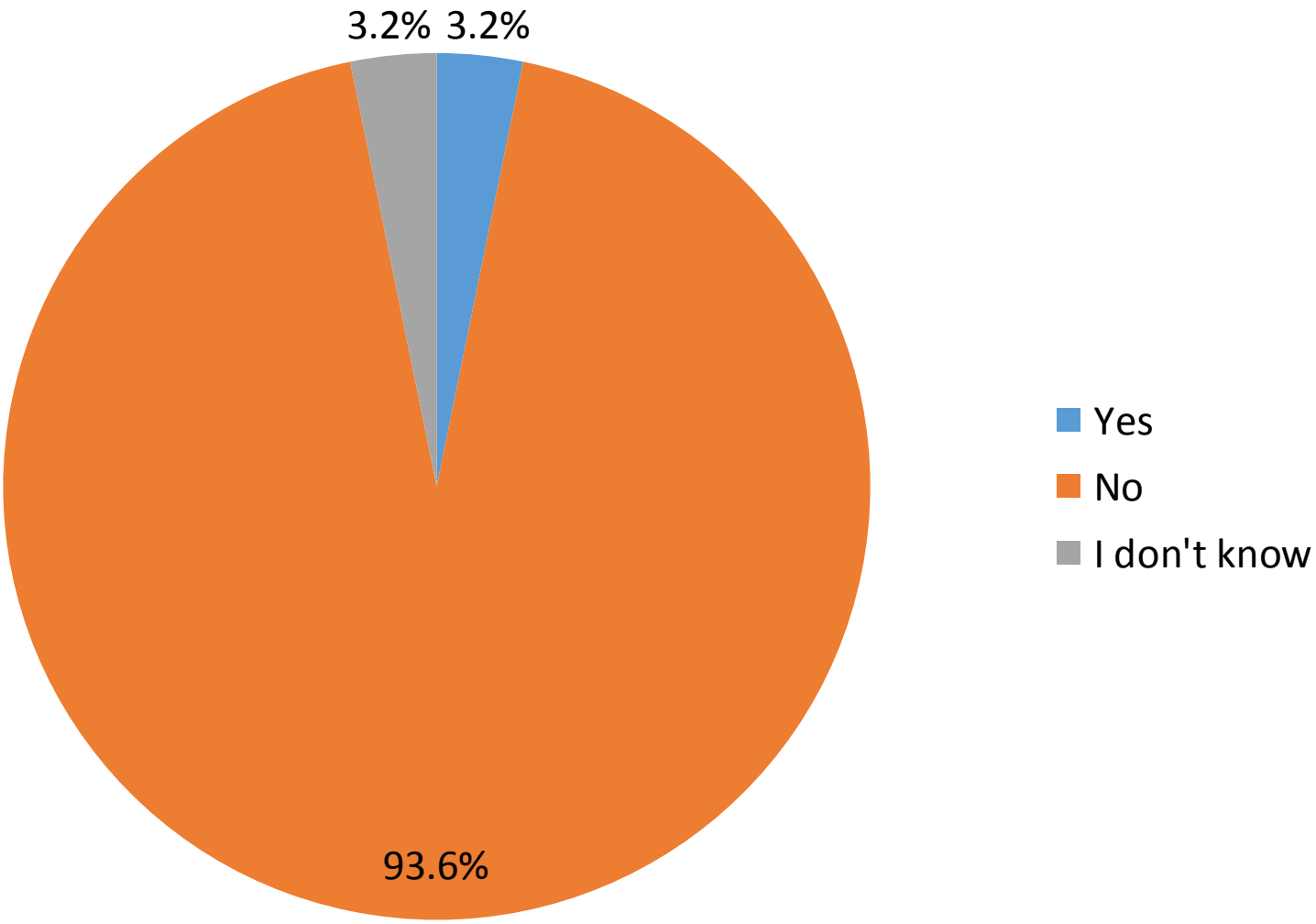
ATKINS

6. Other hazards not listed?

- Crime

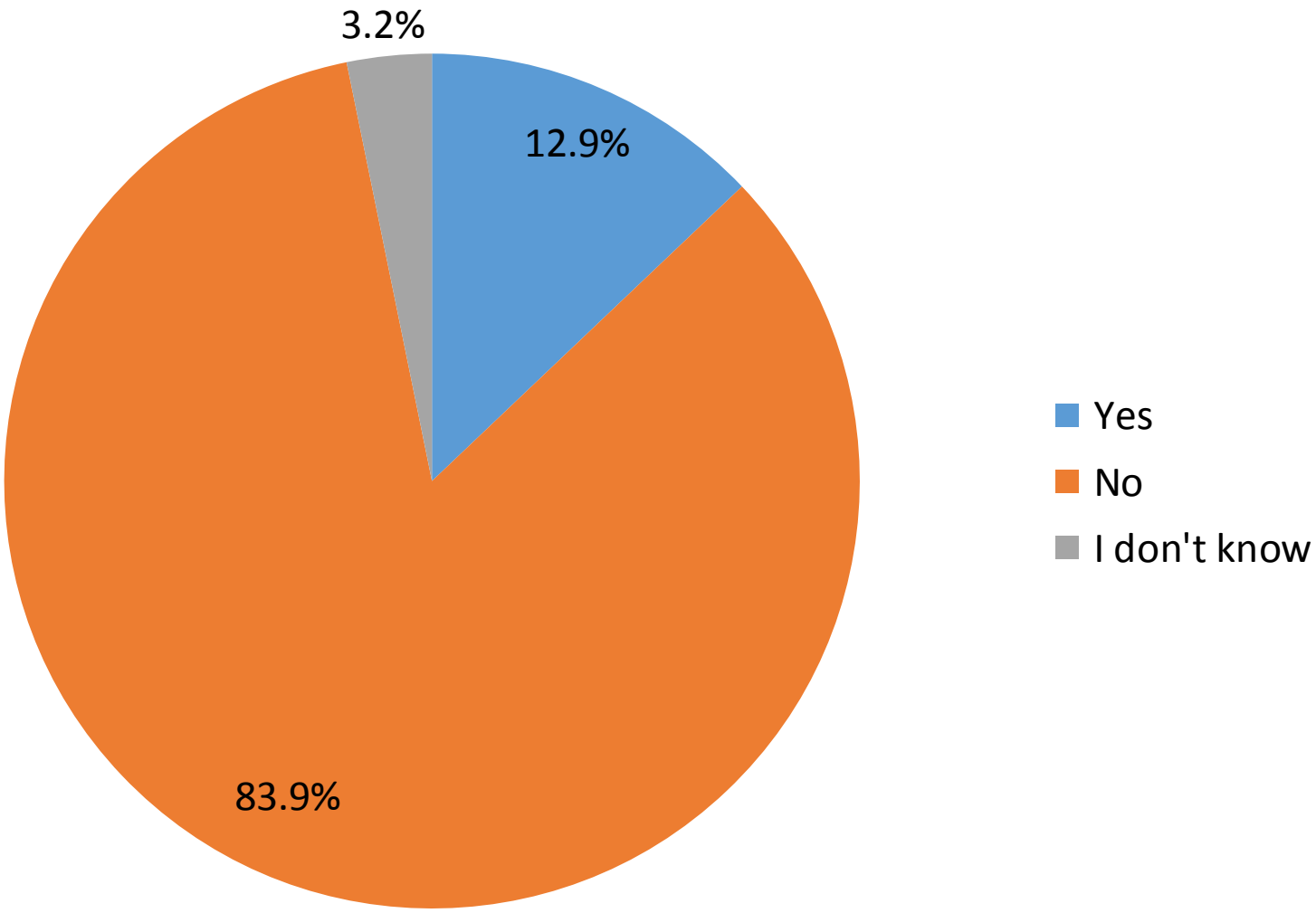
ATKINS

7. Is your home in a floodplain?



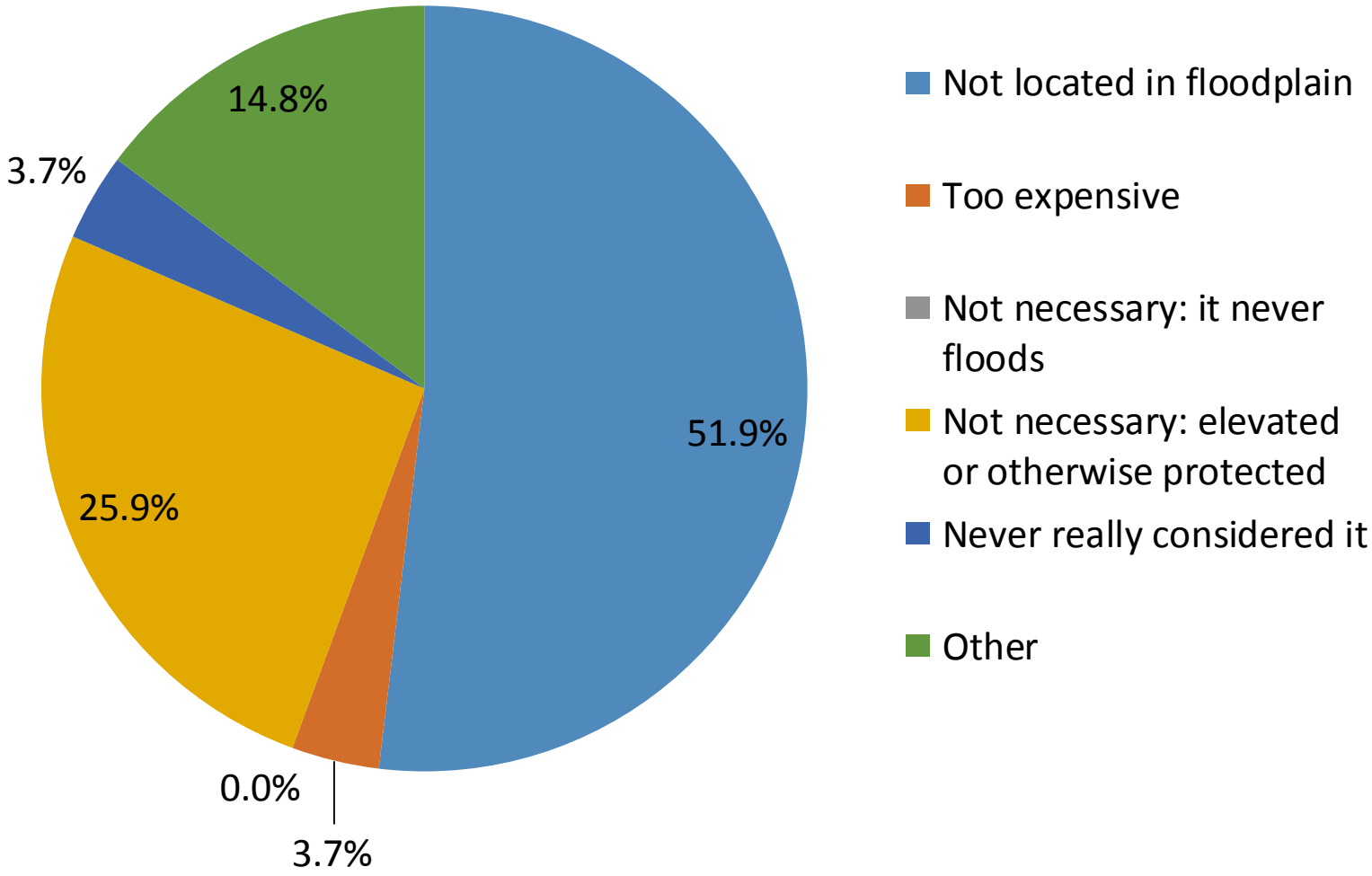
ATKINS

8. Do you have flood insurance?



