Northern Piedmont Regional Hazard Mitigation Plan
2025 UPDATE
DRAFT - JUNE 2025

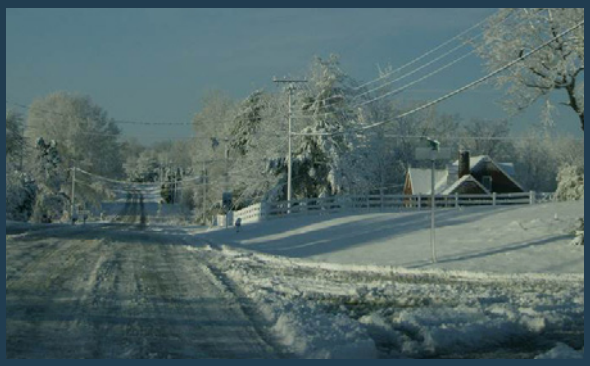


TABLE OF CONTENTS

SECTION 1
INTRODUCTION

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

- 1.1 Background
- 1.2 Purpose
- 1.3 Scope
- 1.4 Authority
- 1.5 Summary of Plan Contents

1.1 BACKGROUND

Natural hazards, such as winter storms, floods, and tornadoes, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. We must consider these hazards to be legitimate and significant threats to human life, safety, and property.

The Northern Piedmont Region is located in the north central part of North Carolina and includes Caswell, Davie, Forsyth, Rockingham, Stokes, Surry, and Yadkin counties and the municipal governments within those counties. This area is vulnerable to a wide range of natural hazards such as winter storms, severe thunderstorms, and floods. It is also vulnerable to human-caused hazards, including chemical releases and hazardous material spills. These hazards threaten the life and safety of residents in the Northern Piedmont Region and have the potential to damage or destroy both public and private property, disrupt the local economy, and impact the overall quality of life of individuals who live, work, and vacation in the region.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our communities and our citizens. By minimizing the impact of hazards upon our built environment, we can prevent such events from resulting in disasters. The concept and practice of reducing risks to people and property from known hazards is generally referred to as *hazard mitigation*.

FEMA Definition of Hazard Mitigation:
"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures (such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards) and non-structural measures (such as the adoption of sound land use policies and the creation of public awareness programs). It is widely accepted that the most effective mitigation measures are implemented at the

local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

A key component in the formulation of a comprehensive approach to hazard mitigation is to develop, adopt, and update a local hazard mitigation plan. A hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk, and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

The seven counties participating in the development of the Northern Piedmont Regional Hazard Mitigation Plan first joined together in 2014 to develop the initial version of this regional plan. Prior to that, each County was operating under individual County-level hazard mitigation plans. The plan development process for the 2025 update of the plan is detailed in Section 2: Planning Process.

This regional plan draws from each of the County plans to document the region's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, the Plan recommends specific actions to minimize hazard vulnerability and protect residents from losses to those hazards that pose the greatest risk. These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting, and acquisition projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to reduce the region's vulnerability to identified hazards. The Plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

1.1 The Disaster Mitigation Act and the Flood Insurance Reform Acts

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

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

The Northern Piedmont Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region 4~~IV~~ and the North Carolina Division of Emergency Management (NCEM) to ensure that the Plan meets all applicable FEMA and state requirements for hazard mitigation plans. A *Local Mitigation Plan Review Tool*, found in Appendix C, provides a summary of federal and state minimum standards and notes the location where each requirement is met within the Plan.

1.2 PURPOSE

The purpose of the Northern Piedmont Regional Hazard Mitigation Plan is to:

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

1.3 SCOPE

The focus of the Northern Piedmont Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the Northern Piedmont 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 Caswell, Davie, Forsyth, Rockingham, Stokes, Surry, and Yadkin as well as their incorporated jurisdictions. **Table 1.1** indicates the participating jurisdictions.

TABLE 1.1: PARTICIPATING JURISDICTIONS IN THE NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLAN

Caswell County	
Milton	Yanceyville
Davie County	
Bermuda Run	Mocksville
Cooleemee	
Forsyth County	
Bethania	Rural Hall
Clemmons	Tobaccoville
Kernersville	Walkertown
Lewisville	Winston-Salem
Rockingham County	
Eden	Reidsville

Madison	Stoneville
Mayodan	Wentworth
Stokes County	
Danbury	Walnut Cove
King	
Surry County	
Dobson	Mount Airy
Elkin	Pilot Mountain
Yadkin County	
Boonville	Jonesville
East Bend	Yadkinville

1.4 AUTHORITY

The Northern Piedmont Regional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local mitigation plans and has been adopted by each participating county and local jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules, and legislation:

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

1.5 SUMMARY OF PLAN CONTENTS

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

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

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

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

SECTION 2
PLANNING PROCESS

This section describes the planning process undertaken to develop the 2025 update of the Northern Piedmont Regional Hazard Mitigation Plan. Copies of the 2020 plan can be obtained by contacting each county emergency management office or NCEM's Hazard Mitigation Planning Section.

This section consists of the following nine subsections:

- 2.1 Overview of Hazard Mitigation Planning
- 2.2 History of Hazard Mitigation Planning in the Northern Piedmont Region
- 2.3 Updating the Plan in 2025
- 2.4 The Northern Piedmont Regional Hazard Mitigation Planning Team
- 2.5 Community Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Involving the Stakeholders
- 2.8 Documentation of Plan Progress
- 2.9 City of Winston-Salem and Forsyth County CRS Planning Process Documentation

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

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

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

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

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

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

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

The advantages of mitigation planning extend beyond merely reducing vulnerability to hazards. Measures such as acquiring or regulating land in high-risk areas can help achieve multiple community objectives (commonly referred to as co-benefits), including preserving open spaces, maintaining environmental health, and enhancing recreational opportunities. Therefore, it is crucial that any local mitigation planning process is integrated with other ongoing local planning efforts. Proposed mitigation strategies must also consider existing community goals and initiatives that could either support or impede their future implementation.

2.2 HISTORY OF HAZARD MITIGATION PLANNING IN THE NORTHERN PIEDMONT REGION

Prior to the development of the Northern Piedmont Regional Hazard Mitigation Plan in 2014, each of the seven (7) counties and their respective jurisdictions participating in the regional plan had previously adopted separate county-level hazard mitigation plans. Each of the county-level plans was developed using the multi-jurisdictional planning process recommended by FEMA. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below in **Table 2.1** below.

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

Plan Name	Plan Date	Jurisdictions Includes
Caswell County HMP	December 2011	Towns of Milton, Yanceyville
Davie County Multi-Jurisdictional HMP	February 2011	Towns of Bermuda Run, Cooleemee, Mocksville
Forsyth County Multi-Jurisdictional HMP	September 2010	City of Winston-Salem; Towns of Bethania, Kernersville, Lewisville, Rural Hall, Walkertown; Villages of Clemmons, Tobaccoville

Plan Name	Plan Date	Jurisdictions Includes
Rockingham County HMP	June 2011	Cities of Eden, Reidsville; Towns of Madison, Mayodan, Stoneville, Wentworth
Stokes County HMP	July 2011	City of King; Towns of Danbury, Walnut Cover
Surry County HMP	March 2012	City of Mount Airy; Towns of Dobson, Elkin, Pilot Mountain
Yadkin County Multi-Jurisdictional HMP	November 2011	Towns of Boonville, East Bend, Jonesville, Yadkinville

In 2014, all participating jurisdictions collaborated to create a regional plan. No new jurisdictions joined the process, and all those involved in previous planning efforts contributed to the development of the 2014 regional plan. This approach aimed to streamline planning for the jurisdictions in the Northern Piedmont Region, allowing resources to be shared among participants and reducing the administrative burdens on smaller, lower capacity communities.

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

2.3 UPDATING THE PLAN IN 2025

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

According to the scope of work, the consultant team adhered to the mitigation planning process recommended by FEMA (Publication Series 386 and the Local Mitigation Plan Review Guide) as well as guidelines from North Carolina Emergency Management (NCEM) mitigation planning staff.

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

TABLE 2.2 FEMA HAZARD MITIGATION PLANNING REQUIREMENTS AND THE CRS 10-STEP PLANNING PROCESS REFERENCE TABLE

FEMA Disaster Mitigation Act Requirement	CRS Activity 510 Planning Requirement
Phase I – Planning Process	
§201.6(c)(1)	Step 1: Organize to Prepare the Plan
§201.6(b)(1)	Step 2: Involve the Public
§201.6(b)(2) & (3)	Step 3: Coordinate

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

TABLE 2.3 COMMUNITY WILDFIRE PROTECTION PLAN PROCESS INTEGRATION REFERENCE TABLE

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

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

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

The process used to prepare this plan included twelve major steps that were completed over the course of approximately eleven months beginning in June 2024. Each of these planning steps (illustrated in **Figure 2.1**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR THE NORTHERN PIEDMONT REGION

2.4 THE NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLANNING TEAM

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

Starting in Juily 2024, the members of the Regional Hazard Mitigation Planning Committee engaged in regular discussions, local meetings, and planning workshops to address and complete tasks related to the preparation of the plan. This collaborative group coordinated all aspects of plan development and provided invaluable input throughout the process. In addition to their regular meetings, committee members maintained ongoing communication and were kept informed via an email distribution list.

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

- Participate in Regional Hazard Mitigation Planning Team meetings and workshops,
- Provide best available data as required to update the risk assessment portion of the plan,
- Provide information that will help update the Capability Assessment section of the plan and provide copies of any mitigation or hazard-related documents for review and incorporation into

the plan,
- Support the update of the Mitigation Strategy, including the review, update and adoption of regional goal statements,
- Help update existing mitigation actions and design and propose any appropriate new mitigation actions for their department/agency for incorporation into the Mitigation Action Plan,
- Review and provide timely comments on all study findings and draft plan deliverables, and
- Support the adoption of the 2025 *Northern Piedmont Regional Hazard Mitigation Plan.*

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

TABLE 2.4: MEMBERS OF THE NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLANNING TEAM

NAME	DEPARTMENT / AGENCY / TITLE	Internal Kickoff Mtg 6/4/24	Stakeholder Kickoff Mtg 7/25/24	HIRA Mtg 12/5/24	Mitigation Mtg 3/5/25	Final Mtg 6/5/25
Caswell County and Municipalities						
Lynch, Barry	Caswell County, Director of Emergency Services	X	X			
Davie County and Municipalities						
Ashburn, Joseph*	ES Director, Davie County					
Smit, Jeff	Town of Cooleemee, Mayor				X	
Forsyth County and Municipalities						
Adams, Marissa	Forsyth County, Social Services Deputy Director			X		
Austin, Emily	Forsyth County, Public Health					X
Bowen, Shaylee	Forsyth County, MapForsyth Geographic Information Officer		X	X		
Brinkley, Andy	City of Winston-Salem/Forsyth County, Incident Management Team		X		X	
Brock, Michelle	City of Winston-Salem/Forsyth County, Emergency Manager & Coordinator/Planning Officer		X	X	X	
Brown, Alston	Town of Rural Hall, Public Information Officer		X	X	X	
Cordell, Leigha	City of Winston-Salem, Emergency Management Coordinator/Administration Officer		X			
Corder, Dan	Village of Tobaccoville, Village Administrator		X	X		

NAME	DEPARTMENT / AGENCY / TITLE	Internal Kickoff Mtg 6/4/24	Stakeholder Kickoff Mtg 7/25/24	HIRA Mtg 12/5/24	Mitigation Mtg 3/5/25	Final Mtg 6/5/25
Correa-Vega, Javier	City of Winston-Salem, Language Access Coordinator			X		
Craps, Rebecca	Forsyth County, NC Cooperation Extension Agent		X			
Gendy, Moriah	City of Winston-Salem, Food Resilience Program Manager		X			
Gunnell, Mike	Village of Clemmons, Village Manager		X			
Haney, Kyle	Forsyth County, Deputy County Manager		X			
Huff, Keith	City of Winston-Salem, Director of Field Operations		X			
Keller, Karen	Town of Bethania, Town Clerk		X			
Moore, Doug	Village of Clemmons, Planning & Community Development Director				X	
Moore, Will	Forsyth County, MapForsyth GIS Coordinator		X		X	
Patterson, Ross	City of Winston-Salem, Emergency Management Coordinator/Logistics Officer		X	X		
Simon, Mike	Town of Rural Hall, Fire Chief		X			
Smith, Brock	Forsyth County, Deputy Fire Chief/Fire Marshal					X
Snow, Scott	Town of Walkertown, Town Manager		X			
Thompson, Bob	City of Winston-Salem, Language Access Coordinator			X		X
Tolbert, Stacy	Town of Lewisville, Town Planner		X		X	
Tuttle, Brian	Forsyth County, MapForsyth GIS Developer			X	X	
Wade, Bobby	City of Winston-Salem, Assistant Chief of Fire Operations					X
Rockingham County and Municipalities						
Brooks, Jay	Rockingham County, Assistant Fire Marshall/ Assistant Emergency Management Coordinator	X				

NAME	DEPARTMENT / AGENCY / TITLE	Internal Kickoff Mtg 6/4/24	Stakeholder Kickoff Mtg 7/25/24	HIRA Mtg 12/5/24	Mitigation Mtg 3/5/25	Final Mtg 6/5/25
Stokes County and Municipalities						
Gentry, Brandon	Stokes County, Director of Emergency Services		X	X	X	
Surry County and Municipalities						
Burchett, Alison	Surry County, GIS Specialist				X	
Cornelison, Brent	Town of Elkin, Town Manager		X			
Gardner, Adrienne	Surry County, Development Services Director				X	
Harris, Sarah	Town of Elkin, Town Planner				X	
Irvine, Kimberly	Surry County, Director of Social Services		X			
Isaacs, Byron	Surry County, Emergency Management Coordinator	X	X	X	X	
Love, Austin	Surry County, Health & Nutrition Center Chief Data Analyst		X	X	X	
Needham, Marty	Surry County, Director of Facilities		X			
Utt, Holly	Town of Pilot Mountain, Town Manager				X	
Vanhoy, Joey	Town of Elkin, Police Chief		X			
Willard, Allie	Surry County, Health & Nutrition Center Health Educator		X			
Williams, Wendy	Surry County, GIS Land Records Coordinator		X	X	X	
Wilson, Kevin	Town of Elkin, Fire Chief		X			
Yadkin County and Municipalities						
Bolden, Chris	Yadkin County, Emergency Medical Services Assistant Director				X	
Anderson, Brittany	Yadkin County, Planning & Zoning Supervisor				X	
Detsch, Meredith	Town of Yadkinville, Planning Director				X	
Vestal, Keith	Yadkin County, Emergency Services Director		X	X	X	
Other Stakeholders						
Armstrong, Maggie	Piedmont Triad Regional Council		X			

NAME	DEPARTMENT / AGENCY / TITLE	Internal Kickoff Mtg 6/4/24	Stakeholder Kickoff Mtg 7/25/24	HIRA Mtg 12/5/24	Mitigation Mtg 3/5/25	Final Mtg 6/5/25
Baker, Carl	NCEM, Hazard Mitigation Planner	X	X	X	X	
Blackwood, Trey	Greater Winston Salem Inc., Economic Development Associate			X		
Crew, Chris	NCEM, State Hazard Mitigation Officer	X	X	X		
Davis, Clarisse	UNCSA, Emergency Manager/Clery Compliance Coordinator		X	X		
DeLude, Hannah	ESP Associates, Hazard Mitigation Planner		X	X	X	
Flores, John	ESP, Associates, Hazard Mitigation Planner	X	X		X	
Garrett, Steve	NCEM, State NFIP Coordinator		X			
Jackson, Steven	NCDPS, Deputy HM Section Chief	X				
Kudla, Kymberly	FEMA, Community Planning		X			
Luck, Ashley	NCAGR, North Central EP Specialist/Planner		X	X		
McGugan, Steve	NCDPS, State Hazard Mitigation Officer	X				
Shields, Mandy	American Red Cross, Community Disaster Program Manager		X	X	X	
Shull, Adam	Piedmont Triad Regional Council		X			
Slaughter, Nathan	ESP Associates, Hazard Mitigation Dept. Manager	X	X	X	X	
Stogner, Jason	WSSU, Director of Emergency Management		X			
Tatum, Tyres	NCEM, Hazard Mitigation Planner			X		
Webster, Andrea	NCORR, Resilience Policy Advisor		X	X		
Wood, Joel	NCDPS, Area 9 Coordinator		X		X	

*Davie County staff had conflicts with each of the meetings in the planning process but participated by providing suggestions and comments on the plan, updates to mitigation actions and the capability assessment via email and phone conversations.

Table 2.5 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 officials

to represent them at in-person meetings, each was still contacted throughout the planning process and participated by providing suggestions and comments on the plan, updates to mitigation actions and the capability assessment via email and phone conversations.

TABLE 2.5: MEMBERS DESIGNATING REPRESENTATIVES TO NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLANNING TEAM

NAME	TITLE / AGENCY
Caswell County	
Daniel-Upchurch, Daniel	Mayor, Milton
Collie, Brian	Town Manager, Yanceyville
Davie County	
Cross, Rick	Mayor, Bermuda Run
Marklin, Will	Mayor, Mocksville
Forsyth County	
Morgan, Dawn	Mayor, Kernersville
Rockingham County	
Galvan, Kathy	Mayor, Stoneville
Gorham, Donald	Mayor, Reidsville
Hall, Neville	Mayor, Eden
Lake, Dwight	Mayor, Mayodan
Paschal, Dennis	Mayor, Wentworth
Phillips, William	Mayor, Madison
Stokes County	
Barrow, Scott	City Manager, King
Barsness, Mike	Town Manager, Danbury
Greenwood, Kim	Town Manager, Walnut Cove
Surry County	
Lewis, Darren	City Manager, Mount Airy
Sedlacek, Jeff	Town Manager, Dobson
Yadkin County	
Adams, Larry	Mayor, East Bend
Benton, Vaughn	Mayor, Boonville
Pardue, Michael	Town Manager, Jonesville

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

2.4.1 Multi-Jurisdictional Participation

The *Northern Piedmont Regional Hazard Mitigation Plan* includes seven counties and thirty incorporated municipalities. To satisfy multi-jurisdictional participation requirements, each county and its

participating jurisdictions were required to perform the following tasks:

- Participate in mitigation planning workshops,
- Provide implementation status updates on previously identified mitigation actions,
- Identify completed mitigation projects (if applicable), and
- Develop and adopt (or update) their local mitigation action plan.

Each participating jurisdiction has developed a local mitigation action plan unique to their jurisdiction. This provides the means for jurisdictions to implement, monitor and track progress, and update their mitigation actions on a regular basis.