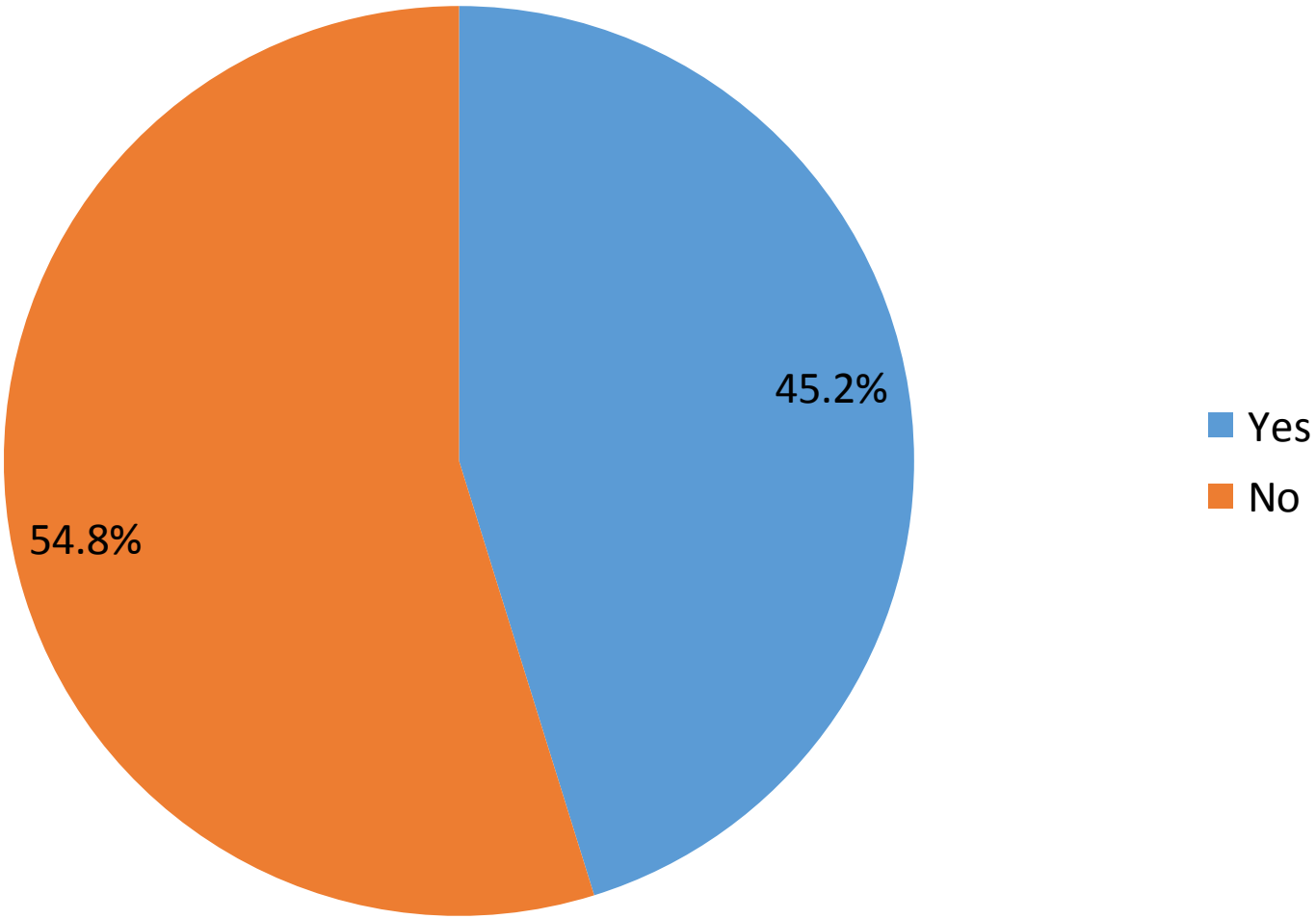
ATKINS

8. Why no flood insurance?



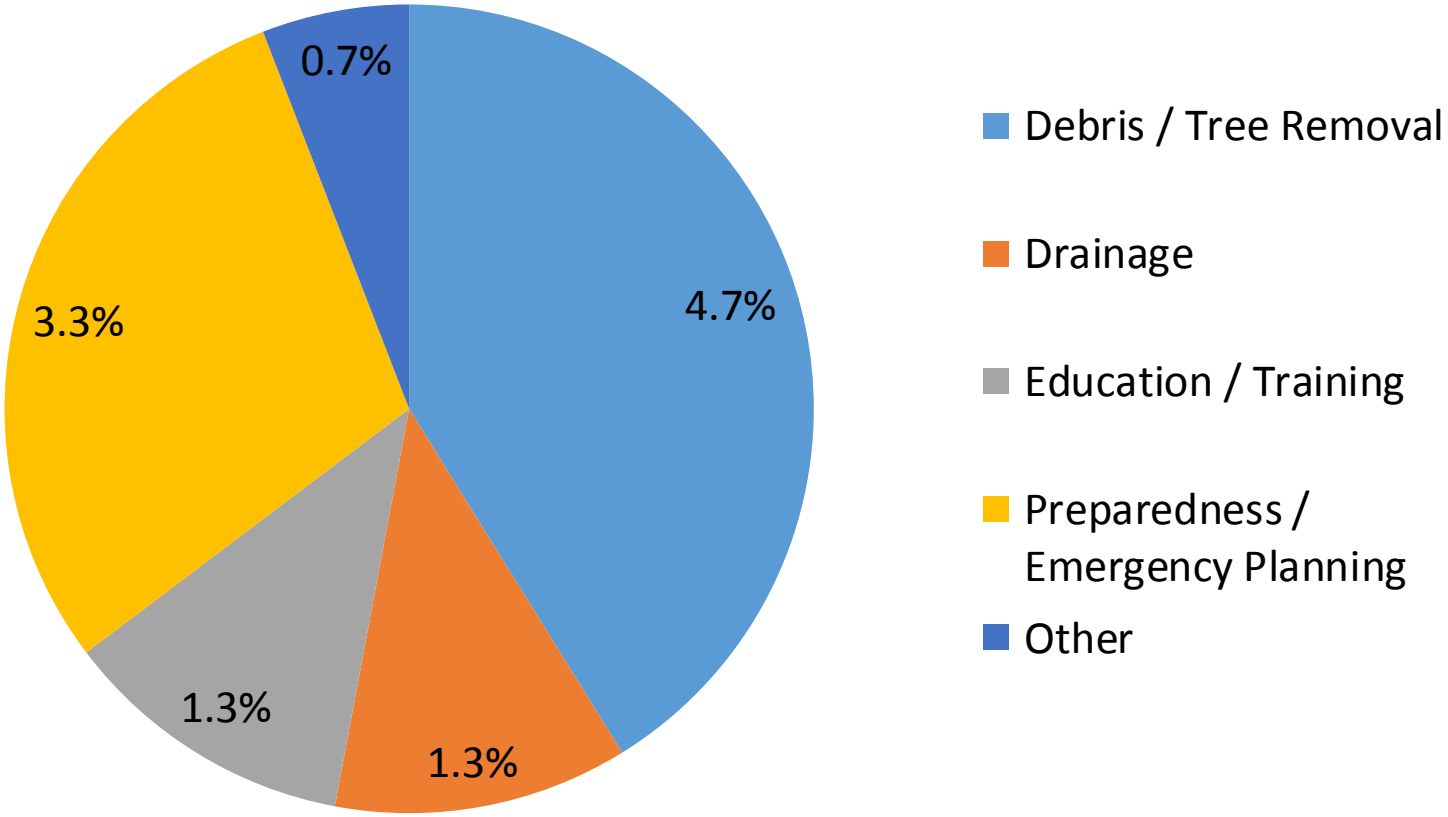
ATKINS

9. Taken action to be more hazard resistant?



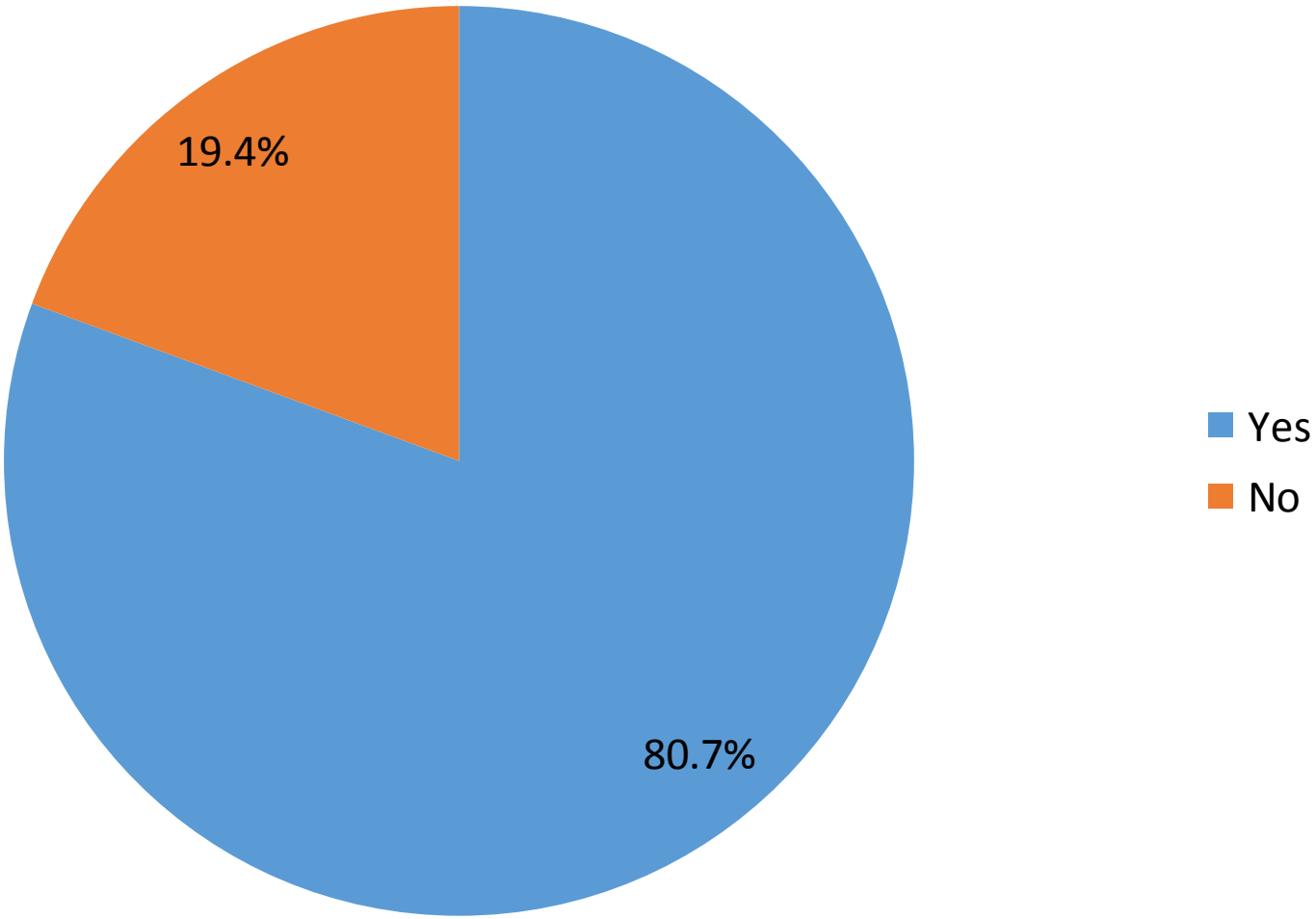
ATKINS

9. Examples of actions taken