2.5 COMMUNITY MEETINGS AND WORKSHOPS

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

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

TABLE 2.6: NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLANNING COMMITTEE MEETING SUMMARY

MEETING	MEETING TOPIC	DATE	LOCATION
County Leads – Internal Kickoff	1. Introduction to project team and county leads 2. Review of mitigation, project scope, and tentative project schedule 3. Discussion on stakeholder engagement and citizen contacts	6/4/24	Virtual Microsoft Teams
HMPC Mtg #1 - Project Kick-Off	1. Introduction to DMA requirements and the planning process 2. Review HMPC responsibilities and project schedule	7/25/24	1450 Fairchild Rd. Winston-Salem, NC 27105
HMPC Mtg #2 - HIRA Mtg	1. Review Draft Hazard Identification and Risk Assessment (HIRA) 2. Review asset inventory and discuss critical facilities	12/5/24	1218 State St. Mount Airy, NC 27030

MEETING	MEETING TOPIC	DATE	LOCATION
HMPC Mtg #3 - Mitigation Strategy Mtg	1. Review Capability Assessment and Mitigation Strategies 2. Solicit comments and feedback	3/5/25	1450 Fairchild Rd. Winston-Salem, NC 27105
Forsyth County Meeting	Final opportunity for Forsyth County and municipalities within the County to review/discuss mitigation actions.	6/5/25	Forsyth County EOC

2.6 INVOLVING THE PUBLIC

44 CFR Requirement

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

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

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

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

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

TABLE 2.7: NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLAN UPDATE PUBLIC ENGAGEMENT OPPORTUNITIES AND MEASURES

OUTREACH TYPE	OUTREACH DESCRIPTION	DATE	LOCATION
Public Survey	• Shared online via municipal and county websites	-	Online Survey Planet

OUTREACH TYPE	OUTREACH DESCRIPTION	DATE	LOCATION
	• Shared in-person at government and community facilities • Respondents could complete anonymously or provide name/email • Input used to inform potential mitigation strategies		
Project Website	• Provides general overview of mitigation and planning process • Summarizes project-specific timeline and tasks • Links to valuable resources including HMPC meeting minutes and presentations	-	Online ARCGIS Story Maps
Public Notices	• Project updates shared on municipal and county websites • Links provided to existing plan and draft plan	-	Online Municipal Websites
Public Meeting #1	• Introduction to DMA, CRS, and FMA requirements and planning process • Review of identified hazards and potential mitigation strategies • Review Draft Hazard Mitigation Plan and collect public comment	3/5/25	Virtual Microsoft Teams

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

2.6.1 Public Participation Survey

The Regional Hazard Mitigation Committee successfully engaged residents in the mitigation planning process through the Public Participation Survey. This survey was specifically designed to gather data and insights from residents of the participating communities.

Copies of the Public Participation Survey were distributed to the Regional Hazard Mitigation Committee, ensuring they were available for residents to complete at local public offices. Additionally, a link to an electronic version of the survey was posted on county and municipal websites. In total, 172 survey responses were received, providing valuable input for the Committee to consider updating the plan. Selected survey results are presented below. Full results can be found in Appendix D.

- Approximately 54 percent of survey respondents had been impacted by a disaster, mainly Severe Thunderstorms and High Winds, Tornadoes, and Flooding.

- Respondents ranked Severe Thunderstorms and High Winds as the highest threat to their neighborhood (41 percent), followed by Tornadoes (12 percent) and Flooding (11 percent).
- Approximately 49 percent of respondents have taken actions to make their homes more resistant to hazards and 90 percent are interested in making their homes more resistant to hazards.
- 71 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services and Prevention were ranked as the most important activities for communities to pursue in reducing risks.

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 outset of the planning process, the project consultant collaborated with the emergency management leaders from each county to initiate stakeholder outreach. At this time, a list was distributed of recommended stakeholders derived from FEMA Publication 386-1, titled *Getting Started: Building Support for Mitigation Planning,* which highlights the diverse range of stakeholders considered for participation in plan development. County emergency management leaders referenced this list while inviting stakeholders from their respective counties to engage in the planning process. Additionally, FEMA's *Local Mitigation Planning Policy Guide* (2023) and *Local Mitigation Planning Handbook* (2023) were reviewed to ensure all elements for participation were addressed.

The participating jurisdictions invited representatives from the health departments, social services departments, and planning departments to advocate for and provide insight on underserved and socially vulnerable populations in the region. In addition to staff representatives of each participating jurisdiction, the HMPC included a variety of stakeholders, including representatives from the American Red Cross, North Carolina Emergency Management (NCEM), Piedmont Triad Regional Council, NC Cooperative Extension, North Carolina Office of Recovery and Resiliency (NCORR), Winston-Salem State University, University of North Carolina School of the Arts, Greater Winston Salem Inc., the Federal Emergency Management Agency and others (see subsection 2.4 and Appendix D).

The Regional Hazard Mitigation Committee actively promoted open and widespread participation in the mitigation planning process. The region also excelled in local outreach efforts by designing and distributing the Public Participation Survey. This initiative allowed local officials, residents, businesses, academics, and other private interests in the Northern Piedmont Region to engage and provide input throughout the local mitigation planning process.

Additionally, outreach was made to the surrounding jurisdictions to offer them an opportunity to provide information relevant for the plan update and to invite them to participate in the planning

process and review drafts of the plan. Copies of the outreach made to them can be found in Appendix D.

2.8 DOCUMENTATION OF PLAN PROGRESS

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

Further details on the progress of plan implementation are provided in the capability assessment. Community capabilities have continued to improve in each participating jurisdiction through the adoption of new plans, policies, and programs that promote hazard mitigation at the local level. The status of local capabilities for these jurisdictions is outlined in *Section 7: Capability Assessment*. The participating jurisdictions demonstrate their ongoing commitment to hazard mitigation by reconvening every five years to update the plan and actively involving the public in the planning process.

2.9 CITY OF WINSTON-SALEM AND FORSYTH COUNTY CRS PLANNING PROCESS DOCUMENTATION

As a participant in the NFIP's CRS program, Forsyth County and Winston-Salem have taken additional steps during the 2025 update of this plan to meet the CRS requirements of Activity 510: Floodplain Management Planning and attempt to maximize the number of points the County receives for this activity for this plan.

County and City staff were assigned to serve on the Regional Hazard Mitigation Planning Committee. The staff members assigned to the committee actively participated in the plan update process and represent a wide range of staff expertise in the areas of mitigation techniques. The participating staff and their associated area of expertise are listed in **Table 2.8**.

TABLE 2.8: WINSTON-SALEM AND FORSYTH COUNTY STAFF MEMBERS OF THE NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLANNING TEAM AND THEIR AREA OF EXPERTISE

NAME	DEPARTMENT / AGENCY / TITLE	MITIGATION TECHNIQUE					
		PREVENTION MEASURES	PROPERTY PROTECTION	NATURAL RESOURCE PROTECTION	EMERGENCY SERVICES	STRUCTURAL PROJECTS	PUBLIC INFORMATION
Adams, Marissa	Forsyth County, Social Services						X
Brinkley, Adam	Winston-Salem Forsyth County, IMT				X		X
Brock, Michelle	Winston-Salem Forsyth County, EM	X	X	X	X	X	X
Cordell, Leigha	Winston-Salem Forsyth County, EM	X	X	X	X	X	X
Correa-Veja, Javier	Winston-Salem, Language Access						X
Gendy, Moriah	Winston-Salem, Food Resiliency	X			X		
Armstrong, Maggie	Piedmont Triad Regional Council	X	X	X		X	X
Luck, Ashley	NCAGR, North Central EP Specialist/Planner	X		X			X
Blackwood, Trey	Greater Winston Salem Inc., Economic Development Associate	X	X	X		X	X
Shields, Mandy	American Red Cross, Community Disaster Program Manager	X					X
Davis, Clarisse	UNCSA, Emergency Manager/Clery Compliance Coordinator	X	X	X	X	X	X
Stogner, Jason	WSSU	X	X	X	X	X	X

The County and City invited multiple outside stakeholders to participate in the plan update process. An email was sent to the relevant stakeholders, including neighboring jurisdictions, to invite them to attend the planning meetings. The email invitation is included in Appendix D.

SECTION 3
COMMUNITY PROFILE

This section of the plan provides a general overview of the Northern Piedmont 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 Northern Piedmont Region is situated in the northern-central part of North Carolina. All counties within this region are part of the Piedmont Triad Regional Council. For the purposes of this plan, the Northern Piedmont Region encompasses the counties of Caswell, Davie, Forsyth, Rockingham, Stokes, Surry, and Yadkin.

The region comprises a total area of over 3000 square miles. The total land area reported for each participating county is presented in **Table 3.1**.

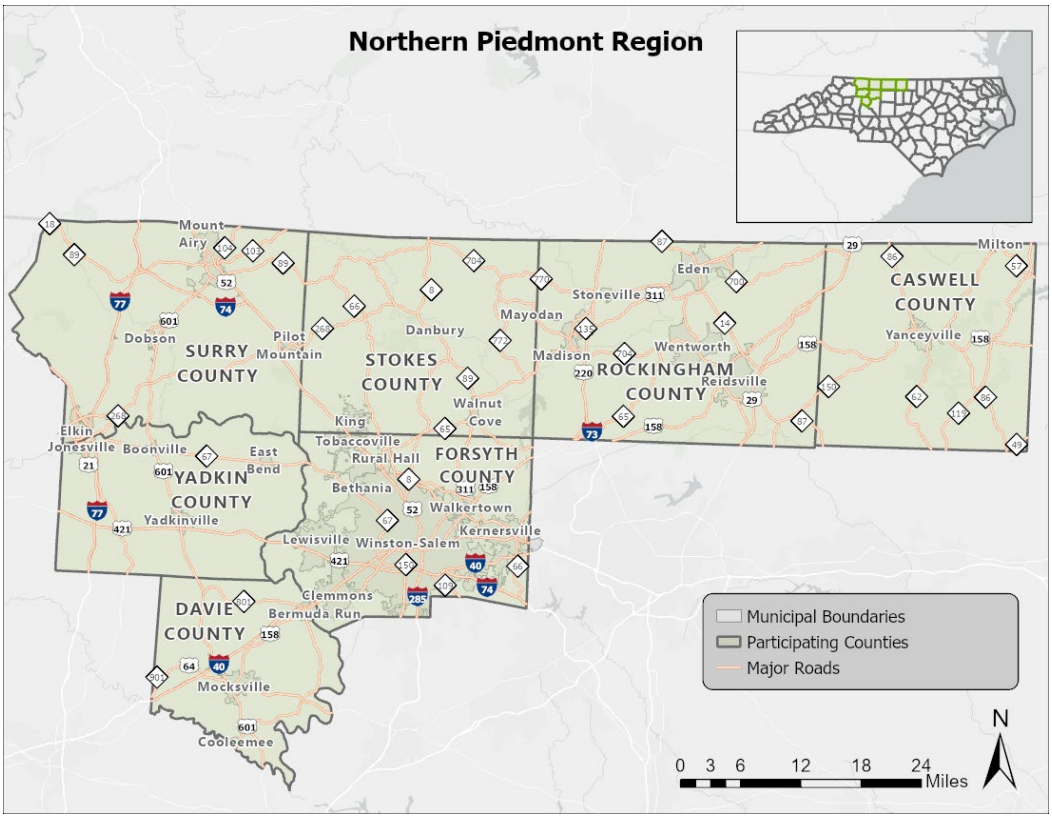
TABLE 3.1: TOTAL AREA OF PARTICIPATING COUNTIES

County	Land Area (sq. mi.)	Water Area (sq. mi.)	Total Area (sq. mi.)
Caswell County	425.37	3.34	428.71
Davie County	263.70	2.90	266.60
Forsyth County	407.85	4.50	412.35
Rockingham County	565.64	7.12	572.76
Stokes County	449.35	6.79	456.14
Surry County	532.65	4.01	536.66
Yadkin County	334.94	2.77	337.71
REGION TOTAL	**2979.50**	**31.43**	**3010.93**

Source: United States Census Bureau

This region lies between the Appalachian Mountains and the Atlantic Ocean, situated within North Carolina's Piedmont, or foothills. The City of Winston-Salem is the largest urban center in the area. The landscape features rolling hills and several prominent peaks, with notable mountain ranges including the Brushy Mountains, the Blue Ridge Mountains, and the Appalachian Mountains. Additionally, some counties within this region are part of the Yadkin Valley American Viticultural Area (AVA), a designated wine and grape-growing region recognized across the United States. An orientation map is provided as **Figure 3.1.**

FIGURE 3.1: NORTHERN PIEDMONT REGION ORIENTATION MAP



According to the Köppen climate classification system, the Northern Piedmont Region is categorized as a humid subtropical climate like much of North Carolina. This climate zone is characterized by mild winters and hot humid summers with significant precipitation even during the driest month. Based on the National Centers for Environmental Information (NCEI) data, the region exhibits a temperate climate with an average annual temperature of 61.6°F over the last ten years. The average temperatures and precipitation of each of the participating counties is presented in **Table 3.2**.

TABLE 3.2: ANNUAI AVERAGE TEMPERATURES/PRECIPITATION OF PARTICIPATING COUNTIES

County	12-Month Avg Temp (2014-2024)	January Annual Avg Min Temp (2014-2024)	January Annual Avg Max Temp (2014-2024)	June Annual Avg Min Temp (2014-2024)	June Annual Avg Max Temp (2014-2024)	12-Month Avg. Rainfall (2014-2024)
Caswell County	59.1˚F	28.3˚F	49.4˚F	63.2˚F	85.4˚F	49.02in
Davie County	59.4˚F	28.5˚F	49.7˚F	63.5˚F	85.2˚F	46.80in
Forsyth County	59.2˚F	28.9˚F	48.7˚F	63.5˚F	84.7˚F	47.65in
Rockingham County	59.2˚F	28.8˚F	48.6˚F	63.3˚F	85.3˚F	48.68in
Stokes County	58.5˚F	28.7˚F	47.4˚F	62.6˚F	84.2˚F	50.61in
Surry County	57.7 ˚F	27.5 ˚F	47.4˚F	60.6 ˚F	83.9 ˚F	54.78in
Yadkin County	58.6 ˚F	27.7 ˚F	48.8 ˚F	62.2 ˚F	84.7 ˚F	49.96in
REGION AVERAGE	**58.9 ˚F**	**28.3˚F**	**48.7˚F**	**62.7˚F**	**84.1˚F**	**49.64in**

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

In January, the region experiences an average minimum temperature of 28.3°F and an average maximum temperature of 48.7°F, respectively. These values indicate a moderate winter climate, which suggests that the region experiences conditions that can lead to freezing events and potential winter storms. Effective hazard mitigation strategies must account for the risks associated with these cold weather patterns, such as ice accumulation, power outages, and increased demand for heating resources.

During the month of June, the region experiences a significant increase in temperatures. Average minimum temperatures rise to approximately 62.7°F and average maximum temperatures reach 84.1°F, indicating a shift to a warm and humid summer. This not only affects human health, potentially increasing the incidence of heat-related illnesses, but also heightens the risk of wildfires and heatwaves. Understanding these temperature fluctuations is essential for developing adaptive strategies to protect vulnerable populations and infrastructure.

Regarding precipitation, the region averages about 49.64 inches of annual rainfall, with Surry County receiving the highest at approximately 54.78 inches. This consistent rainfall contributes to the region's hydrology and supports its diverse ecosystems. Rainfall in the region is generally well-distributed throughout the year, with the driest conditions typically occurring in the fall. Summer precipitation is primarily attributed to thunderstorms, and there may be occasional dry spells lasting from one to three weeks. The annual average precipitation equates to approximately four inches per month.

Consistent rainfall supports agriculture and biodiversity, but also poses challenges related to flooding and water management. The well-distributed rainfall throughout the year necessitates robust flood management systems and infrastructure. Thunderstorms can bring intense, localized rainfall, leading to flash flooding, which can overwhelm drainage systems and pose risks to life and property. Therefore, strategies such as improving stormwater management, enhancing drainage systems, and implementing green infrastructure can enhance resilience against such hazards.

3.2 POPULATION AND DEMOGRAPHICS

Rockingham County is the largest participating county by area, but Forsyth County is the largest county by population, due to the metropolitan City of Winston-Salem. Between 2010 and 2024, only two counties experienced growth; Davie and Forsyth. All other counties experienced population decline. Forsyth County had the highest county growth rate at 13.3 percent. Population counts from the U.S. Census Bureau for 2000, 2010, 2020 and estimations for 2024 for each of the participating counties are presented in **Table 3.2**.

TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING JURISDICTIONS

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	2020 Census Population	2024 Population Estimates	% Change 2010-2024
Caswell County	20,693	23,501	23,719	22,736	22,363	-5.7%
Davie County	27,859	34,835	41,240	42,712	45,383	10.0%
Forsyth County	265,878	306,067	350,670	382,590	398,143	13.3%
Rockingham County	86,064	91,928	93,643	91,096	93,517	-0.1%

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	2020 Census Population	2024 Population Estimates	% Change 2010-2024
Stokes County	37,223	44,711	47,401	44,520	45,857	-3.2%
Surry County	61,704	71,219	73,673	71,359	71,547	-2.9%
Yadkin County	30,488	36,348	38,406	37,214	37,995	-1.1%

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

Based on the 2020 Census, the median age of residents of the participating counties was roughly 42 years old. 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 74 percent of the population. Conversely, the counties with a smaller population of white people, Caswell and Forsyth Counties, have the largest minority populations.

TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING COUNTIES

Jurisdiction	White, Percent (2023)	Black or African American, Percent (2023)	American Indian or Alaska Native, Percent (2023)	Asian, Percent (2023)	Other Race, Percent (2023)	Persons of Hispanic Origin, Percent (2023) *	Two or More Races, Percent (2023)
Caswell County	60.3%	31.5%	0.1%	0.4%	1.9%	4.9%	5.9%
Davie County	84.2%	4.0%	0.4%	0.7%	2.8%	8.0%	7.8%
Forsyth County	58.2%	25.5%	0.4%	2.4%	2.8%	14.6%	7.7%
Rockingham County	72.6%	17.6%	0.7%	0.2%	2.8%	6.9%	6.1%
Stokes County	96.1%	3.4%	0.2%	0.0%	1.1%	3.6%	3.9%
Surry County	86.2%	3.8%	0.2%	0.6%	3.4%	12.1%	5.9%
Yadkin County	86.2%	2.9%	0.5%	0.1%	4.3%	12.1%	5.9%
REGION AVERAGE	**74.8%**	**13.2%**	**0.3%**	**0.7%**	**2.7%**	**9.8%**	**6.9%**

*Hispanics may be of any race, so also are included in applicable race categories
Source: US Census Bureau, 2023 ACS 5-Year Estimates

The demographic profile of the counties within this region reveals notable variations that are critical for hazard mitigation planning. For example, counties like Forsyth and Rockingham show a more diverse racial composition, with Black or African American populations accounting for approximately 25.5 percent and 17.6 percent, respectively. Conversely, counties such as Stokes and Yadkin exhibit predominantly White populations, exceeding 86 percent. These demographic differences influence community vulnerability and resilience, as certain populations may face higher risks during natural hazards due to factors like economic disparities, access to resources, and language barriers. Communities with higher proportions of Hispanic or minority populations, such as Forsyth County with nearly 15 percent Hispanic origin, may require culturally tailored outreach and education efforts to ensure effective communication and engagement.

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the U.S. Census Bureau's 2018 estimates, there were 314,949 housing units in the Northern Piedmont Region, the majority of which are single family homes or mobile homes. Housing information for the seven participating counties is presented in **Table 3.4**. As shown in the table, all of the counties have a low percentage of seasonal housing units.

TABLE 3.4: HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES

Jurisdiction	Housing Units (2010)	Housing Units (2023)	Owner-Occupied Units, Percent (2023)	Renter-Occupied Units, Percent (2023)	Median Home Value (2023)
Caswell County	10,619	10,490	76.1%	23.9%	$151,200
Davie County	18,238	19,079	83.4%	16.6%	$235,300
Forsyth County	156,872	173,220	62.7%	37.3%	$227,800
Rockingham County	43,696	43,685	72.4%	27.6%	$156,000
Stokes County	21,924	21,353	78.4%	21.6%	$186,800
Surry County	33,667	33,906	73.3%	26.7%	$166,400
Yadkin County	15,821	17,165	77.1%	22.9%	$176,400

Source: US Census Bureau, 2023 ACS 5-Year Estimates

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

- Growth in Housing Units Forsyth has experienced substantial growth in housing units. This growth indicates a trend toward urbanization and population influx, which can strain infrastructure and emergency services.
- Owner-Occupied Housing Rates – Davie County leads with a high owner-occupied rate of 83.4 percent, followed closely by Stokes County at 78.4 percent. This suggests a demographic that may be more economically stable and better positioned to undertake mitigation strategies, enhancing community resilience. In contrast, Forsyth County's lower owner-occupied rate (62.7 percent) may be indicative of a more vulnerable population.
- Financial Resilience and Vulnerability – The regional differences in median home values highlight disparities in financial resilience. Davie and Forsyth Counties have higher median values, which can correlate with greater economic stability and capacity to recover from disasters. Counties with lower home values may have limited financial capacity to bounce back from hazards.
- Focus on Renters – Despite the predominance of homeowners, the presence of renters (approximately 25 percent for the region at large) points to a critical need for inclusive hazard

mitigation strategies. Renters may face unique challenges in disaster recovery, necessitating targeted resources and support to ensure they are not overlooked in planning efforts.

3.3.2 Infrastructure

Transportation

There are several interstates that cross the Northern Piedmont Region. Interstate 77 runs across the region from north to south and interstates 40 and 85 run east to west across the area. Since the previous update, construction of two new interstates, I-73 and I-74, has been completed. These seven counties have numerous US highways that run through the region including 64, 21, 421, 601, 52, 311, 29, 158, 220, and 311. North Carolina state highways also cross the region and provide routes of transportation. The Blue Ridge Parkway also provides a route through North Carolina and runs along a small portion Surry County.

The Northern Piedmont Region is served by the Piedmont Triad International Airport and Charlotte-Douglas International Airport which are located in Greensboro and Charlotte respectively. No large airports are located in the region but rather at least nine small private and public airports. The Piedmont Triad International Airport has six airlines that service it with flights daily. The airport is located in Guilford County which is east of Forsyth County and south of Rockingham County. The Charlotte Douglas International Airport offers non-stop commercial flights on nine airlines to numerous destinations across the eastern US and Midwest as well as to several international destinations. Additional general aviation and other public-use airports servicing the Northern Piedmont Region include Caswell Airport in Yanceyville, Twin Lakes Airport in Mocksville, Smith Reynolds Airport in Winston-Salem, Rockingham County NC Shiloh Airport in Reidsville, Meadow Brook Field in Walnut Cove, Mount Airy/Surry County Airport in Mount Airy, and Lone Hickory Airport in Yadkinville.

Utilities

Electrical power in the Northern Piedmont Region is provided by Duke Energy and several electricity cooperatives. Duke Energy provides service to all seven counties. Surry and Yadkin Counties are also served by Surry-Yadkin Electric Corporation.

Water and sewer service is provided by many of the towns or counties in the Northern Piedmont Region. However, private and/or shared wells and septic systems are common as well.

Community Facilities

There are a number of public buildings and community facilities located throughout the Northern Piedmont Region. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 184 fire stations, 48 police stations, 465 medical care facilities and 8 public schools located within the study area.

According to the NC Division of Health Service Regulation (NCDHSR), there are a total of ten (10) licensed hospitals in the Northern Piedmont Region.[1] Of these ten facilities, the largest two are in Forsyth County and include North Carolina Baptist Hospital (885 total beds) and Novant Health Forsyth Medical Center (978 total beds). Both hospitals have 50 designated operating rooms. There are also 8 smaller hospitals located throughout the region.

[1] https://info.ncdhhs.gov/dhsr/data/Hllistco.pdf?ver=3.1

Hanging Rock State Park is located in Stokes County and is almost 7,000 acres in size. In addition to this park are the state parks around the Dan and Mayo Rivers. Lake Reidsville provides recreation as well. All of these facilities offer recreational opportunities to area residents and visitors each year.

3.3.3 Land Use

Land uses vary greatly throughout the region. The Winston-Salem metropolitan statistical area, consisting of Forsyth, Davidson (not participating in this plan), Davie, Stokes, and Yadkin counties, is highly urbanized. However, many areas of the Northern Piedmont Region are undeveloped or sparsely developed. As shown in **Figure 3.1** above, there are several small, incorporated municipalities located throughout the study area, and these are other areas where the region's population is also concentrated. The Winston-Salem metro area and the smaller incorporated areas are also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of rural residential development, agricultural uses, recreational areas, and forestland.

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

3.4 EMPLOYMENT AND INDUSTRY

The early modern economy of the Northern Piedmont Region was built around the tobacco and textiles industries. Like many other Piedmont Triad communities, the jurisdictions in the Northern Piedmont Region have focused recent economic development efforts on a diverse range of economic sectors to include medical, technological and manufacturing companies. Winemaking has become part of the economy in the region as well.

According to 2023 ACS 5-Year Estimates, Caswell County had a Labor force of 9,905 workers. In 2024, the top five employers in Caswell County were Caswell County Schools, Caswell County, RWS Construction Inc., NC Department of Adult Corrections, and Yanceyville Opco LLC. The average unemployment rate was 5.7 percent compared to the State rate of 3.7.

Davie County had a labor force of 21,084 workers. As of 2024, the top five employers in Davie County were Ashley Furniture Industries, Davie County Schools, Davie County, Wake Forest University Baptist Medi., and Brakebush Brothers Inc. The average unemployment rate was 3 percent compared to the State rate of 3.7.

Forsyth's County labor force consisted of 191,865 workers. As of 2024, the top five employers in Forsyth County were Wake Forest University Baptist Medi., Winston Salem Forsyth County Schools, Forsyth Memorial Hospital Inc., Novant Health Inc., and Wake Forest University. The average unemployment rate was 5.3 percent compared to the State rate of 3.7.

Rockingham County had a labor force of 43,210 workers. The top five employers in Rockingham County were Rockingham County Schools, Wal-Mart Associates, Rockingham County, Unifi Manufacturing Inc.,

and Sturm Ruger & Company Inc. The average unemployment rate was 6.3 percent compared to the State rate of 3.7.

Stokes County had a labor force of 21,061 workers. The top five employers in Stokes County in 2024 were Stokes County Schools, Stokes County, Wal-Mart Associates, Wieland Copper Products LLC., and M-6 Contacting Inc. The average unemployment rate was 4.6 percent compared to the State rate of 3.7.

Surry County had a labor force of 33,646 workers. The top five employers in Surry County were Pike Electric LLC., Surry County Schools, Northern Hospital of Surry County, Wayne Farms LLC., and Hugh Chatham Memorial Hospital Inc. The average unemployment rate was 5 percent compared to the State rate of 3.7.

Yadkin County had a labor force of 17,981 workers. The top five employers in Yadkin County in 2024 were Unifi Manufacturing Inc., Yadkin County Schools, Mega International LLC., Yadkin County, and PVH Corp. The average unemployment rate was 5.4 percent compared to the State rate of 3.7.

SECTION 4
HAZARD IDENTIFICATION

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

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

---

44 CFR Requirement

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

4.1 OVERVIEW

The Northern Piedmont 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 Northern Piedmont 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 Northern Piedmont Region have identified numerous hazards that are to be addressed in its Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Northern Piedmont Regional Hazard Mitigation Planning Committee members, research of past disaster declarations in the participating counties[1], and review of the North Carolina State Hazard Mitigation Plan (2023). To maintain consistency, the Northern Piedmont Planning Committee agreed to assess the same hazards that were identified in the most recent update of the North Carolina State Hazard Mitigation Plan. A list of all previous hazards covered in the 2020 Northern Piedmont Regional Hazard Mitigation Plan is viewable in **Table 4.1**, along with a summary of the hazards assessed in this update. Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

[1] A complete list of disaster declarations for the Northern Piedmont Region can be found below in Section 4.2.

TABLE 4.1: 2025 NORTHERN PIEDMONT HAZARDS UPDATE

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

4.2 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the Northern Piedmont Region planning area. Since 1979, 19 presidential disaster declarations have been reported in the Northern Piedmont Region by FEMA, which can be seen in **Table 4.2** below. This includes seven storms related to hurricanes and coastal hazards, six storms related to severe winter weather, five storms related to tornadoes and major flooding, and an infectious disease pandemic (COVID-19).

TABLE 4.2: NORTHERN PIEDMONT REGION DISASTER DECLARATIONS

Year	Disaster Number	Description	Caswell County	Davie County	Forsyth County	Rockingham County	Stokes County	Surry County	Yadkin County
1979	605	Severe Storms & Flooding						X	
1989	827	Tornadoes		X	X				
1989	844	Hurricane Hugo		X	X		X	X	X
1996	1087	Blizzard of '96	X	X	X	X	X	X	X
1996	1103	Winter Storm	X	X	X	X	X	X	X
1996	1134	Hurricane Fran	X			X			
1998	1211	Severe Storms, Tornadoes & Flooding				X			
1999	1292	Hurricane Floyd	X		X	X	X		
2000	1312	Severe Winter Storm	X			X			
2002	1448	Severe Ice Storm		X	X				
2003	1457	Ice Storm	X		X	X	X		
2004	1153	Hurricane Ivan	X		X	X	X		
2014	4167	Severe Winter Storm	X	X					
2018	4364	Tornado & Severe Storms				X			
2018	4412	Tropical Storm Michael	X	X	X	X	X	X	X
2020	4487	COVID-19 Pandemic	X	X	X	X	X	X	X
2020	4543	Severe Storms, Tornadoes, & Flooding					X		X
2020	4588	Tropical Storm Eta		X			X		X
2024	4827	Tropical Storm Helene			X			X	X

4.3 SUMMARY OF HAZARD IMPACTS SINCE PREVIOUS PLAN

Since the approval date of the previous Northern Piedmont Regional Hazard Mitigation Plan (10/1/2020 to 12/31/2023), there have been 432 hazard events recorded for the region in the National Centers for Environmental Information (NCEI) Storm Events Database. It is important to take note of those hazard

events and consider them in the *Hazard Identification* section to help ensure that the appropriate hazards are being considered in the risk assessment sections and in the Mitigation Strategy. **Table 4.3** documents the hazard events recorded and may be underreported by regional jurisdictions. Details for some of these events are discussed in further detail in the *Hazard Profiles* section.

TABLE 4.3: SUMMARY OF HAZARD EVENTS SINCE PREVIOUS PLAN

	Number of Reported Events						
Hazard Type*	**Caswell County**	**Davie County**	**Forsyth County**	**Rockingham County**	**Stokes County**	**Surry County**	**Yadkin County**
Flood	1	1	10	7	1	19	7
Hail	8	7	9	11	4	11	5
Lightning	0	0	1	1	1	1	1
Thunderstorm Wind	22	13	59	36	41	53	22
Tornado	0	0	0	1	0	2	1
Winter Storm	3	7	9	3	3	1	2
Total Number of Reported Events	**34**	**28**	**88**	**59**	**50**	**87**	**38**

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

Appendix H includes more detailed information about all previous historical hazard occurrence events as reported to the National Centers for Environmental Information. Additional detailed information about previous historical hazard events can be found in Section 5: Hazard Profiles under each separate hazard profile.

4.4 HAZARD EVALUATION

Table 4.4 documents the evaluation process used for determining which of the initially identified hazards are considered significant to warrant listing and evaluation in the risk assessment. For each hazard considered, the table indicates whether the hazard was identified as a significant listed hazard, how this determination was made, and why this determination was made. The table works to summarize not only those hazards that *were* identified (and why) but also those that *were not* identified (and why not). Hazards not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the planning committee during the plan update process.

TABLE 4.4: DOCUMENTATION OF THE HAZARD EVALUATION PROCESS

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
NATURAL HAZARDS			
Avalanche	**NO**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of US Forest Service National Avalanche Center website	• There is no risk of avalanche events in North Carolina. The United States avalanche hazard is limited to mountainous western states including Alaska as well as some areas of low risk in New England. • Avalanche hazards are not discussed in the North Carolina State Hazard Mitigation Plan. • Avalanche is not included in the previous Northern Piedmont Regional Hazard Mitigation Plan.
Drought	**YES**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of the North Carolina Drought Monitor website	• Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. • Droughts are discussed in the NC State Hazard Mitigation Plan. • Drought is included in the previous Northern Piedmont Regional Hazard Mitigation Plan. • There are reports of drought conditions in most of the last 24 years (2000-2024) in the Northern Piedmont Region, according to the North Carolina Drought Monitor.
Hailstorm	**YES (Assessed under Tornadoes/ Thunderstorms)**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI 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 State Plan under the Tornadoes/Thunderstorm hazard. • Hail is addressed under the Tornadoes/Thunderstorm hazard in the previous Northern Piedmont Regional Hazard Mitigation Plan. Given the frequency of the event, individual analysis is warranted.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			• NCEI reports 727 hailstorm events (0.45-inch size hail to 3.0 inches) for the Northern Piedmont Region since 1955. For these events, there was over $1.4 million (2023 dollars) in property damages reported.
Excessive Heat	**YES**	• Review of FEMA's National Risk Index • Review of the North Carolina State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	• Many areas of the United States are susceptible to excessive heat events, including North Carolina. • Excessive heat is discussed in the State Plan. • Heat wave or excessive heat was included in the previous Northern Piedmont plan in tandem with the drought hazard.
Hurricane and Coastal Hazards	**YES**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations	• The Atlantic and Gulf regions are most prone to landfall by hurricanes and tropical storms. • Hurricane and coastal hazards were addressed in the previous Northern Piedmont plan. • NOAA historical records indicate roughly 29 hurricanes or tropical storms have come within 75 miles of the Northern Piedmont Region since 1859. • NCEI reports 19 hurricane or tropical storm events since 1996 for the Northern Piedmont Region. • 7 out of 19 disaster declarations in the Northern Piedmont Region are directly related to hurricane and tropical storm events.
Lightning	**YES (Assessed under Tornadoes/ Thunderstorms)**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern	• 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.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database • Review of Vaisala's NLDN Lightning Flash Density Map	• Lightning events are discussed in the State Plan as part of the Tornadoes/Thunderstorm hazard. • Although lightning is addressed under the Tornadoes/Thunderstorm hazard in the previous regional plan, given the damage and reported death and injuries, individual analysis is warranted. • NCEI reports 51 lightning events for the Northern Piedmont Region since 1994. These events have resulted in 10 recorded injuries and over $7.5 million (2023 dollars) in property damage. • According to Vaisala's U.S. National Lightning Detection Network, the Northern Piedmont Region is located in an area that experienced an average of 3 to 4 lightning flashes per square kilometer per year between 1997 and 2010.
Nor'easter	**NO**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	• Nor'easters are discussed in the State Plan. • Nor'easter was not included in the previous Northern Piedmont Regional Hazard Mitigation Plan. • NCEI does not report any nor'easter activity for the Northern Piedmont 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.
Tornadoes/ Thunderstorm	**YES**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	• From 1953 to 1993, North Carolina averaged 10 to 25 tornadoes per year. • Tornado events are discussed in the NC State Hazard Mitigation Plan. • Tornado events were addressed in the previous Northern Piedmont Regional Hazard Mitigation Plan. • NCEI reports 69 tornado events in Northern Piedmont Region counties since 1952. These events have resulted in 2 deaths, 115 injuries, and over $310 million (2023 dollars) in property

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of historical presidential disaster declarations	damage with the most severe being an F3. • 4 of the region's 19 disaster declarations were directly related to tornado events.
Severe Thunderstorm	**YES (Assessed under Tornadoes/ Thunderstorms)**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI 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 storm events were addressed in the previous Northern Piedmont Regional Hazard Mitigation Plan. • NCEI reports 2,180 thunderstorm/high wind events in the Northern Piedmont Region counties since 1958. These events have resulted in 2 deaths, 2 injuries, and $23 million (2023 dollars) in property damage. • 4 of the region's 19 disaster declarations were directly related to severe storm events.
Severe Winter Weather	**YES**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations.	• Winter storms affect every state in the continental U.S. and Alaska. • Severe winter weather, including snowstorms and ice storms, are discussed in the State Plan. • Winter weather events were addressed in the previous Northern Piedmont Regional Hazard Mitigation Plan. • NCEI reports that the Northern Piedmont counties have been affected by 435 winter weather events since 1993. These events resulted in $18.8 million (2023 dollars) in property damages. 6 deaths and 5 additional injuries were reported with these events, but they may have occurred outside of the study region. • 6 of the region's 19 disaster declarations were directly related to winter weather events.
Earthquakes	**YES**	• Review of FEMA's National Risk Index	• Although the zone of greatest seismic activity in the United States is along the

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI records • USGS Earthquake Hazards Program website	Pacific Coast, eastern regions have experienced significant earthquakes. • Earthquake events are discussed in the State Plan and two of the participating Northern Piedmont counties (Surry and Yadkin) are in the region with the highest vulnerability of 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. • The previous Northern Piedmont plan addresses earthquakes. • At least 64 events are known to have occurred in the region according to NCEI and USGS records. The greatest MMI reported was a 6. • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Northern Piedmont Region is approximately 2 to 4%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more.
Expansive Soils	**NO**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • 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 not discussed in the State Plan. • The previous Northern Piedmont Regional Hazard Mitigation Plan did not identify expansive soils. • According to FEMA and USDA sources, the Northern Piedmont Region is located in an area that has "little or no" clay swelling potential.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Geological (Landslides, Sinkholes, Erosion)	**YES**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • 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. • The previous Northern Piedmont Hazard Mitigation Plan addresses landslides. • USGS landslide hazard maps indicate "high susceptibility" and "moderate susceptibility" is found throughout the Northern Piedmont Region. Additionally, there is "moderate incidence" (more than 1.5-15% of the area is involved in landsliding) in portions of all the Northern Piedmont counties except Davie County. • Data provided by NCGS does not indicate many recorded landslide events in the Northern Piedmont Region, but data is still being collected and compiled.
Land Subsidence	**NO**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan	• 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 does not discuss land subsidence hazards. • The previous Northern Piedmont Regional Hazard Mitigation Plan does not identify land subsidence as a potential hazard.
Tsunami	**NO**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont	• 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 not discussed as a hazard in the State Plan.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		Regional Hazard Mitigation Plan • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses)	• Tsunami was not addressed as a hazard in the previous Northern Piedmont Regional Hazard Mitigation Plan. • FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.
Volcano	**NO**	• Review of FEMA's National Risk Index • Review of the 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 Northern Piedmont Region.
Dam Failure	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of North Carolina Dam Safety Program's NC Dam Inventory as of July 2024	• Dam failure is identified as a hazard in the State Plan. • The previous Northern Piedmont Regional Hazard Mitigation Plan identified dam failure as a hazard. • Per the NC Dam Inventory, there are 150 high hazard dams in the planning region. (High hazard is defined as "where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads.")
Erosion	**YES (Referenced in Geological Hazards)**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan	• Coastal erosion is discussed in the State Plan but is only applicable for coastal areas. • Riverine erosion is discussed in the previous Northern Piedmont Regional Hazard Mitigation Plan. • Although erosion was not previously identified as a top hazard, it remains a

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			natural, dynamic, and continuous process in the Northern Piedmont Region that warrants inclusion as a potential hazard.
Flooding	**YES**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI 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 State Plan. • The previous Northern Piedmont plan addresses flooding as a hazard. • NCEI reports that the Northern Piedmont Region counties have been affected by 342 flood events since 1996. These events resulted in an estimated $16.1 million (2023 dollars) in property damages. • 3 of the 19 disaster declarations were flood-related and an additional 7 were hurricane or tropical storm-related which caused flooding issues. • Roughly 6.5% of the Northern Piedmont Region is located in an identified floodplain (100- or 500-year). • All of the counties and nearly all of the jurisdictions in the Northern Piedmont Region participate in the NFIP.
Storm Surge	**NO**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	• Given the inland location of the Northern Piedmont Region, storm surge would not affect the area. • Storm surge is discussed in the State Plan under the Hurricane hazard. • The previous Northern Piedmont plan does not include storm surge as a potential hazard. • No historical events were reported by NCEI for the Northern Piedmont Region.
Wildfires	**YES**	• Review of FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan	• 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.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of Southern Wildfire Risk Assessment (SWRA) Data • Review of the NC Forest Service website	• Wildfires are identified as a hazard in the State Hazard Mitigation Plan. • The previous Northern Piedmont plan addressed wildfire. • A review of SWRA data indicates that there are some areas of elevated concern in the Northern Piedmont Region. • According to the North Carolina Forest Service, the Northern Piedmont Region experiences an average of 343 fires each year which burn a combined average of 767 acres.
Infectious Disease	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan	• Including infectious disease to be consistent with the State Plan. • This hazard will assess foreign animal disease.
TECHNOLOGICAL HAZARDS			
Hazardous Substances	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan	• The previous Northern Piedmont plan identifies hazardous substances as a hazard of concern. • This update assesses hazardous materials, hazardous chemicals, and oil spills under this hazard.
Terrorism	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of local official knowledge	• Including terrorism hazards to be consistent with the State Plan. • There are several fixed nuclear facilities in the state. • This hazard will assess chemical, biological, radiological, nuclear, and explosive terrorism events. • The previous Northern Piedmont plan included terrorism as a hazard.
Radiological Emergency –	**YES**	• Review of the NC State Hazard Mitigation Plan	• The McGuire Nuclear Power Station is located on Lake Norman within 50 miles of the region.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Fixed Nuclear Facilities		• Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of IAEA list of fixed nuclear power stations in the United States • Discussion with local officials about location of nuclear power stations	• The previous Northern Piedmont plan included radiological emergencies as a hazard. • Nuclear events can sometimes be caused by natural hazards and deserve some attention in this plan due to some areas of the region being located in the 50-mile evacuation zone for the McGuire Nuclear Power Station.
Cybersecurit	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan • Review of the North Carolina Emergency Operations Plan	• Changing future conditions encourage the assessment of the possibility of a cyberattack with the increase in global technology. • Cybersecurity is a hazard included in the North Carolina Emergency Operations Plan
Electromagnetic Pulse	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Northern Piedmont Regional Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of an electromagnetic pulse with the increase in global technology.
Civil Disturbance	**YES**	• Review of NC State Hazard Mitigation Plan	• Changing future conditions and social systems encourage the assessment of the possibility of a civil disruption incident.
Food Emergency	**YES**	• Review of NC State Hazard Mitigation Plan	• Changing future conditions and food systems encourage the assessment of the possibility of a food emergency.