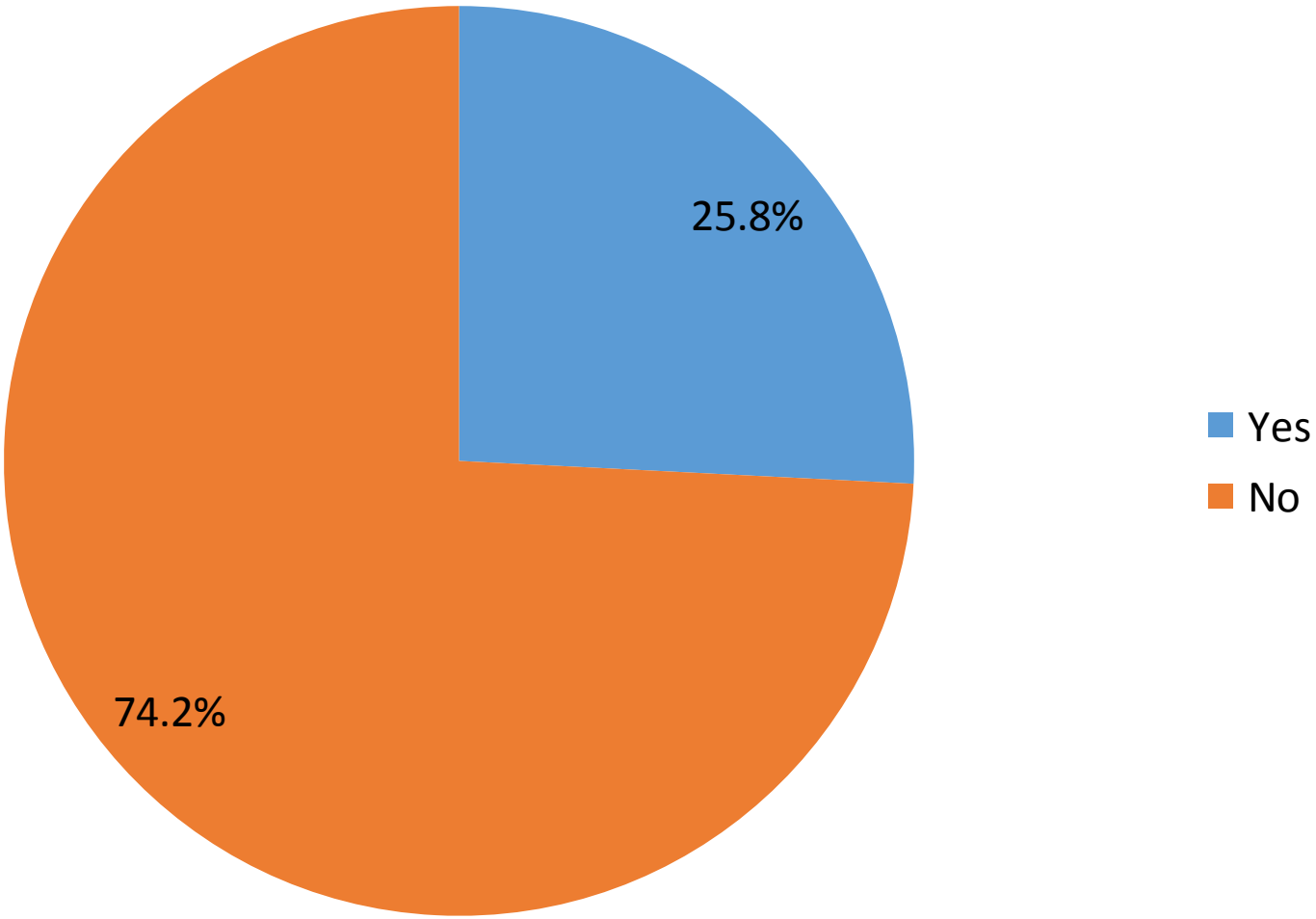
ATKINS

10. Interested in being more hazard resistant?



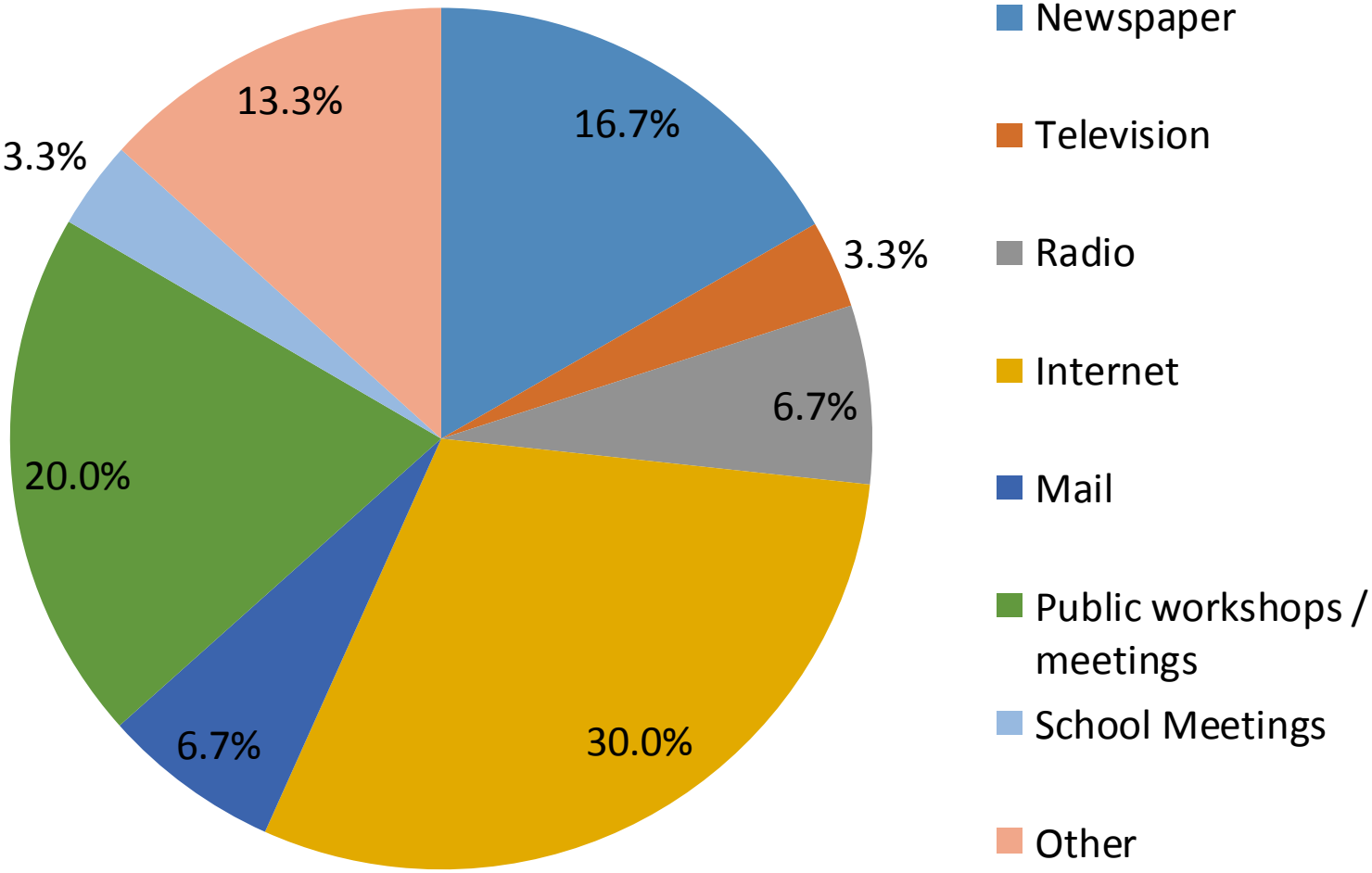
ATKINS

11. Know who to contact for reducing risks?



ATKINS

12. Most effective way to receive information?