4.5 HAZARD IDENTIFICATION RESULTS

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

TABLE 4.5: HAZARD IDENTIFICATION AND EVALUATION RESULTS

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

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

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

SECTION 5
HAZARD PROFILES

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

44 CFR Requirement

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

5.1 OVERVIEW

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

After reviewing the list of assessed hazards from the previous update, the Northern Piedmont Regional Hazard Mitigation Planning Committee agreed to amend the hazards in order to be consistent with the State of North Carolina Hazard Mitigation Plan. This required some of the hazard names to be changed and additional hazards were included in the assessment.

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

HAZARD	COMPOUNDING - NATURAL											COMPOUNDING - TECHNOLOGICAL						
	Drought	Excessive Heat	Hurricane and Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Geological	Dam Failure	Flooding	Wildfires	Infectious Disease	Hazardous Substances	Radiological Emergency	Terrorism	Cyber	Electromagnetic Pulse	Civil Disturbance	Food Emergency
NATURAL HAZARDS																		
DROUGHT (6)		•			•		•		•	•								•
EXCESSIVE HEAT (7)	•			•			•		•	•	•							•
HURRICANE AND TROPICAL HAZARDS (7)				•			•	•	•			•	•					•
TORNADOES/ THUNDERSTORMS (6)		•	•				•		•	•		•						
SEVERE WINTER WEATHER (6)	•			•			•		•		•							•
EARTHQUAKES (5)							•	•	•			•	•					
GEOLOGICAL (8)	•	•	•	•	•	•		•	•									
DAM FAILURE (5)			•			•	•		•					•				
FLOODING (11)	•	•	•	•	•	•	•	•			•	•						•
WILDFIRES (3)	•	•		•														
INFECTIOUS DISEASE (7)		•			•				•			•		•			•	•
TECHNOLOGICAL HAZARDS																		
HAZARDOUS SUBSTANCES (9)			•	•		•			•	•	•		•	•				•
RADIOLOGICAL EMERGENCY (7)			•			•						•		•	•	•		•
TERRORISM (7)								•			•	•	•		•	•	•	
CYBERSECURITY (4)													•	•		•	•	
ELECTROMAGNETIC PULSE (4)													•	•	•		•	
CIVIL DISTURBANCE (4)											•			•	•	•		
FOOD EMERGENCY (8)	•	•	•		•				•		•	•	•					

5.2 STUDY AREA

The Northern Piedmont Region includes seven counties: Caswell, Davie, Forsyth, Rockingham, Stokes, Surry, and Yadkin. **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 Northern Piedmont Region.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE NORTHERN PIEDMONT REGIONAL HAZARD MITIGATION PLAN

Caswell County	
Milton	Yanceyville
Unincorporated Caswell County	
Davie County	
Bermuda Run	Mocksville
Cooleemee	Unincorporated Davie County
Forsyth County	
Bethania	Rural Hall
Clemmons	Tobaccoville
Kernersville	Walkertown
Lewisville	Winston-Salem
Unincorporated Forsyth County	
Rockingham County	
Eden	Reidsville
Madison	Stoneville
Mayodan	Wentworth
Unincorporated Rockingham County	
Stokes County	
Danbury	Walnut Cove
King	Unincorporated Stokes County
Surry County	
Dobson	Mount Airy
Elkin	Pilot Mountain
Unincorporated Surry County	
Yadkin County	
Boonville	Jonesville
East Bend	Yadkinville
Unincorporated Yadkin County	

FIGURE 5.1: NORTHERN PIEDMONT REGION BASE MAP

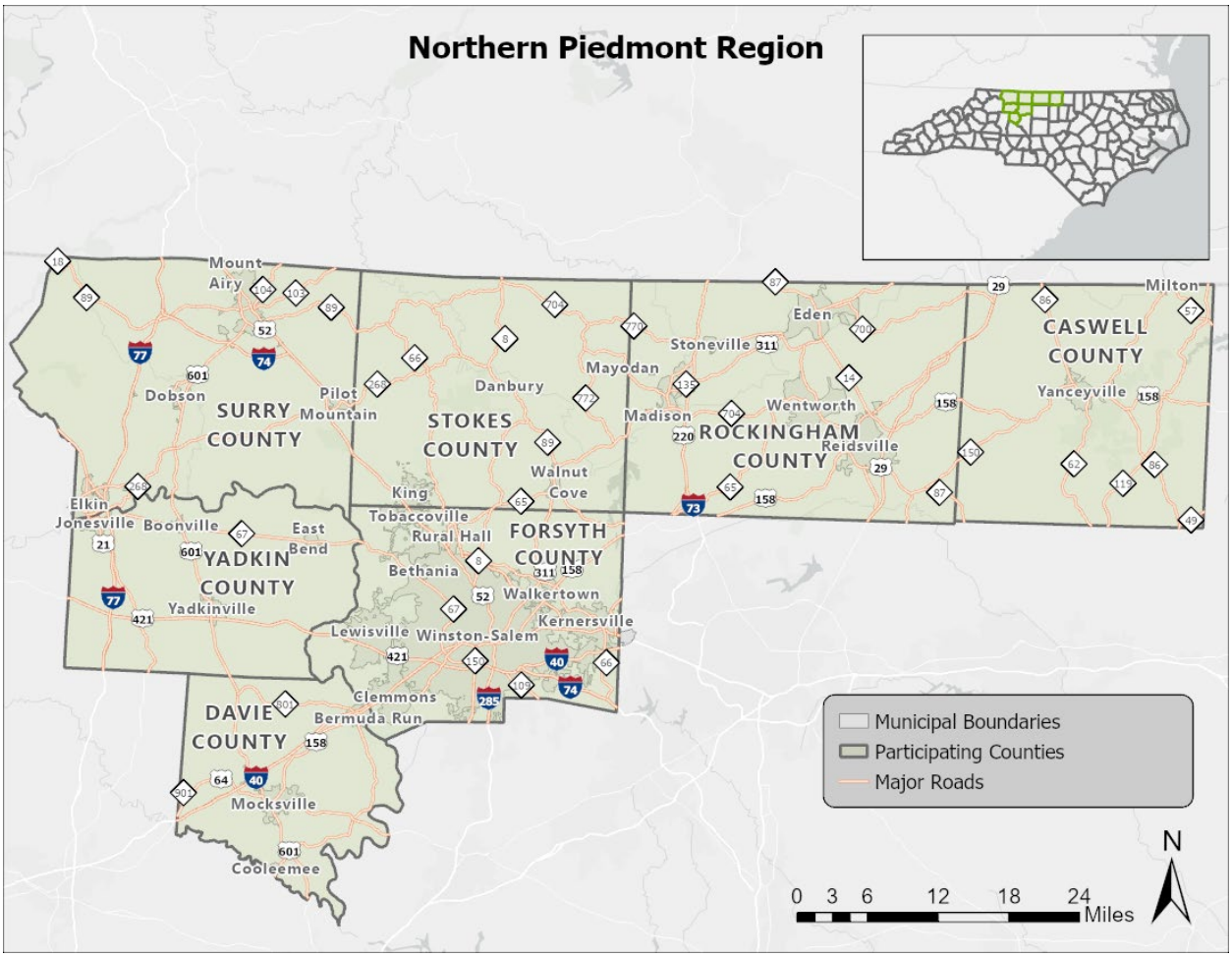


Table 5.2 lists each significant hazard for the Northern Piedmont Region and identifies whether or not it has been determined to be a specific hazard of concern for the 30 municipal jurisdictions and each of the countywide unincorporated areas. This is based on the best available data and information from the Northern Piedmont Regional Hazard Mitigation Planning Committee. (● = hazard of concern)

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS

Jurisdiction	NATURAL									OTHER		TECHNOLOGICAL				
	Drought	Excessive Heat	Hurricane and Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Geological	Dam Failure	Flooding	Wildfires	Infectious Disease	Hazardous Substances	Radiological Emergency	Terrorism	Cybersecurity	Electromagnetic Pulse
Caswell County																
Milton	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Yanceyville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Davie County																
Bermuda Run	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Cooleemee	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mocksville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Forsyth County																
Bethania	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Clemmons	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Kernersville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lewisville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rural Hall	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tobaccoville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Walkertown	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Winston-Salem	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rockingham County																
Eden	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Madison	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mayodan	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Reidsville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Stoneville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Wentworth	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Stokes County																
Danbury	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
King	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Walnut Cove	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Surry County																
Dobson	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Jurisdiction	NATURAL									OTHER		TECHNOLOGICAL				
	Drought	Excessive Heat	Hurricane and Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Geological	Dam Failure	Flooding	Wildfires	Infectious Disease	Hazardous Substances	Radiological Emergency	Terrorism	Cybersecurity	Electromagnetic Pulse
Elkin	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mount Airy	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pilot Mountain	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Yadkin County																
Boonville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
East Bend	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Jonesville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Yadkinville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Natural Hazards

5.3 DROUGHT

5.3.1 Background and Description

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

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

TABLE 5.3 DROUGHT CLASSIFICATION DEFINITIONS

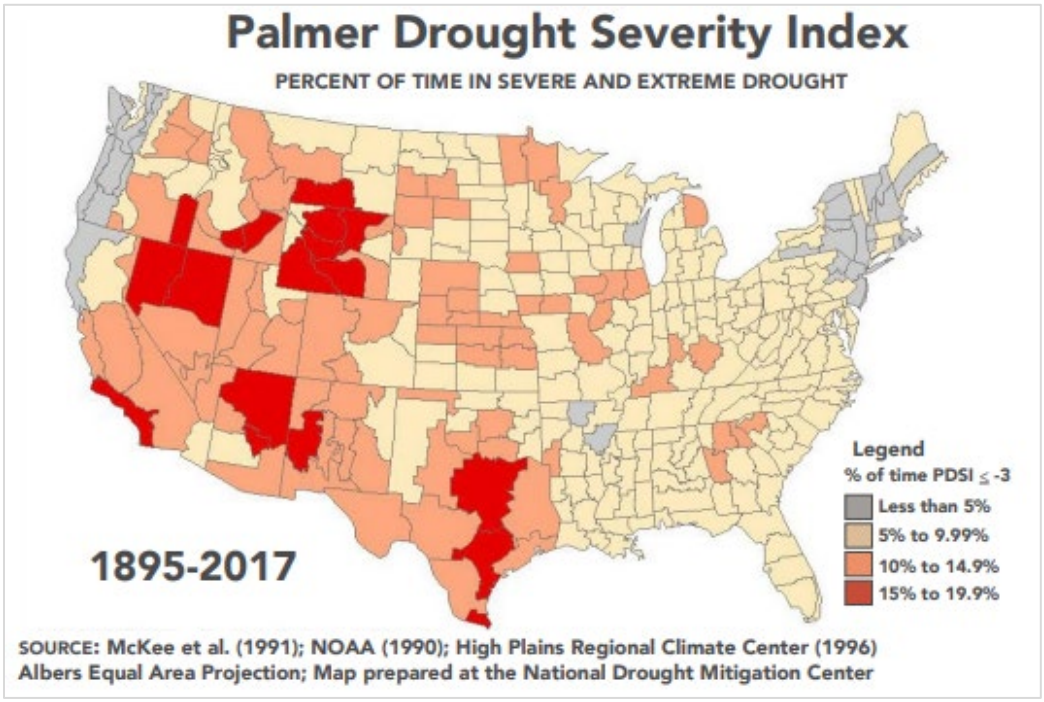
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural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

Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

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

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

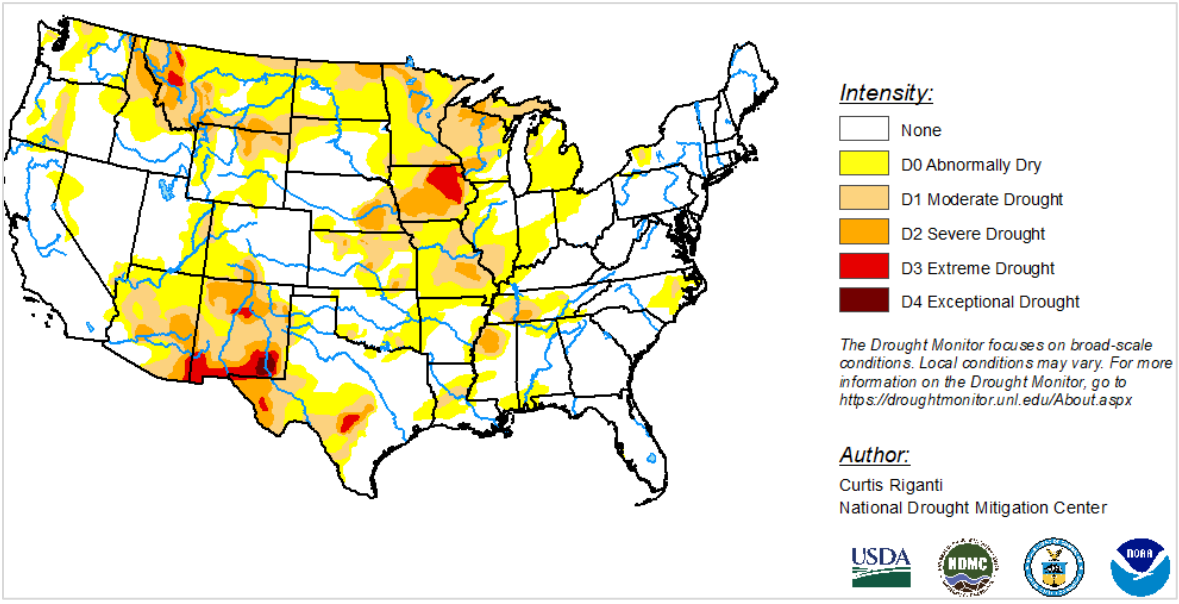
FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP



Source: National Drought Mitigation Center

The figure above is the most updated version of the Palmer Drought Severity Index; however, the US Drought Monitor is updated on a weekly basis. An archived map from March 5, 2024 can be seen below in **Figure 5.3** to reflect more current drought conditions in the US.

FIGURE 5.3: US DROUGHT MONITOR



Source: US Drought Monitor

5.3.2 Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index (**Figure 5.2**), Western North Carolina has a relatively low risk for drought hazard. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Furthermore, it is assumed that the Northern Piedmont 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

Data from the North Carolina Drought Management Advisory Council and National Centers for Environmental Information (NCEI) were used to ascertain historical drought events in the Northern Piedmont Region. The North Carolina Drought Management Advisory Council reports data on North Carolina drought conditions from 2000 to 2024 through the North Carolina Drought Monitor. It classifies drought conditions using the scale set by the US Drought Monitor (USDM), which classifies conditions on a scale of D0 to D4. Each class is further explained in **Table 5.4**.

TABLE 5.4: USDM DROUGHT CLASSIFICATIONS

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

According to the North Carolina Drought Monitor, all of the counties in the Northern Piedmont Region have had drought occurrences in nearly all of the last 24 years (2000-2024) (**Table 5.5**). It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional, but a majority of the county may actually be in a less severe condition.

TABLE 5.5: SUMMARY OF DROUGHT OCCURRENCES

Location	Number Years with Drought Occurrences	Number Years with Exceptional Drought Occurrences
Caswell County	23	2
Davie County	23	3
Forsyth County	23	3
Rockingham County	23	1

Location	Number Years with Drought Occurrences	Number Years with Exceptional Drought Occurrences
Stokes County	21	1
Surry County	21	1
Yadkin County	22	2

Source: North Carolina Drought Monitor (through August 2024)

5.3.4 Changing Future Conditions

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

5.3.5 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the Northern Piedmont Region has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location, but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability of extreme, long-lasting drought conditions. As of 2024, the FEMA National Risk Index[1] rates the drought hazard as "relatively moderate" in Caswell County and Rockingham County compared to "relatively low" in Davie County, Forsyth County, Stokes County, Surry County, and Yadkin County.

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

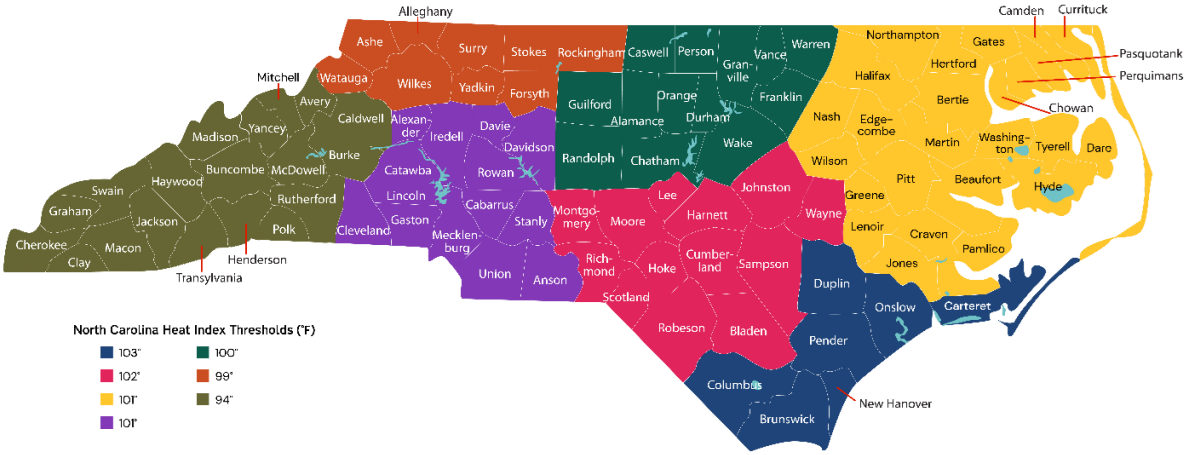
5.4 EXCESSIVE HEAT

5.4.1 Background and Description

Excessive heat, like drought, poses little risk to property. However, excessive heat can have devastating effects on health. Excessive heat is often referred to as "extreme heat" or a "heat wave." According to the National Oceanic and Atmospheric Administration, there is no universal definition for extreme heat because "the definition of "extreme" can vary depending on the location and typical climate[2]." In most areas of the country, the National Weather Service generally issues alerts "when the heat index is expected to exceed 105°F-110°F for at least two consecutive days," but they also work with local partners to determine the most appropriate conditions for a specific geography[3, 4]. Each National Weather Service forecast office considers their own community's vulnerabilities, local guidelines and thresholds, forecast confidence, heat intensity and duration, occurrences during summer holidays or outdoor events, and other factors. They use this information to decide when and whether to issue a heat watch, warning, or advisory.

The State of North Carolina defines extreme heat regionally using heat index thresholds, as shown in **Figure 5.4**. The regional thresholds recognize that an area's typical climate conditions and relevant local factors, such as the proportion of the population engaged in outdoor work, can impact how heat affects the local population. At heat indices higher than established thresholds, negative health impacts begin to occur. The North Carolina Department of Health and Human Services (NCDHHS) uses these regional temperature thresholds to activate its Heat Health Alert System. NCDHHS sends heat alerts to county health departments and Heat Health Alert System subscribers when the daily maximum heat index is forecasted to meet or exceed the heat index threshold for their region. In the Northern Piedmont Region, that threshold ranges from 99 to 101°F.

FIGURE 5.4: NORTH CAROLINA REGIONAL HEAT INDEX THRESHOLDS



Source: North Carolina State Climate Office

[2] 2024-2030 National Heat Strategy (https://cpo.noaa.gov/wp-content/uploads/2024/07/National_Heat_Strategy-2024-2030.pdf)

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

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

Extreme heat can lead to heat-related illness and death. The number of extreme heat days has been increasing on average each year, putting residents at a higher risk of health impacts. In 2023, more people in the United States died of heat-related illness than any other year on record[5]. **Table 5.6** shows the dangers associated with different heat index temperatures. Some populations, such as the elderly the young, and people with pre-existing health conditions, are more susceptible to heat danger than other segments of the population. However, everyone is at risk of health impacts from exposure to extreme heat.

TABLE 5.6: HEAT DISORDERS ASSOCIATED WITH HEAT INDEX TEMPERATURE

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

Source: National Weather Service, NOAA

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

5.4.2 Location and Spatial Extent

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

5.4.3 Historical Occurrences

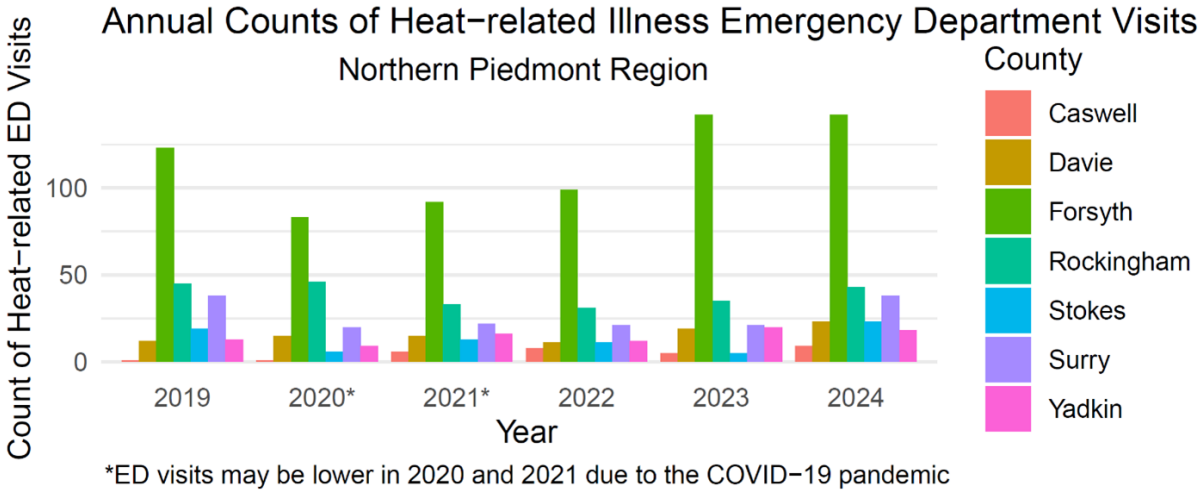
Data from the National Centers for Environmental Information (NCEI) was used to determine historical excessive heat and heat wave events in the Northern Piedmont Region. Only four events were recorded (2 for Davie County and 1 each for Forsyth and Yadkin Counites).

Although there were no deaths or property damage reported by NCEI, residents experienced heat-related illnesses. **Figure 5.5** shows the annual count of emergency department visits for heat-related illness in the Northern Piedmont Region, using public health syndromic surveillance system data from the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT). The annual count of emergency department visits for heat-related illness in Caswell County ranged from 1 visit in 2019 and 2020 to 9 visits in 2024. The annual count of emergency department visits for heat-related

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

illness in Davie County ranged from 11 visits in 2022 to 23 visits in 2024. The annual count of emergency department visits for heat related illness in Forsyth County ranged from 83 in 2020 to 142 in 2023 and 2024. The annual count of emergency department visits for heat-related illness in Rockingham County ranged from 31 visits in 2022 to 46 visits in 2020. The annual count of emergency department visits for heat-related illness in Stokes County ranged from 5 in 2023 and 23 in 2024. The annual count of emergency department visits for heat related illness in Surry County ranged from 20 in 2020 to 38 in 2019 and 2024. The annual count of emergency department visits in Yadkin County ranged from 9 in 2020 to 20 in 2023.

FIGURE 5.5: HEAT-RELATED ILLNESS



In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperatures in the region. Temperature information has been reported since 1890. The recorded maximum for each county can be found below in **Table 5.7**.

TABLE 5.7: HIGHEST RECORDED TEMPERATURE

Location	Date	Temperature (°F)
Caswell County	7/8/1977	104
Davie County	8/10/2007	103
Forsyth County	8/15/2023	105
Rockingham County	7/14/1954	108
Stokes County	8/21/1983	103
Surry County	7/14/1954	105
Yadkin County	7/7/1977	105
Northern Piedmont Regional Maximum	--	108

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 Danbury (Stokes County). **Table 5.8** shows the average maximum temperatures from 1947 to 2023 at the Danbury observation station which can be used as a general comparison for the region.

TABLE 5.8: AVERAGE MAXIMUM TEMPERATURE IN DANBURRY, STOKES COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	66.79	70	78.35	85.78	88.49	93.05	95.01	94	90.7	83.83	76.33	68.43

Source: State Climate Office of North Carolina

5.4.4 Changing Future Conditions

According to 2022 climate summary data from the NOAA National Centers for Environmental Information, temperatures recorded since the middle of the century have steadily increased and been marked above the average consistently beyond the late 1990s. Recent summer average temperatures were also logged as the warmest reported on record for the last 16 years (2005-2020). Furthermore, the last 11 years (2010-2020) indicated the greatest number of very warm nights recorded despite no significant increase in the frequency of very hot days[6].

The State Climate Office of North Carolina provides county-specific climate projections on the North Carolina Resilience Exchange. These projections, which are based on the Fifth National Climate Assessment, anticipate that the number of days above 90°F in all three counties will increase significantly by the 2060s, as shown in **Table 5.9**. The number of days above 95°F are anticipated to increase substantially by the 2060s – as much as five times the amount that Cleveland County, Gaston County, and Lincoln County currently experience. The same dataset shows that nighttime temperatures, which have historically surpassed 70°F 11 nights per year in Cleveland County, will surpass 70°F between 43 and 61 nights per year, on average. The data for nighttime temperatures projections is just as stark in Gaston and Lincoln Counties[7].

TABLE 5.9: EXTREME HEAT PROJECTIONS IN THE NORTHERN PIEDMONT REGION

Location	Average Number of Days each Year with Daytime Temperatures Over 90°F	
	Historical Number of Days	Projected Number of Days by the 2060s
Caswell County	42	76-89
Davie County	43	78-92
Forsyth County	34	68-83
Rockingham County	34	67-81
Stokes County	26	58-73
Surry County	23	56-71
Yadkin County	33	66-80
	Average Number of Days each Year with Daytime Temperatures Over 95°F	
	Historical Number of Days	Projected Number of Days by the 2060s
Caswell County	10	29-42

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

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

Davie County	9	28-42
Forsyth County	6	23-35
Rockingham County	6	23-36
Stokes County	4	17-28
Surry County	4	15-25
Yadkin County	6	21-33
	Average Number of Days each Year with Nighttime Lows Over 70°F	
	Historical Number of Nights	Projected Number of Nights by the 2060s
Caswell County	17	45-62
Davie County	15	43-61
Forsyth County	14	43-62
Rockingham County	14	42-60
Stokes County	7	28-44
Surry County	3	17-31
Yadkin County	6	26-43

Source: State Climate Office of North Carolina

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

5.4.5 Probability of Future Occurrences

Based on historical occurrence information and echoing key findings from the 2020 North Carolina Climate Science Report, it is assumed that all of the Northern Piedmont Region has a probability level of likely (10 to 100 percent annual probability) for future excessive heat events to impact the region.

5.5 HURRICANE AND TROPICAL HAZARDS

5.5.1 Background and Description

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

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

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

TABLE 5.10: SAFFIR-SIMPSON SCALE

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

Source: National Hurricane Center (2024)

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

TABLE 5.11: HURRICANE DAMAGE CLASSIFICATIONS

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

Source: National Hurricane Center; Federal Emergency Management Agency

5.5.2 Location and Spatial Extent

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

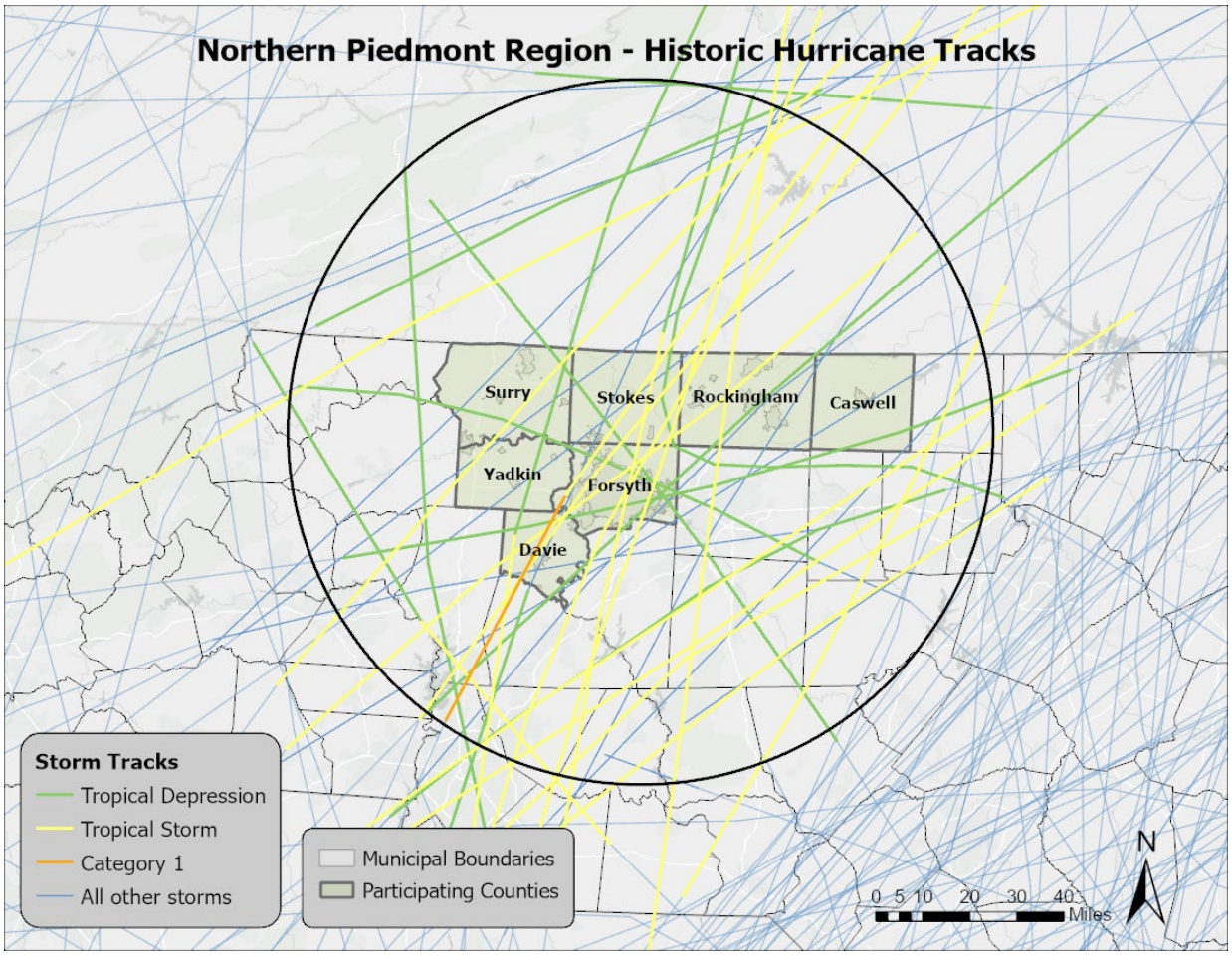
5.5.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 60 hurricane or tropical storm tracks have passed within 75 miles of the Northern Piedmont Region since 1854[8].

Of the recorded storm events, thirteen have traversed directly through the Northern Piedmont Region as shown in **Figure 5.6**. Furthermore, **Table 5.12** provides for each event the date of occurrence, name (if applicable), maximum wind speed, and maximum category of the storm based on the Saffir-Simpson Scale (e.g., Hurricane Category 1-5 = "H1" to "H5", Tropical Storm = "TS", Tropical Depression = "TD").

[8] 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 5.6: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE NORTHERN PIEDMONT REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE 5.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE NORTHERN PIEDMONT REGION (1850–2024)

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category
ELSA 2021	6/30/2021	75	H1
ZETA 2020	10/24/2020	100	H3
BERTHA 2020	5/27/2020	45	TS
MICHAEL 2018	10/6/2018	140	H5
HANNA 2008	8/28/2008	75	H1
JEANNE 2004	9/13/2004	105	H3
IVAN 2004	9/2/2004	145	H5
GASTON 2004	8/27/2004	65	H1
BILL 2003	6/28/2003	50	TS
DENNIS 1999	8/24/1999	90	H2
DANNY 1997	7/16/1997	70	H1
FRAN 1996	8/23/1996	105	H3
BERYL 1994	8/14/1994	50	TS

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category
UNNAMED 1994	7/20/1994	30	TD
HUGO 1989	9/10/1989	140	H5
CHRIS 1988	8/21/1988	45	TS
DANNY 1985	8/12/1985	80	H1
BOB 1985	7/21/1985	65	H1
DAVID 1979	8/25/1979	150	H5
BABE 1977	9/3/1977	65	H1
UNNAMED 1976	9/13/1976	40	TS
GINGER 1971	9/6/1971	95	H2
ALMA 1970	5/17/1970	65	H1
CAMILLE 1969	8/14/1969	150	H5
ABBY 1968	6/1/1968	65	H1
CLEO 1964	8/20/1964	130	H4
CINDY 1959	7/4/1959	65	H1
GRACIE 1959	9/20/1959	115	H4
DIANE 1955	8/7/1955	90	H2
HAZEL 1954	10/5/1954	115	H4
UNNAMED 1952	8/27/1952	45	TS
ABLE 1952	8/18/1952	85	H2
UNNAMED 1949	9/11/1949	45	TS
UNNAMED 1949	8/23/1949	115	H4
UNNAMED 1945	9/12/1945	115	H4
UNNAMED 1944	7/30/1944	70	H1
UNNAMED 1940	8/5/1940	85	H2
UNNAMED 1935	8/29/1935	160	H5
UNNAMED 1927	9/30/1927	50	TS
UNNAMED 1920	9/19/1920	75	H1
UNNAMED 1915	7/31/1915	65	H1
UNNAMED 1913	8/30/1913	75	H1
UNNAMED 1904	9/8/1904	70	H1
UNNAMED 1902	6/12/1902	50	TS
UNNAMED 1901	7/4/1901	70	H1
UNNAMED 1899	10/26/1899	95	H2
UNNAMED 1896	9/22/1896	110	H3
UNNAMED 1893	9/25/1893	105	H3
UNNAMED 1893	8/15/1893	105	H3
UNNAMED 1889	9/12/1889	95	H2
UNNAMED 1888	9/6/1888	50	TS
UNNAMED 1886	6/27/1886	85	H2
UNNAMED 1886	6/17/1886	85	H2
UNNAMED 1885	10/10/1885	60	TS
UNNAMED 1883	9/4/1883	110	H3
UNNAMED 1882	9/2/1882	110	H3
UNNAMED 1878	9/1/1878	90	H2
UNNAMED 1867	6/21/1867	70	H1
UNNAMED 1859	9/15/1859	70	H1
UNNAMED 1854	9/7/1854	110	H3

Source: National Hurricane Center, NCEI

The National Centers for Environmental Information reported 19 events associated with a hurricane or tropical storm in the Northern Piedmont Region between 1950 and 2018. The storms resulted in over $4 million of property damage within the region and numerous trees and power lines were reported down across the region. Federal records also indicate that six disaster declarations were made in 1989 (Hurricane Hugo), 1996 (Hurricane Fran), 1999 (Hurricane Floyd), 2004 (Hurricane Ivan), 2018 (Tropical Storm Michael), and 2020 (Tropical Storm Eta)[9].

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in the Northern Piedmont Region. However, winds can also be a concern in terms of damage to utilities, buildings, and trees. Some anecdotal information is available for the major storms that have impacted that area as found below:

Hurricane Isabel – September 18, 2003
As Hurricane Isabel weakened to a tropical storm, winds were sustained during the mid-afternoon and early evening at up to 45 to 55 mph with gusts near 65 mph. This produced widespread wind damage with numerous trees and power lines downed.

Hurricane Irene – August 27, 2011
The center of Irene made landfall along the Virginia coast but strong winds extended well west into the North Carolina Piedmont generating gusts to at least 40 mph and bringing down some trees and large tree branches. Danville ASOS (KDAN) just over the border from Caswell County had a wind gust to 44 mph around 12 pm.

Tropical Storm Hermine – September 2, 2016
Tropical Storm Hermine tracked along the Southeast United States coastline and across coastal portions of the Carolinas. Tropical Storm Hermine produced heavy rain across portions of central North Carolina. However, due to dry antecedent conditions, no flooding occurred despite rainfall amounts of up to 3 to 5 inches across southeastern portions of central North Carolina. Given the rain and gusty winds associated with Hermine there were numerous reports of trees down and wind damage and resultant power outages in Forsyth County.

Tropical Storm Michael – October 10, 2018
Tropical Storm Michael moved through North Carolina on Thursday, October 11th. Michael brought heavy rain and strong damaging winds to central North Carolina. While heavy rainfall of 3 to 6 inches produced minor flash flooding across the area, it was high wind gusts of 40 to 60 mph that caused the biggest problems, knocking down scores of trees, leading to blocked roadways and thousands without power.