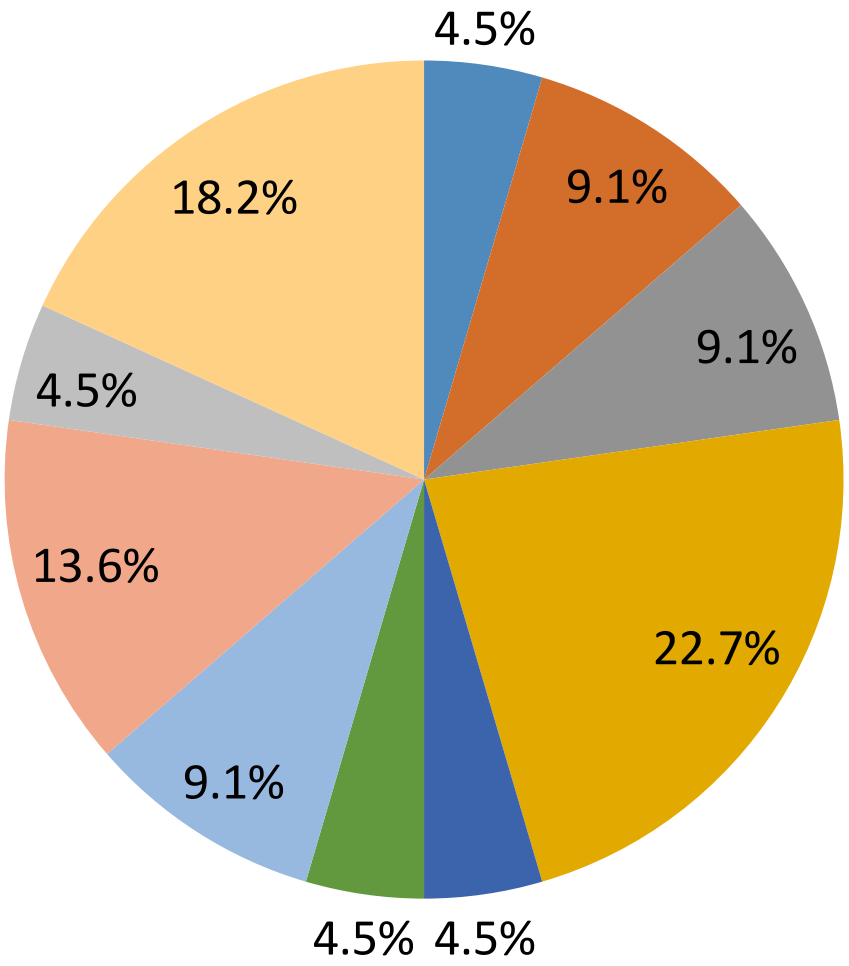
ATKINS

12. Other ways to receive information

- Email

ATKINS

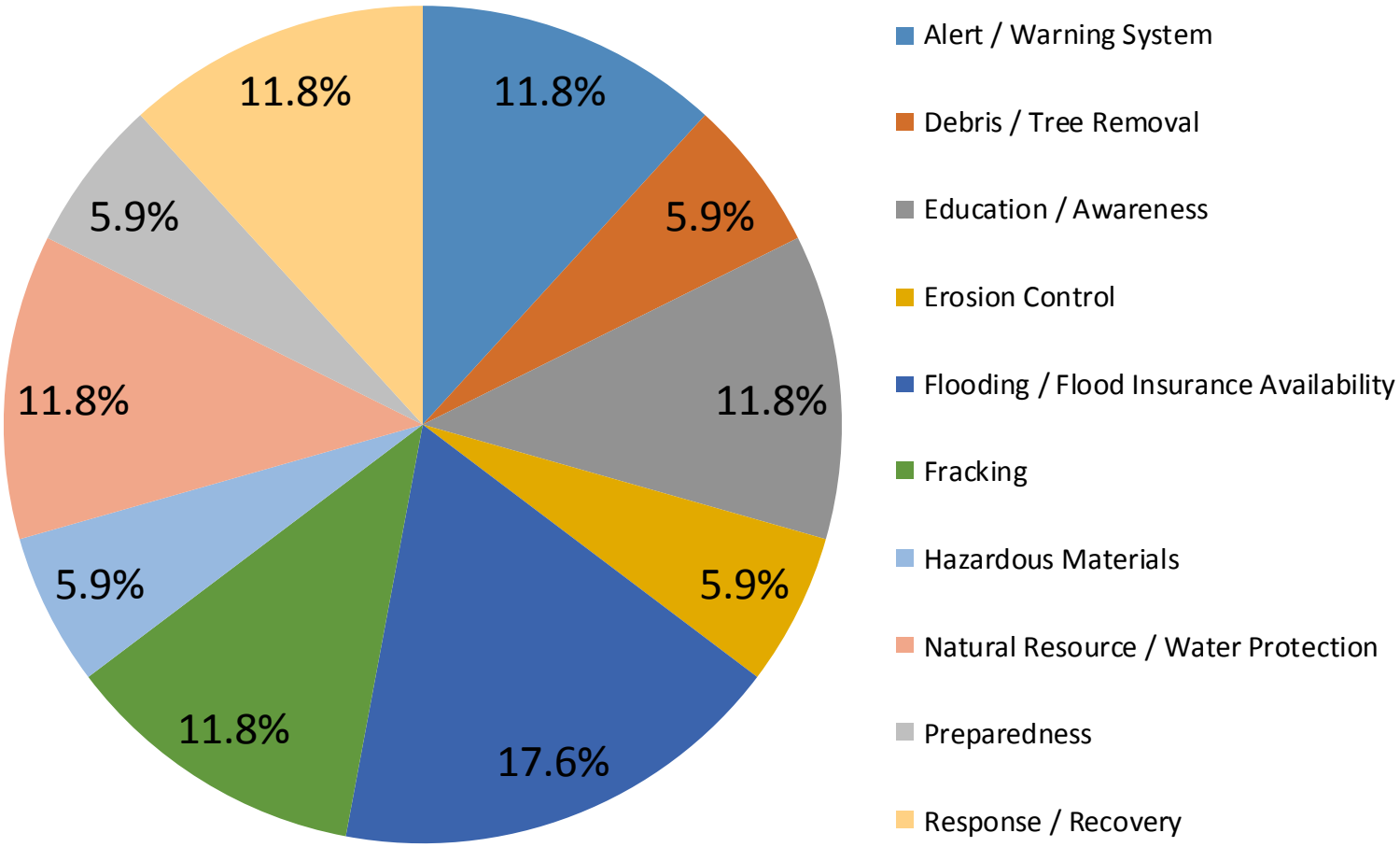
13. Steps local gov't could take to reduce risk



- Alert / Warning System
- Improve Communication / Coordination
- Debris / Tree Limb Removal
- Floodplain / Erosion / Steep Slope Regulations
- Hazard / Risk Assessment
- Natural Resource Protection
- Planning / Inspections / Enforcement
- Response / Recovery
- Improve / Retrofit Infrastructure
- Pubilc Education / Awareness

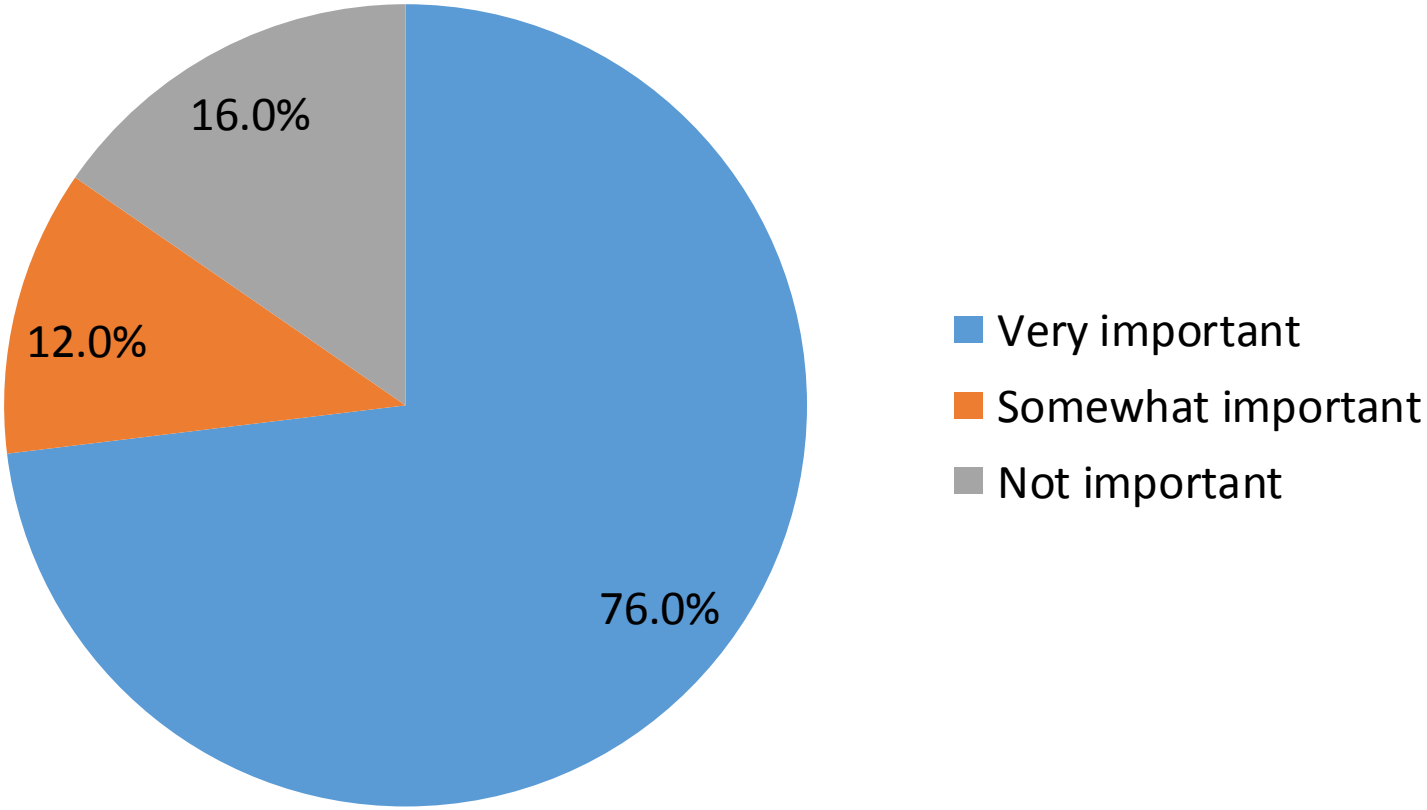
ATKINS

14. Other issues regarding risk and loss



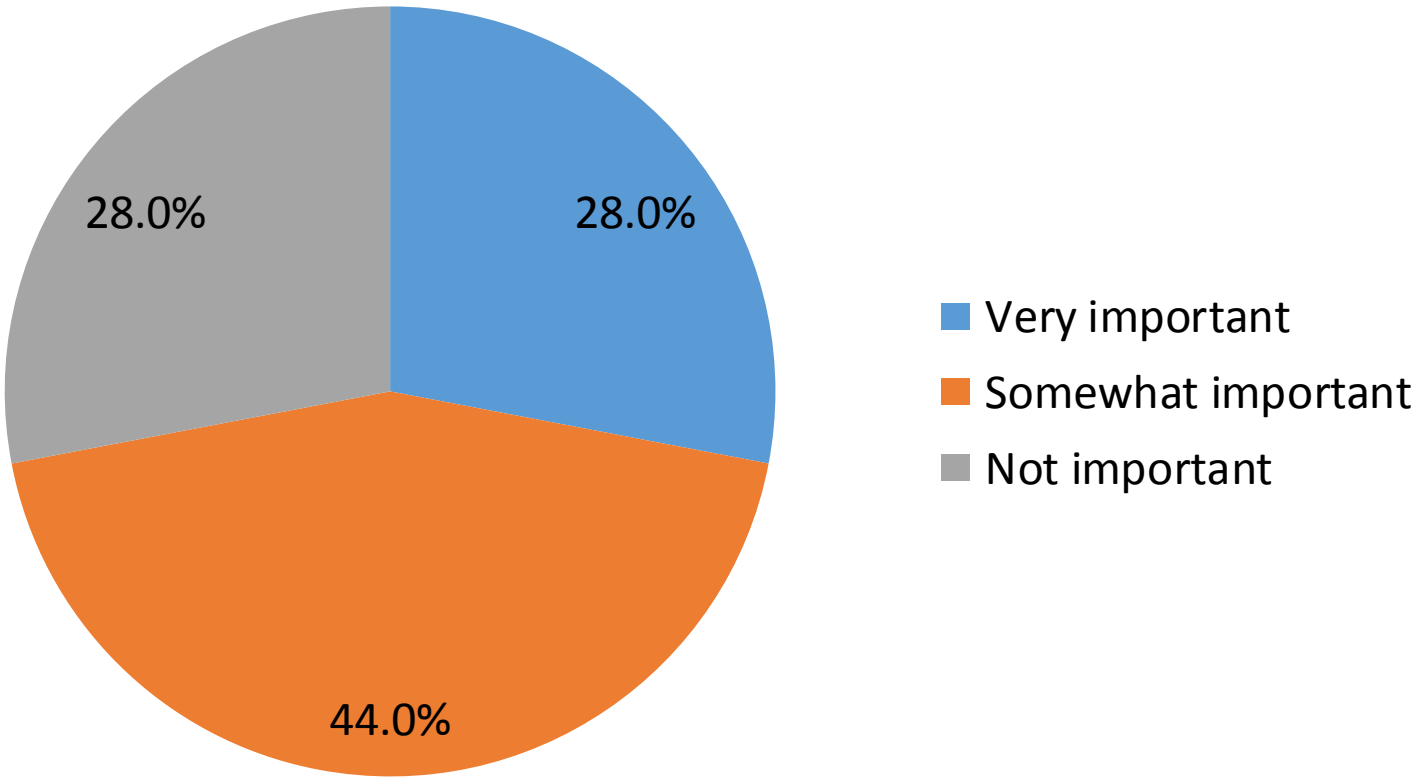
ATKINS

15. Mitigation Actions: Prevention



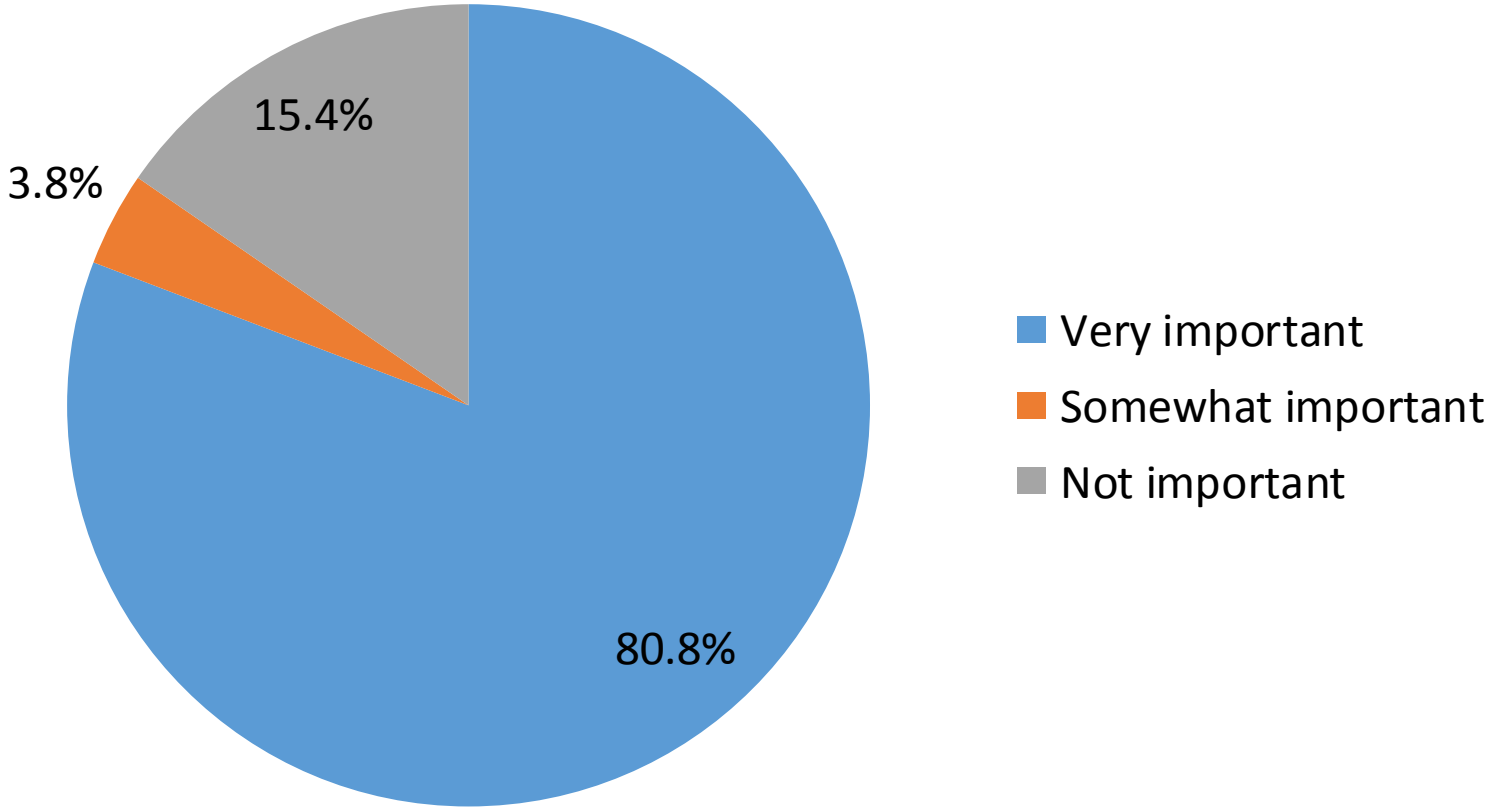
ATKINS

15. Mitigation Actions: Property Protection