Tropical Storm Helene – September 26-29, 2024
Tropical Storm Helene originated in the Caribbean Sea and rapidly intensified to a major hurricane ahead of its landfall along the coast of Florida before moving farther north towards the Appalachian Mountains with an unprecedented amount of rainfall. Many areas across the Carolinas broke historic records for precipitation totals with anywhere from 10 to nearly 30 inches recorded and some estimates reported over 40 trillion cumulative gallons released throughout the course of Helene's lifetime in the Southeast. This led to multiple 1,000-year flood events in Western North Carolina where the worst impacts materialized. According to the National Centers for Environmental Information (NCEI), Helene

[9] 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*.

led to roughly 219 deaths making it one of the deadliest hurricanes after Hurricane Maria (2,981) and Hurricane Katrina (1,833) in addition to approximately $78.7 billion in CPI-adjusted estimated costs[10].

5.5.4 Changing Future Conditions

North Carolina is vulnerable to the hazards of tropical storms and hurricanes due to its location along the Atlantic Coast. This inherently creates the greatest risk near low-lying coastal areas of the state, although inland areas found to the west may still face significant impacts over time. According to 2022 climate summary data from the NOAA National Centers for Environmental Information, a storm at hurricane-level intensity makes landfall in the state roughly once every 3 years. Several periods since the late 1990s were notably active in terms of hurricane formation and local damages, including Hurricanes Dennis, Floyd, Frances, Ivan, Matthew, and Florence. Models project that hurricane-associated storm intensity and rainfall rates will both increase in the future despite some annual variability in the number of landfalling hurricanes in North Carolina[11].

5.5.5 Probability of Future Occurrences

Given the inland location of the region, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but still remains a real threat to the Northern Piedmont Region due to induced events like flooding and landsliding. Based on historical evidence, the probability level of future occurrence is possible (between 1 and 10 percent annual probability). Given the regional nature of the hazard, all areas are equally exposed to this hazard. However, when the region is impacted, the damage could be catastrophic, threatening lives and property throughout the planning area. As of 2024, the FEMA National Risk Index rates the hurricane hazard as “relatively low” across Caswell County, Davie County, Forsyth County, Rockingham County, Stokes County, and Surry County compared to “very low” in Yadkin County.

[10] NCEI Billion-Dollar Weather and Climate Disasters (https://www.ncei.noaa.gov/access/billions/events)

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

5.6 TORNADOES/THUNDERSTORMS

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

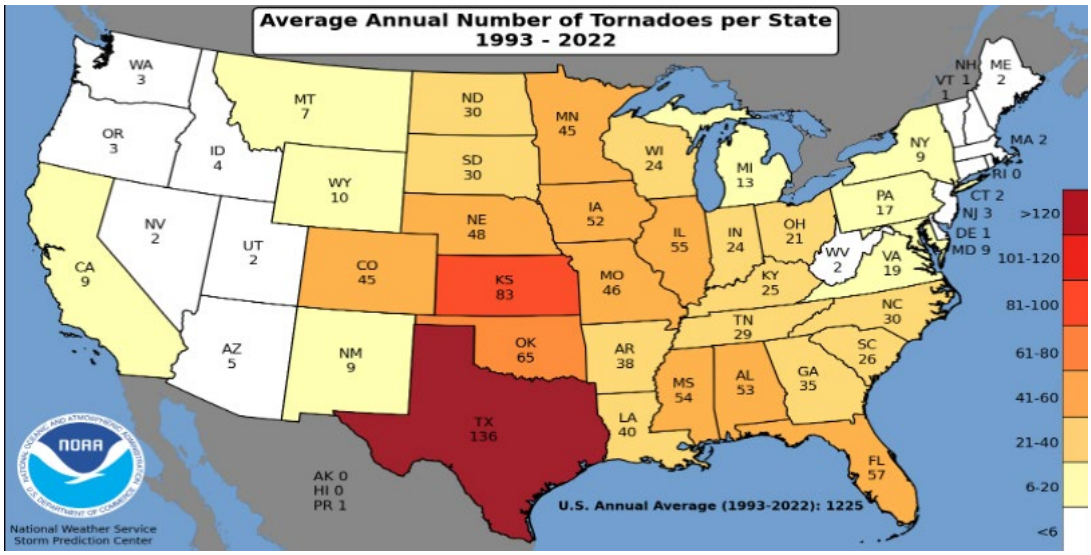
5.6.1 Background and Description

Tornadoes

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

Each year, an average of over 1,200 tornadoes is reported nationwide, resulting in an average of approximately 56 deaths and 1,500 injuries[12]. According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas, and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of "tornado alley"), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). **Figure 5.7** shows tornado activity in the United States based on the number of recorded tornadoes per 10,000 square miles.

FIGURE 5.7: TORNADO ACTIVITY IN THE UNITED STATES



Source: NOAA Storm Prediction Center

Tornadoes are more likely to occur during the months of March through May and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down

[12] NOAA, 2013.

briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

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

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

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

Source: National Weather Service

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

EF-Scale Number	Intensity Phrase	3 Second Gust (MPH)	Type of Damage Done
0	Gale	65-85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
1	Moderate	86-110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
2	Significant	111-135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
3	Severe	136-165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
4	Devastating	166-200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
5	Incredible	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

Thunderstorms

Thunderstorms can produce a variety of accompanying hazards including wind, hailstorms, and lightning[13], which are all discussed here. Although thunderstorms generally affect a small area, they are very dangerous and may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun's heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Furthermore, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) hail of three-quarters of an inch, 2) a tornado, or 3) winds of at least 58 miles per hour.

Thunderstorm events have the capability of producing straight-line winds that can cause severe destruction to communities and threaten the safety of a population. Such wind events, sometimes separate from a thunderstorm event, are common throughout the Northern Piedmont Region.

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

Therefore, high winds are also reported in this section.

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

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

Hailstorms

Hailstorms are a potentially damaging outgrowth of severe thunderstorms (thunderstorms are discussed separately in Section 5.8). Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. **Table 5.15** shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 5.15: TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 – 0.2	No damage
H1	Potentially Damaging	5-**15**	>20	0.2 – 0.6	Slight general damage to plants, crops
H2	Significant	10-**20**	>100	0.4 – 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-**30**	>300	0.8 – 1.2	Severe damage to crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-**40**	>500	1.0 – 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-**50**	>800	1.2 – 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-**60**		1.6 – 2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-**75**		2.0 – 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-**90**		1.6 – 3.5	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-**100**		3.0 – 3.9	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m²	mm to inch conversion (inches)	Typical Damage Impacts
H10	Super Hailstorms	>100			Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organisation (TORRO)

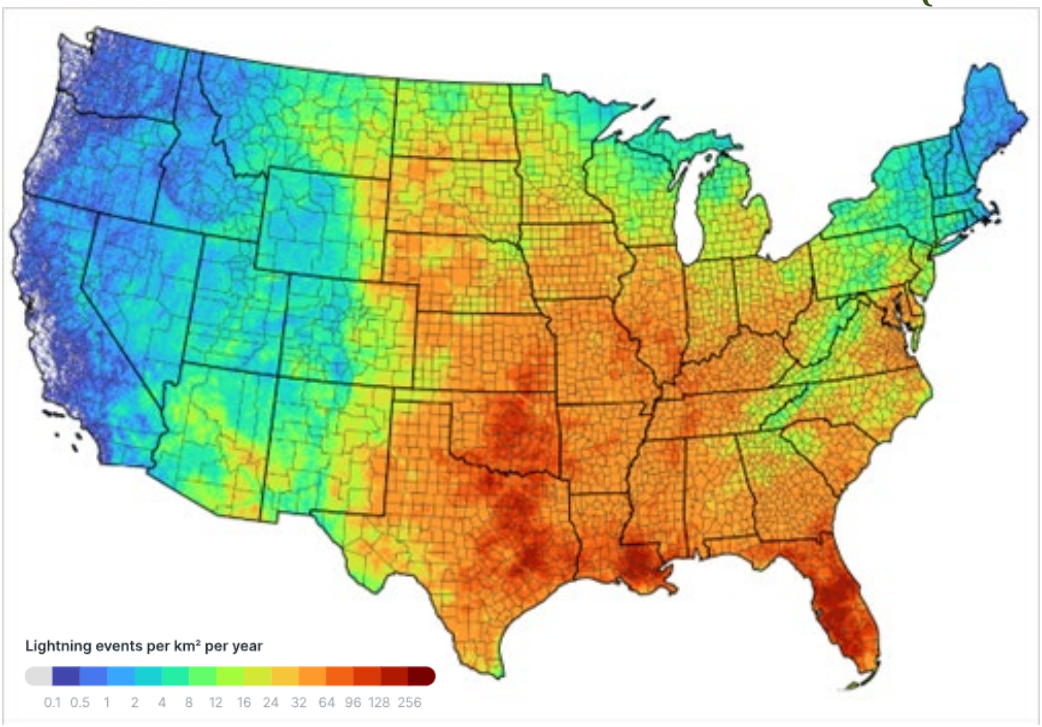
Lightning

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

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

Figure 5.8 shows a lightning flash density map for the years 2016-2022 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN).

FIGURE 5.8: LIGHTNING FLASH DENSITY IN THE UNITED STATES (2016-2022)



Source: Vaisala U.S. National Lightning Detection Network

5.6.2 Location and Spatial Extent

Tornadoes

Tornadoes occur throughout the state of North Carolina, and thus in the Northern Piedmont 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 Northern Piedmont Region is uniformly exposed to this hazard.

Thunderstorms

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

Hailstorms

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

Lightning

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

5.6.3. Historical Occurrences

Tornadoes

Tornadoes are a somewhat rare occurrence; however, they have and do occur in the Northern Piedmont Region. Tornadoes resulted in four disaster declarations in the Northern Piedmont Region in 1989, 1998, 2018, and 2020[14]. According to the National Centers for Environmental Information, there have been a total of 69 recorded tornado events in the Northern Piedmont Region since 1950 (**Table 5.16**), resulting in over $310 million (2023 dollars) in property damages[15]. In addition, 2 deaths and 115 injuries were reported. The magnitude of these tornadoes ranges from F0 to F3 in intensity, although an F4 or 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.

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

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

TABLE 5.16: SUMMARY OF TORNADO OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)[16]
Caswell County	**7**	**0/3**	**$6,504,741**
Milton	1	0/0	$117,228
Yanceyville	1	0/0	$3,764
Unincorporated Areas	5	0/3	$6,383,749
Davie County	**7**	**0/1**	**$479,706**
Bermuda Run	0	0/0	-
Cooleemee	1	0/0	-
Mocksville	1	0/0	$21,548
Unincorporated Areas	5	0/1	$458,158
Forsyth County	**16**	**0/58**	**$182,042,881**
Bethania	0	0/0	-
Clemmons	2	0/5	$94,209,460
Kernersville	0	0/0	-
Lewisville	1	0/0	-
Rural Hall	0	0/0	-
Tobaccoville	0	0/0	-
Walkertown	0	0/0	-
Winston-Salem	0	0/0	-
Unincorporated Area	13	0/53	$87,833,421
Rockingham County	**11**	**2/34**	**$75,355,803**
Eden	1	0/0	$5,013,562
Madison	0	0/0	-
Mayodan	2	2/27	$64,442,844
Reidsville	0	0/0	-
Stoneville	0	0/0	-
Wentworth	0	0/0	-
Unincorporated Area	8	0/7	$5,899,397
Stokes County	**9**	**0/15**	**$27,366,669**
Danbury	0	0/0	-
King	3	0/0	$26,160,924
Walnut Cove	0	0/0	-
Unincorporated Area	6	0/15	$1,205,745
Surry County	**9**	**0/3**	**$5,289,752**
Dobson	0	0/0	-
Elkin	1	0/0	-
Mount Airy	1	0/0	$274,043
Pilot Mountain	0	0/0	-
Unincorporated Area	7	0/3	$5,015,709
Yadkin County	**10**	**0/1**	**$13,458,074**

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)[16]
Boonville	0	0/0	-
East Bend	0	0/0	-
Jonesville	0	0/0	-
Yadkinville	2	0/0	-
Unincorporated Area	8	0/1	**$13,458,074**
Northern Piedmont Regional Total	**69**	**2/115**	**$310,497,626**

Source: National Centers for Environmental Information

Thunderstorms

Severe storms have resulted in three disaster declarations in the Northern Piedmont Region in and of themselves[17]. According to NCEI, there have been over 2,180 reported thunderstorm and high wind events since 1950 in the Northern Piedmont[18]. These events caused over $23 million dollars (2023 dollars) in damages. There were reports of 2 deaths and 22injuries. **Table 5.17** summarizes this information.

TABLE 5.17: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)
Caswell County	**249**	**0/0**	**$3,787,016**
Milton	13	0/0	$33,140
Yanceyville	32	0/0	$319,736
Unincorporated Areas	204	0/0	$3,434,140
Davie County	**147**	**0/0**	**$1,091,681**
Bermuda Run	-	0/0	-
Cooleemee	8	0/0	$1,196
Mocksville	41	0/0	$117,658
Unincorporated Areas	98	0/0	$972,827
Forsyth County	**351**	**1/3**	**$1,813,205**
Bethania	4	0/0	$675,080
Clemmons	20	0/1	$75,306
Kernersville	27	0/0	$49,903
Lewisville	40	0/0	$99,648
Rural Hall	10	0/0	$6,282
Tobaccoville	14	0/0	$85,606
Walkertown	18	0/0	$15,844
Winston-Salem	38	1/1	$158,160
Unincorporated Area	180	1/3	$647,376
Rockingham County	**441**	**0/0**	**$6,151,257**
Eden	31	0/0	$278,182

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

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)
Madison	27	0/0	$223,494
Mayodan	24	0/0	$92,709
Reidsville	53	0/0	$143,713
Stoneville	40	0/0	$196,801
Wentworth	27	0/0	$77,548
Unincorporated Area	239	0/0	$5,138,810
Stokes County	**340**	**0/0**	**$2,281,452**
Danbury	42	0/0	$102,142
King	31	0/0	$282,066
Walnut Cove	34	0/0	$147,581
Unincorporated Area	233	0/0	$1,749,663
Surry County	**445**	**1/12**	**$5,777,110**
Dobson	40	0/0	$121,099
Elkin	37	0/3	$733,398
Mount Airy	64	0/0	$1,105,003
Pilot Mountain	29	0/0	$315,234
Unincorporated Area	275	1/9	$3,502,376
Yadkin County	**207**	**0/7**	**$2,745,928**
Boonville	17	0/1	$104,445
East Bend	16	0/0	$98,771
Jonesville	18	0/3	$143,594
Yadkinville	37	0/0	$397,590
Unincorporated Area	156	0/3	$2,001,528
Northern Piedmont Regional Total	**2,180**	**2/22**	**$23,647,649**

Source: National Centers for Environmental Information

Hailstorms

According to the National Centers for Environmental Information, 727 recorded hailstorm events have affected the Northern Piedmont Region since 1950[19]. **Table 5.18** is a summary of the hail events in the Northern Piedmont Region. In all, hail occurrences resulted in over $1.4 million (2023 dollars) in property damages, most of which were reported in Surry County. Hail ranged in diameter from 0.75 inches to 4.5 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Centers for Environmental Information. Furthermore, high losses in Surry County indicate that neighboring counties may also be subject to additional, unreported losses. Therefore, it is likely that damages are greater than the reported value. Additionally, a single storm event may have affected multiple counties.

[19] These hail events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional hail events have affected the Northern Piedmont Region. As additional local data becomes available, this hazard profile will be amended.

TABLE 5.18: SUMMARY OF HAIL OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)
Caswell County	**78**	**0/0**	**$20,982**
Milton	4	0/0	-
Yanceyville	14	0/0	-
Unincorporated Areas	60	0/0	$20,982
Davie County	**79**	**0/0**	**$0**
Bermuda Run	-	0/0	-
Cooleemee	5	0/0	-
Mocksville	31	0/0	-
Unincorporated Areas	43	0/0	-
Forsyth County	**109**	**0/0**	**$0**
Bethania	-	0/0	-
Clemmons	12	0/0	-
Kernersville	12	0/0	-
Lewisville	9	0/0	-
Rural Hall	5	0/0	-
Tobaccoville	2	0/0	-
Walkertown	4	0/0	-
Winston-Salem	24	0/0	-
Unincorporated Area	41	0/0	-
Rockingham County	**160**	**0/0**	**$275,878**
Eden	24	0/0	$106,509
Madison	12	0/0	-
Mayodan	9	0/0	-
Reidsville	29	0/0	$141,141
Stoneville	6	0/0	-
Wentworth	8	0/0	$28,228
Unincorporated Area	72	0/0	-
Stokes County	**91**	**0/0**	**$6,626**
Danbury	12	0/0	$3,681
King	10	0/0	-
Walnut Cove	9	0/0	$2,945
Unincorporated Area	60	0/0	-
Surry County	**141**	**0/0**	**$920,464**
Dobson	11	0/0	-
Elkin	9	0/0	-
Mount Airy	20	0/0	$912,434
Pilot Mountain	9	0/0	-
Unincorporated Area	92	0/0	$8,030
Yadkin County	**69**	**0/0**	**$203,715**
Boonville	9	0/0	-
East Bend	11	0/0	$4,417
Jonesville	2	0/0	-

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)
Yadkinville	10	0/0	$199,298
Unincorporated Area	34	0/0	-
Northern Piedmont Regional Total	**727**	**0/0**	**$1,427,665**

Source: National Centers for Environmental Information

Lightning

According to the National Centers for Environmental Information, there have been a total of 51 recorded lightning events in the Northern Piedmont Region since 1994[20]. These events resulted in over $7.5 million (2023 dollars) in damages, as listed in summary **Table 5.19**. Furthermore, lightning caused at least ten injuries throughout the Northern Piedmont Region. It is certain that more than 43 events have impacted the Region. Many of the reported events are those that caused damage. Therefore, it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE 5.19: SUMMARY OF LIGHTNING OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)
Caswell County	**4**	**0/0**	**$249,190**
Milton	0	0/0	-
Yanceyville	0	0/0	-
Unincorporated Areas	4	0/0	$249,190
Davie County	**3**	**0/1**	**$141,139**
Bermuda Run	0	0/0	-
Cooleemee	0	0/0	-
Mocksville	2	0/1	$117,228
Unincorporated Areas	1	0/0	$23,911
Forsyth County	**4**	**0/0**	**$349,834**
Bethania	0	0/0	-
Clemmons	1	0/0	$11,213
Kernersville	2	0/0	$271,865
Lewisville	1	0/0	$66,756
Rural Hall	0	0/0	-
Tobaccoville	0	0/0	-
Walkertown	0	0/0	-
Winston-Salem	0	0/0	-
Unincorporated Area	0	0/0	-
Rockingham County	**11**	**0/5**	**$4,849,899**
Eden	3	0/0	$3,880,979
Madison	1	0/0	$959
Mayodan	0	0/0	-
Reidsville	0	0/0	-

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)
Stoneville	2	0/0	$10,413
Wentworth	2	0/5	$832,447
Unincorporated Area	3	0/0	$125,101
Stokes County	**6**	**0/1**	**$127,684**
Danbury	1	0/0	-
King	1	0/0	$643
Walnut Cove	1	0/0	$30,009
Unincorporated Area	2	0/1	$97,032
Surry County	**17**	**0/3**	**$1,450,971**
Dobson	0	0/0	-
Elkin	1	0/0	$56,180
Mount Airy	6	0/1	$946,401
Pilot Mountain	2	0/0	$39,174
Unincorporated Area	8	0/2	$409,216
Yadkin County	**6**	**0/0**	**$357,874**
Boonville	3	0/0	$40,994
East Bend	0	0/0	-
Jonesville	1	0/0	$36,714
Yadkinville	0	0/0	-
Unincorporated Area	2	0/0	$280,166
Northern Piedmont Regional Total	**51**	**0/10**	**$7,526,591**

Source: National Centers for Environmental Information

5.6.4 Changing Future Conditions

Tornadoes are among the most difficult hazards to link definitively to changes in climate, partially because they are both relatively small and short-lived events when compared against wildfires, heat waves, and other climate disasters with a larger temporal and/or spatial distribution. However, the clustering of tornado systems has appeared to increase in recent years despite few changes in the total number of systems observed[21]. According to 2022 climate summary data from the NOAA National Centers for Environmental Information, tornadoes can be produced by hurricanes and severe thunderstorm systems, with the largest outbreak of 30 confirmed tornadoes and 24 deaths in North Carolina reported as of April 16, 2011.

Changing weather patterns may also result in more frequent and more severe storms (thunderstorms, lightning, and hail) throughout the Northern Piedmont Region. According to the National Aeronautics and Space Administration (NASA), severe storm events are likely to become more frequent and intense throughout the Southeast due to radical changes in weather extremes[22].

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

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

5.6.5 Probability of Future Occurrences

Tornadoes

According to historical information, tornado events are not an annual occurrence for the region. However, in recent years, the southeastern United States, including North Carolina, has experienced a number of tornado events. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should the Northern Piedmont Region experience a direct tornado strike. The probability of future tornado occurrences affecting the Northern Piedmont Region is likely (10 to 100 percent annual probability). As of 2024, the FEMA National Risk Index rates the tornado hazard as "relatively low" across Caswell County, Davie County, Rockingham County, Stokes County, Surry County, and Yadkin County compared to "relatively moderate" in Forsyth County.

Thunderstorms

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire planning area. As of 2024, the FEMA National Risk Index rates the strong wind hazard as "relatively low" in Caswell County, Davie County, Stokes County, and Yadkin County compared to "relatively moderate" in Rockingham County and Surry County and "relatively high" in Forsyth County.

Hailstorms

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is likely (10 to 100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that the entire Northern Piedmont Region has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the region. As of 2024, the FEMA National Risk Index rates the hail hazard as "very low" in Caswell County compared to "relatively low" in Davie County, Rockingham County, Stokes County, Surry County, and Yadkin County and "relatively moderate" in Forsyth County.

Lightning

Since there were a moderate number of historical lightning events reported throughout the Northern Piedmont Region via NCEI data, it is considered a fairly regular occurrence that often accompanies thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN) data from 2016 to 2023, the Northern Piedmont Region is located in an area of the country that experiences an average of 8 to 12 lightning flashes per square kilometer per year. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region. As of 2024, the FEMA National Risk Index rates the lightning hazard as "relatively low" in Caswell County, Davie County, and Stokes County compared to "relatively moderate" in Rockingham County, Surry County, and Yadkin County and "relatively high" in Forsyth County.

5.7 SEVERE WINTER WEATHER

5.7.1 Background and Description

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.

5.7.2 Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. The Northern Piedmont Region is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire region has uniform exposure to a winter storm.

5.7.3 Historical Occurrences

Winter weather has resulted in six disaster declarations in the Northern Piedmont Region. This includes the Blizzard of 1996, one subsequent 1996 winter storm, the 2000 winter storm, 2002 & 2003 ice storms, and a severe winter storm in 2014[23]. According to the National Centers for Environmental Information, there have been a total of 435 recorded winter storm and winter weather events in the Northern

[23] 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*.

Piedmont Region since 1993 (**Table 5.20**)[24]. These events resulted in over $18.8 million (2023 dollars) in damages.

TABLE 5.20: SUMMARY OF WINTER WEATHER EVENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023dollars)
Caswell County	43	0/0	$141,316
Davie County	119	0/0	$15,299,962
Forsyth County	85	0/0	$735,863
Rockingham County	50	0/0	$434,270
Stokes County	49	2/0	$384,635
Surry County	62	4/5	$1,574,288
Yadkin County	27	0/0	$279,807
Northern Piedmont Regional Total	**435**	**6/5**	**$18,850,141**

Source: National Centers for Environmental Information

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

1996 Winter Storm – January 6-8, 1996
Heavy snow developed across northwest North Carolina during the late evening hours on the 11th and spread eastward. The snow mixed with sleet and freezing rain in Rockingham and Caswell Counties. Snow accumulations were generally from 4 to 6 inches in the mountains, around 4 inches in Surry, Stokes, and Yadkin Counties and from 1 to 4 inches in Rockingham, Davie, and Caswell Counties. Hazardous road conditions resulted in numerous traffic accidents and at least one known building collapse.

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

2018 Winter Storm – December 8-9, 2018
This storm developed shortly after midnight on December 9, 2018 and continued into the afternoon. Snowfall was moderate to heavy and both sleet and rain were incorporated. The heavy snow caused numerous vehicle accidents and downed trees that fell on to roads and power lines, and it also caused one indirect fatality in Yadkin County. Average snowfall accumulations ranged from ten to twenty inches over the Northern Piedmont Region.

Winter storms throughout the planning area have several negative externalities including hypothermia for those individuals having to remain outdoors for a certain length of time and likely increased impact

[24] These ice and winter storm events (including cold/wind chill, extreme cold/wind chill, freezing fog, frost/freeze, heavy snow, ice storm, sleet, winter storm, and winter weather) are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional winter storm conditions have affected the Northern Piedmont Region. In addition, the events are reported by county, so many of these storms likely affected all of the counties.

for the need of medical services, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could lead to fire or an accumulation of toxic fumes.

5.7.4 Changing Future Conditions

According to recent climate findings from NOAA, average winter temperatures in urban hubs throughout North Carolina have been noted at 2 to 4 degrees Fahrenheit above the normal average, which is defined as the 30-year Climate Normals data published from 1991 to 2020[25]. The increased atmospheric moisture of warmer conditions year-round also helps to intensify the water cycle. Air holds about 4% more water vapor for each additional degree Fahrenheit increase in temperature – thereby increasing the likelihood of warmer and wetter conditions in future winter seasons[26].

5.7.5 Probability of Future Occurrences

Winter storm events will remain a regular occurrence in the Northern Piedmont Region due to its location in the western part of the state. According to historical information the Northern Piedmont Region often experiences several winter storm events each year. Therefore, the annual probability is likely (10 to 100 percent). As of 2024, the FEMA National Risk Index rates the winter weather hazard as “relatively low” in Davie County, Stokes County, and Yadkin County compared to “relatively moderate” in Caswell County, Forsyth County, and Surry County and “relatively high” in Rockingham County.

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

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

5.8 EARTHQUAKES

5.8.1 Background and Description

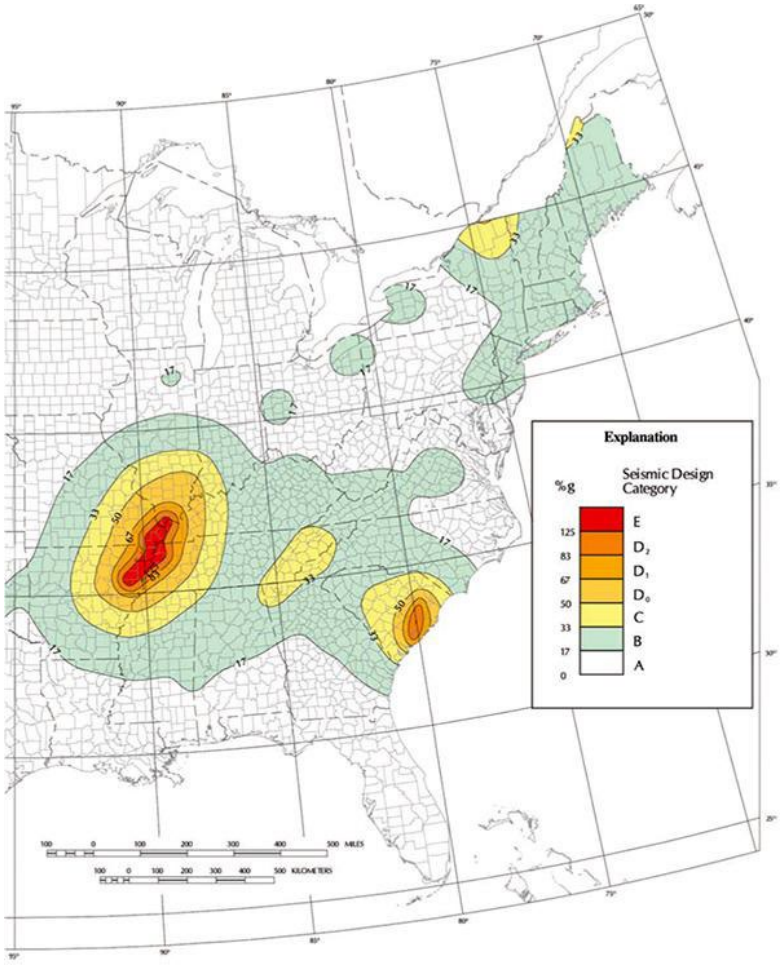
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured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

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

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates. Deformations at plate boundaries can lead to fractures as energy builds. The rock on both sides of the fracture is then snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. **Figure 5.9** shows relative seismic risk for the United States.

FIGURE 5.9: EASTERN UNITED STATES EARTHQUAKE HAZARD MAP



Source: Federal Emergency Management Agency

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (**Table 5.21**). Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 5.22**.

TABLE 5.21: RICHTER SCALE

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

Source: Federal Emergency Management Agency

TABLE 5.22: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

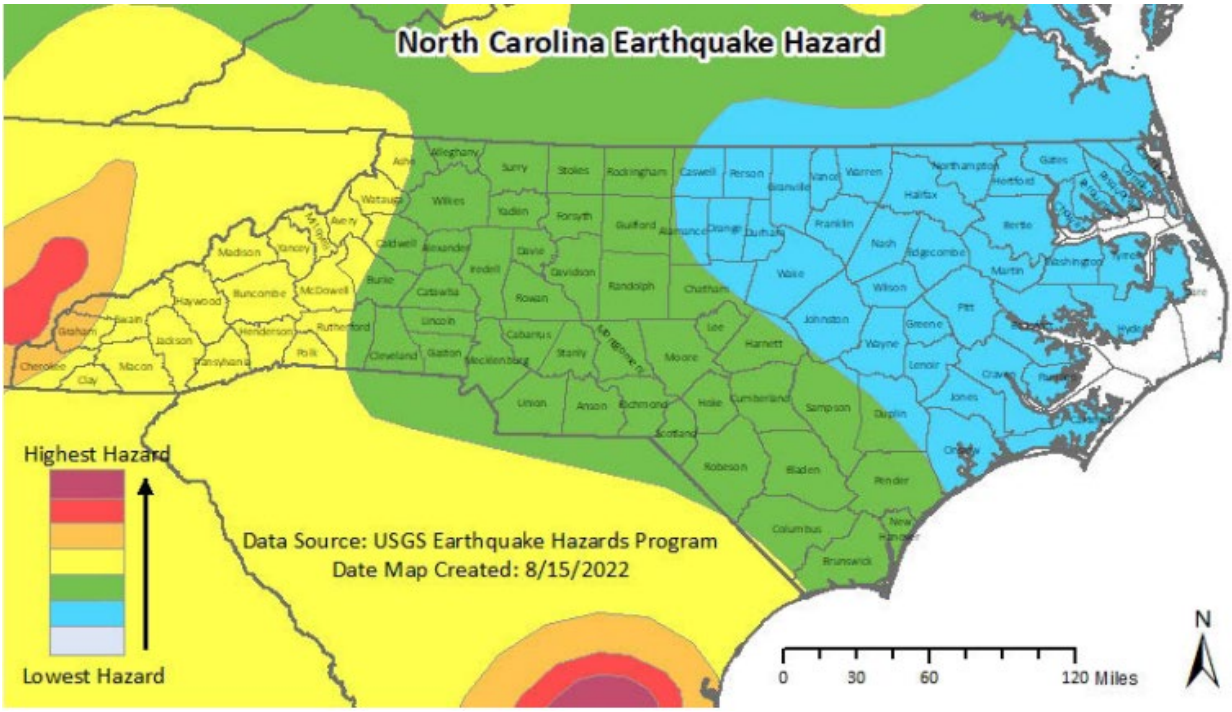
Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Not felt	Not felt except by a very few under especially favorable conditions.	
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.	< 4.2
III	Weak	Felt quite noticeably by persons indoors, especially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

Source: Federal Emergency Management Agency

5.8.2 Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure 5.10** is a map showing geological and seismic information for North Carolina.

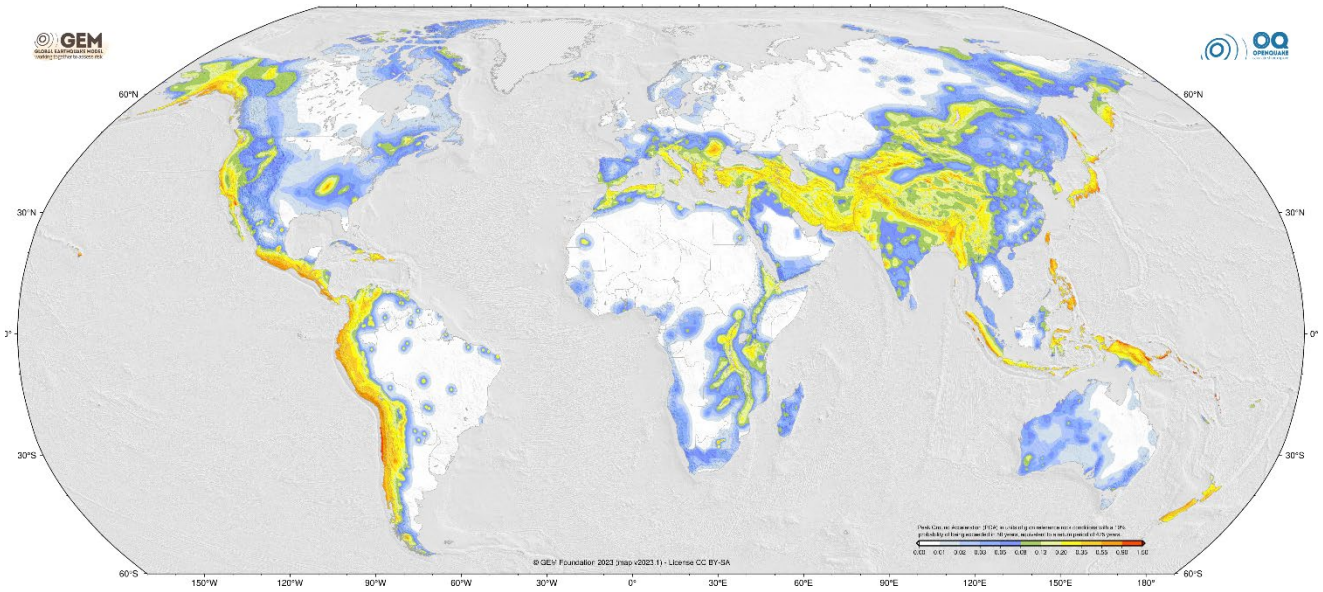
FIGURE 5.10: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.11 shows the intensity level associated with the world and the Northern Piedmont Region, based on the national USGS and Global Earthquake Model (GEM). The Global Earthquake Model Global Seismic Hazard Map depicts the geographic distribution of the Peak Ground Acceleration (PGA) with a 10% probability of being exceeded in 50 years. The data represents the probability that the ground motion will reach a certain level during an earthquake. The map was created by collating maps computed using national and regional probabilistic seismic hazard models developed by various institutions and projects, and by GEM Foundation scientists. This indicates that the region as a whole exists within an area of low to moderate seismic risk.

FIGURE 5.11: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: Global Earthquake Model, 2023

5.8.3 Historical Occurrences

At least 64 earthquakes are known to have affected the Northern Piedmont Region since 1886. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table 5.23** provides a summary of earthquake events reported by the USGS and NOAA between 1638 and 2024.

TABLE 5.23: SUMMARY OF SEISMIC ACTIVITY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Caswell County	**2**	**V**	**< 4.8**
Milton	1	III	< 4.8
Yanceyville	0	--	--
Unincorporated Areas	1	V	< 4.8
Davie County	**1**	**V**	**< 4.8**
Bermuda Run	0	--	--
Cooleemee	0	--	--
Mocksville	0	--	--
Unincorporated Areas	1	V	< 4.8
Forsyth County	**22**	**V**	**< 4.8**
Bethania	0	--	--
Clemmons	1	III	< 4.8
Kernersville	0	--	--
Lewisville	1	IV	< 4.8
Rural Hall	1	V	< 4.8
Tobaccoville	0	--	--
Walkertown	0	--	--
Winston-Salem	7	IV	< 4.8
Unincorporated Area	12	III	< 4.8

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Rockingham County	**5**	**VI**	**< 5.4**
Eden	0	--	--
Madison	1	IV	< 4.8
Mayodan	0	--	--
Reidsville	1	IV	< 4.8
Stoneville	0	--	--
Wentworth	0	--	--
Unincorporated Area	3	VI	< 5.4
Stokes County	**3**	**IV**	**< 4.8**
Danbury	1	IV	< 4.8
King	0	--	--
Walnut Cove	1	III	< 4.8
Unincorporated Area	1	III	< 4.8
Surry County	**24**	**VI**	**< 5.4**
Dobson	2	V	< 4.8
Elkin	3	IV	< 4.8
Mount Airy	3	VI	< 5.4
Pilot Mountain	3	V	< 4.8
Unincorporated Area	13	VI	< 4.8
Yadkin County	**7**	**V**	**< 4.8**
Boonville	2	IV	< 4.8
East Bend	1	V	< 4.8
Jonesville	2	IV	< 4.8
Yadkinville	1	--	--
Unincorporated Area	1	V	< 4.8
Northern Piedmont Regional Total	**64**	**VI**	**< 5.4**

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

TABLE 5.24: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
12/16/1811 - 1	NE Arkansas	8.5	XI	VI
12/16/1811 - 2	NE Arkansas	8.0	X	VI
12/18/1811 - 3	NE Arkansas	8.0	X	VI
01/23/1812	New Madrid, MO	8.4	XI	VI
02/071812	New Madrid, MO	8.7	XII	VI
04/29/1852	Wytheville, VA	5.0	VI	VI
08/31/1861	Wilkesboro, NC	5.1	VII	VII
12/23/1875	Central Virginia	5.0	VII	VI
08/31/1886	Charleston, SC	7.3	X	VII
05/31/1897	Giles County, VA	5.8	VIII	VI
01/01/1913*	Union County, SC	4.8	VII	VI
02/21/1916*	Asheville, NC	5.5	VII	VII
07/08/1926	Mitchell County, NC	5.2	VII	VII
11/03/1928*	Newport, TN	4.5	VI	VI

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
05/13/1957*	McDowell County, NC	4.1	VI	VI
07/02/1957	Buncombe County, NC	3.7	VI	VI
11/24/1957	Jackson County, NC	4.0	VI	VI
10/27/1959 **	Chesterfield, SC	4.0	VI	VI
07/13/1971	Newry, SC	3.8	VI	VI
11/30/1973*	Alcoa, TN	4.6	VI	VI
11/13/1976	Southwest Virginia	4.1	VI	VI
05/05/1981	Henderson County, NC	3.5	VI	VI

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

5.8.4 Changing Future Conditions

According to the North Carolina Department of Environmental Quality (NCDEQ), despite infrequent occurrences of severe seismic events and no active fault zones in the state, North Carolina is bordered by the Middleton Place-Summerville Seismic Zone (near Charleston, SC) to the south, East Tennessee Seismic Zone to the west, and Central Virginia Seismic Zone to the north[27]. Although strong earthquakes are rare in North Carolina, there have still been several notable events recorded across susceptible regions of the state within the last 100 years alone. A single event of magnitude 5 or greater can easily cut off critical infrastructure around the mountains and cause residual structural damage over a large area. Current building and development practices may account for this hazard in their designs, but significant portions of existing development, especially in more rural or older areas, will remain vulnerable to earthquakes without any new structural interventions. Earthquakes are primarily influenced by tectonic processes and although they could potentially be affected by climate factors such as droughts these connections remain unclear[28].