ATKINS

15. Mitigation Actions: Natural Resource Protection



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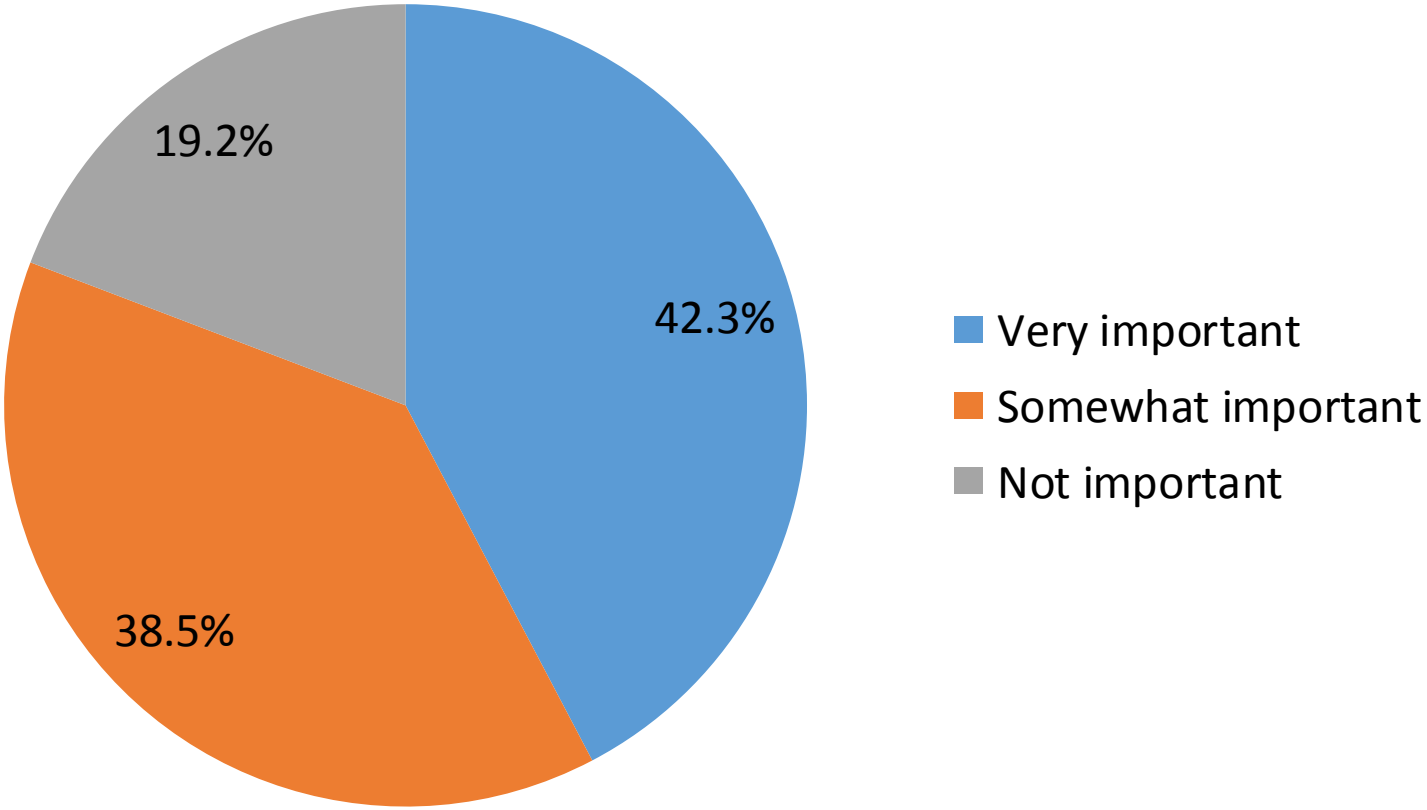
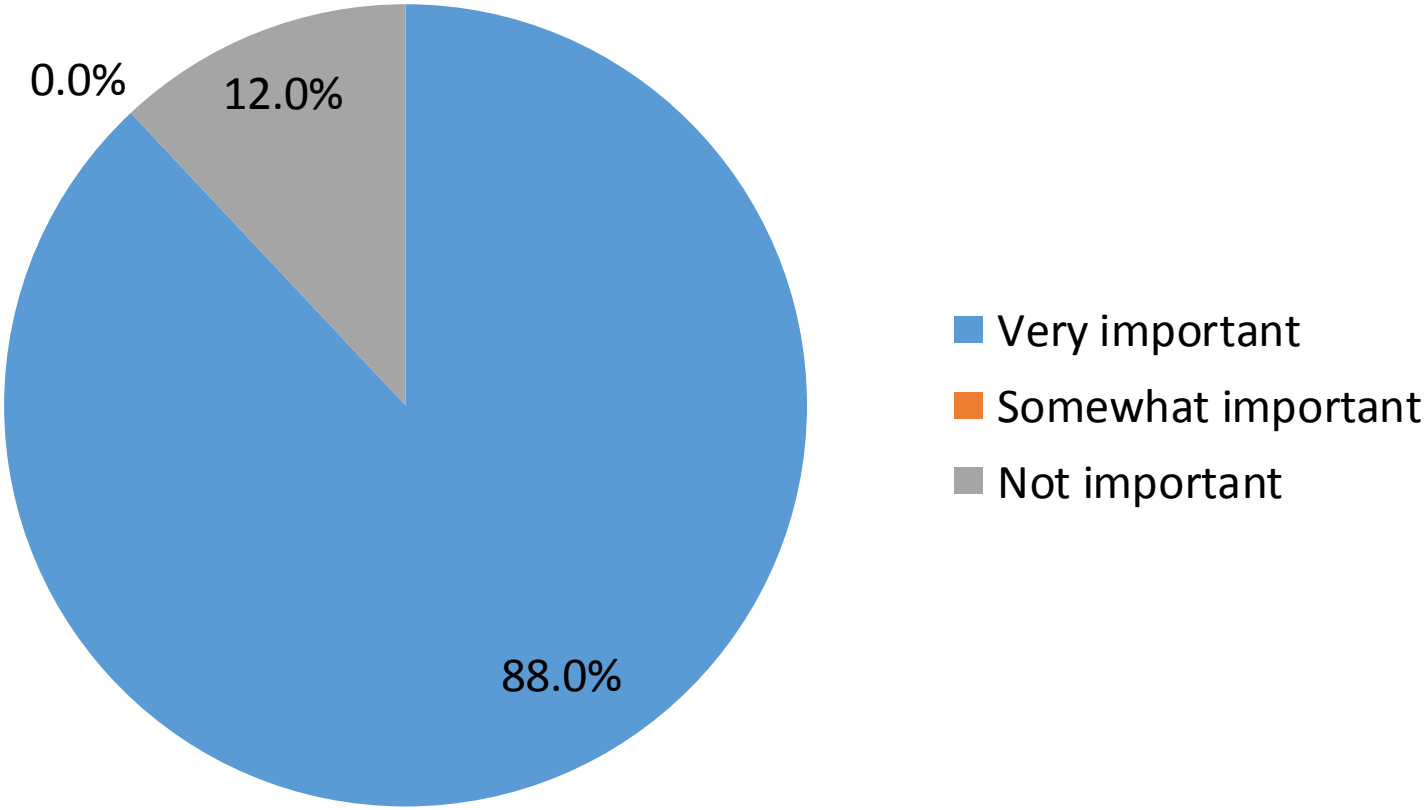
15. Mitigation Actions: Structural Projects



ATKINS

15. Mitigation Actions: Emergency Services



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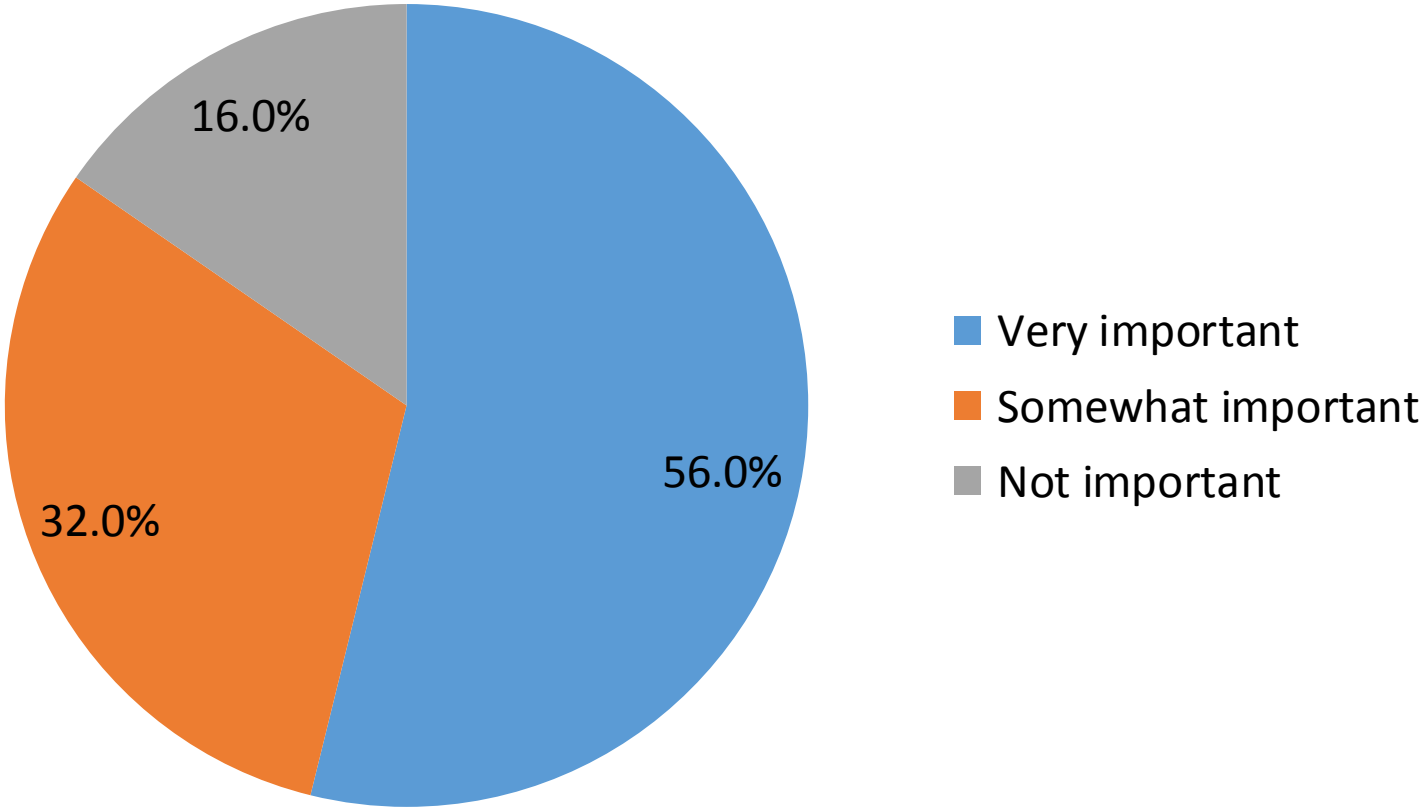
15. Mitigation Actions: Public Education & Awareness



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15. Mitigation Actions: Summary

- Highest importance
  - Emergency Services
  - Natural Resource Protection
  - Prevention
- Moderate importance
  - Public Education & Awareness
  - Structural Projects
- Lowest importance
  - Property Protection

ATKINS

Peeks Creek Landslide, Macon County, NC
Photo Source: Wikipedia

Clay Macon
Regional Hazard Mitigation Plan

Public Participation Survey Results

ATKINS