5.8.5 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the Northern Piedmont Region is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the region. Members of the planning committee noted that tremor events have been observed approximately every 7-8 months.

The annual probability level for the region is estimated between 1 and 10 percent (possible). The USGS also uses historical data to predict the probability of a major earthquake (equivalent to Modified Mercalli Intensity VI or greater) within the next 100 years, reporting a 5-25% chance for North Carolina as of 2023[29]. As of 2024, the FEMA National Risk Index rates the earthquake hazard as “very low” across Caswell County, Davie County, Rockingham County, Stokes County, Surry County, and Yadkin County compared to “relatively low” in Forsyth County.

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

5.9 GEOLOGICAL

5.9.1 Background and Description

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

Landslides

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

There are several types of landslides: rock falls, rock topple, slides, and flows. Rock falls are rapid movements of bedrock, which result in bouncing or rolling. A topple is a section or block of rock that rotates or tilts before falling to the slope below. Slides are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material.

Mudflows, sometimes referred to as mudslides, mudflows, lahars or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits. Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

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

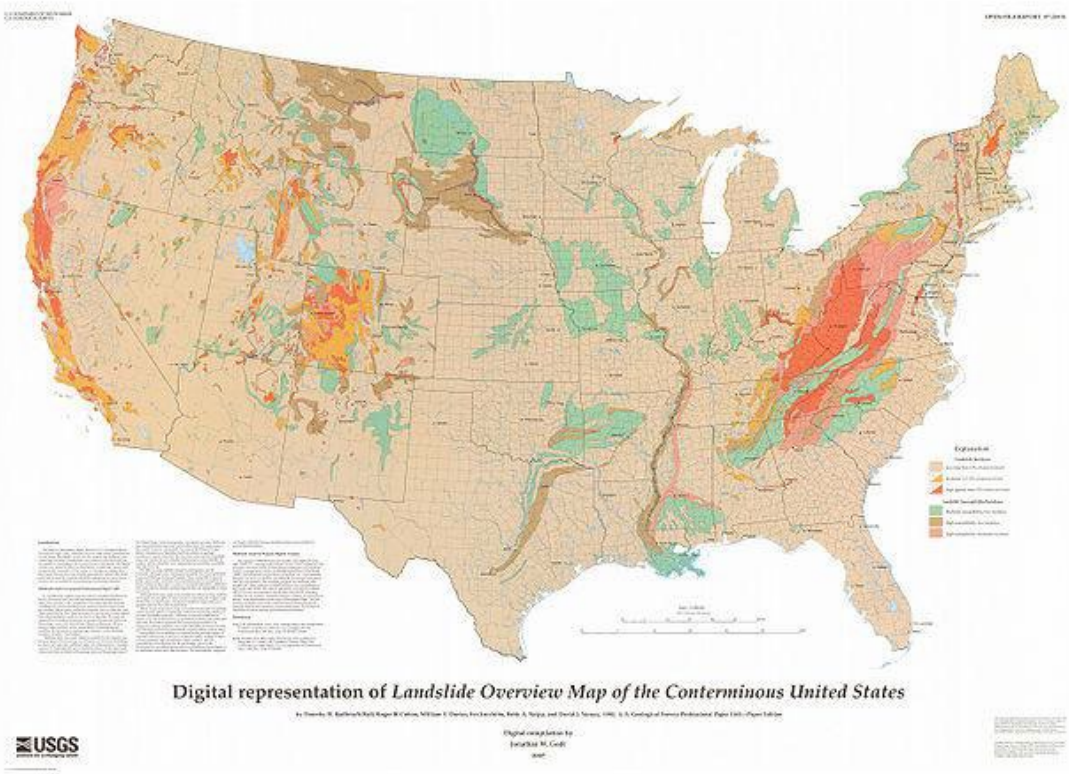
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved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

According to the United States Geological Survey, each year landslides cause $5.4 billion (2023 dollars) in damage and between 25 and 50 deaths in the United States[30]. **Figure 5.12** delineates areas where large

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

numbers of landslides have occurred and areas that are susceptible to landsliding in the conterminous United States[31].

FIGURE 5.12: LANDSLIDE OVERVIEW MAP OF THE CONTERMINOUS UNITED STATES[32]



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

Source: USGS

Sinkholes

According to the United States Geological Survey, a sinkhole is an area of ground that has no natural external surface drainage--when it rains, all of the water stays inside the sinkhole and typically drains into

[31] This map layer is provided in the U.S. Geological Survey Professional Paper 1183, Landslide Overview Map of the Conterminous United States, available online at: https://www.usgs.gov/programs/landslide-hazards

[32] Susceptibility not indicated where same or lower than incidence. Susceptibility to landsliding was defined as the probable degree of response of [the area] rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landsliding. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated.

the subsurface. Sinkholes can vary from a few feet to hundreds of acres and from less than 1 to more than 100 feet deep. Some are shaped like shallow bowls or saucers whereas others have vertical walls.

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces just get too big. If there is not enough support for the land above the spaces then a sudden collapse of the land surface can occur. These collapses can be small, or, as **Figure 5.13** below shows, they can be huge and can occur where a house or road is on top[33].

FIGURE 5.13: SINKHOLE IN NORTH CAROLINA

Source: NCEM

Erosion

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

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

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

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.

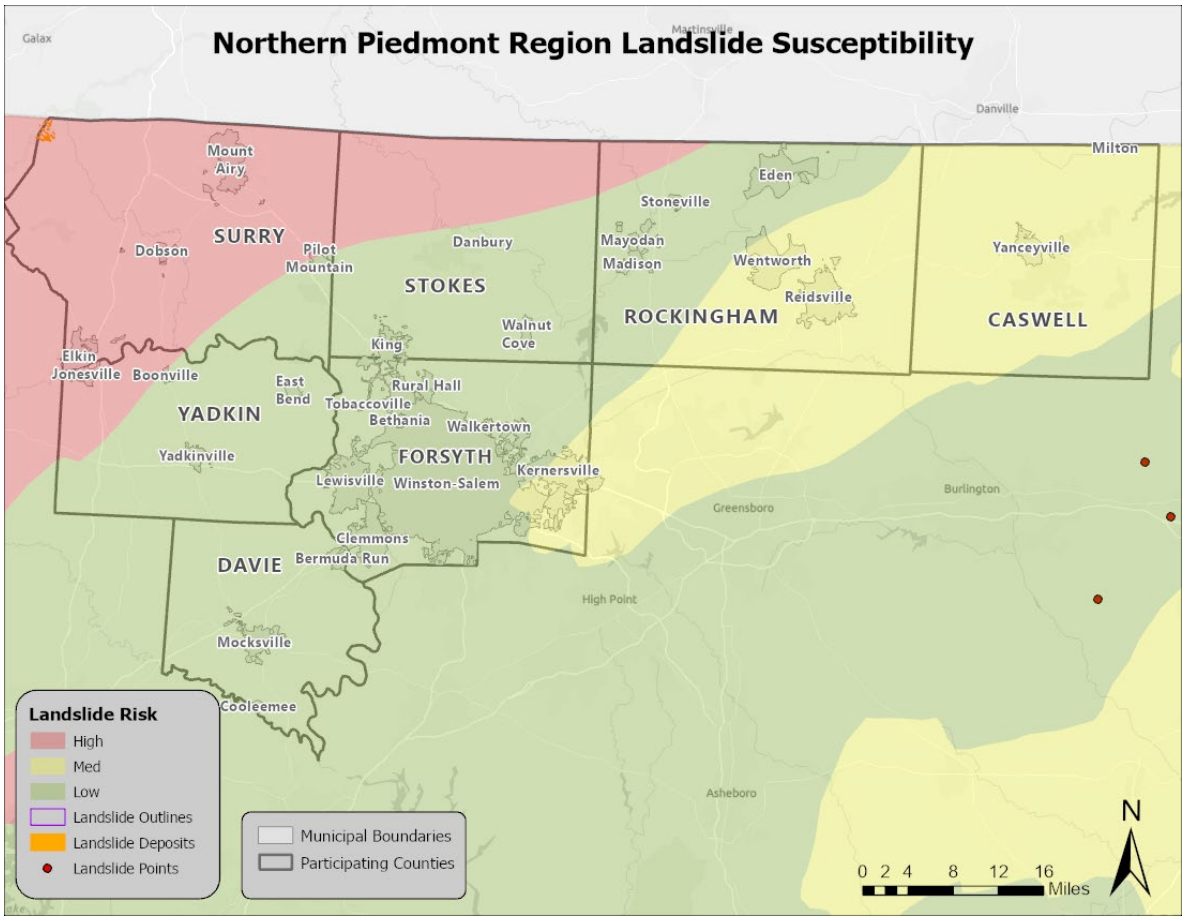
5.9.2 Location and Spatial Extent

Landslides

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

According to **Figure 5.14** below, landslide activity is limited in the region based on existing North Carolina Geological Survey inventories. However, previous risk mapping from the USGS has identified large areas of Surry County, northern Stokes County, and western Yadkin County at high risk.

FIGURE 5.14: NORTHERN PIEDMONT REGION LANDSLIDE SUSCEPTIBILITY

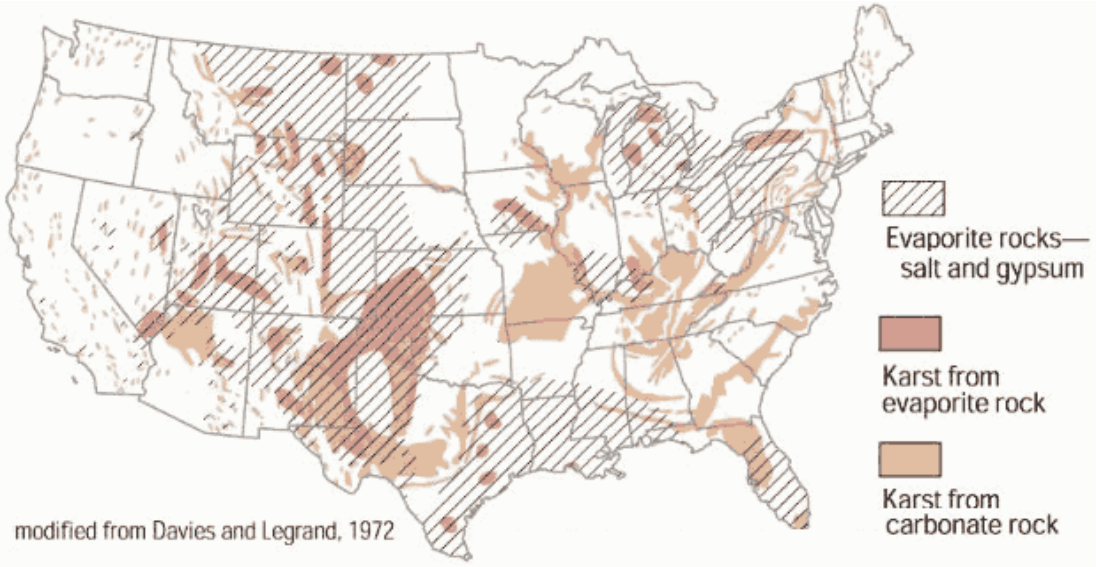


Source: United States Geological Survey, North Carolina Geological Survey

Sinkholes

Figure 5.15 below shows areas of the United States where certain rock types that are susceptible to dissolution in water occur. In these areas, the formation of underground cavities can form and catastrophic sinkholes can happen. These rock types are evaporites (salt, gypsum, and anhydrite) and carbonates (limestone and dolomite). Evaporite rocks underlie about 35 to 40 percent of the United States, though in many areas they are buried at great depths. In some cases, sinkholes in North Carolina have been measured at up to 20 to 25 feet in depth, with similar widths.

FIGURE 5.15: UNITED STATES GEOLOGICAL SURVEY OF KARST MODIFIED FROM DAVIES AND LEGRAND, 1972



Erosion

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

5.9.3 Historical Occurrences

Landslides

Steep topography in some areas of the Northern Piedmont Region makes the planning area susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. The locations of landslide events, provided by the North Carolina Geological Survey, demonstrate no reported incidents in the region per the Western North Carolina Landslide Hazard Database[34]. 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 the Northern Piedmont Region counties.

Sinkholes

In North Carolina, most sinkholes occur in the southern coastal plain due to the high concentration of limestone; however, they are also common in the western part of the state and in the Northern Piedmont region though often caused by erosion from failed stormwater infrastructure.

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

Erosion

Most historical occurrences of erosion are seen near the coast of North Carolina, but the Northern Piedmont region is still susceptible to the hazard. Several sources were vetted to identify areas of erosion in the Northern Piedmont Region. This includes searching local newspapers, consulting local officials at meetings, and reviewing previous hazard mitigation plans. Little information could be found beyond the hazard mitigation plans. Erosion was referenced in the previous Northern Piedmont Regional Hazard Mitigation Plan, but there was no recorded history of significant erosion events, and it was found to be a hazard of negligible potential impacts.

5.9.4 Changing Future Conditions

According to the North Carolina Climate Risk Assessment and Resilience Plan as of 2020, the number of landslides statewide is increasing due to more extreme rainfall events. As the global climate continues to change, both storm intensity and rainfall rates affecting North Carolina are projected to increase in tandem[35]. According to the USGS, pumping water and its associated drawdown of the water table is a primary risk factor associated with sinkholes. The potential impacts could accelerate this dynamic as well. For example, altered rainfall patterns and increasing rates of evaporation due to higher temperatures can lead to a decrease in subsurface groundwater flow, resulting in changing sinkhole formations. Decreased groundwater flow could lead to additional water pumping and related drawdowns near urban and industrial areas capable of reducing water tables and contributing to the formation of new sinkholes[36].

5.9.5 Probability of Future Occurrences

Landslides

Based on historical information and the USGS susceptibility index, the probability of future landslide events is possible (1 to 10 percent annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in the Northern Piedmont Region have greater risk than others given factors such as steepness on slope and modification of slopes. As of 2024, the FEMA National Risk Index rates the landslide hazard as “relatively low” in Caswell County, Davie County, Stokes County, and Yadkin County compared to “relatively moderate” in Forsyth County, Rockingham County, and Surry County.

Sinkholes

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

Erosion

Erosion remains a natural, dynamic, and continuous process for the Northern Piedmont Region, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent annual probability). However, given the lack of historical events, location, data, and threat to life or property, no further analysis will be done in Section 6: Vulnerability Assessment.

[35] 2020 NC Climate Risk Assessment and Resilience Plan (https://www.deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-plans-and-progress/nc-climate-risk-assessment-and-resilience-plan)
[36] USGS Sinkholes (https://www.usgs.gov/special-topics/water-science-school/science/sinkholes)

5.10 DAM FAILURE

5.10.1 Background and Description

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

There are approximately 91,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

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

5.10.2 Location and Spatial Extent

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

TABLE 5.25: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

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

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

According to the North Carolina Division of Energy, Mineral, and Land Resources Dam Safety Program as of July 2024, there are 1,185 dams in the Northern Piedmont Region[37]. **Figure 5.16** shows the dam location and the corresponding hazard ranking for each. Of these dams, 150 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.26.**

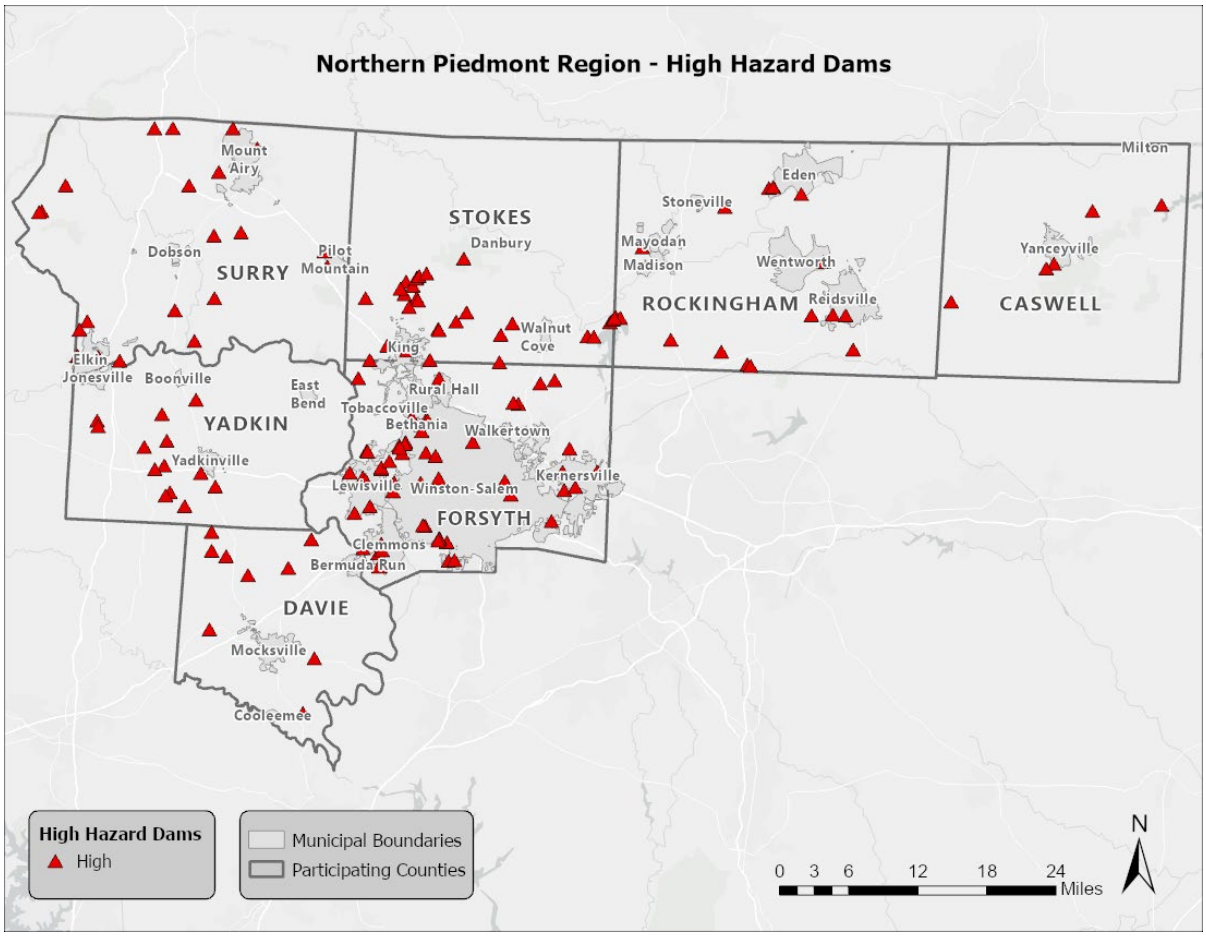
[37] The July 2024 list of high hazard dams was obtained from the North Carolina Division of Energy, Mineral, and Land Resources (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/dam-safety).

TABLE 5.26: SUMMARY OF HIGH HAZARD DAM LOCATION

Location	Number High Hazard Dams
Caswell County	5
Davie County	9
Forsyth County	56
Rockingham County	17
Stokes County	29
Surry County	21
Yadkin County	13
Northern Piedmont Region Total	**150**

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

FIGURE 5.16: NORTHERN PIEDMONT REGION HIGH HAZARD DAM LOCATION



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

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

5.10.3 Historical Occurrences

According to the North Carolina Division of Energy, Mineral, and Land Resources as of July 2024, there have been a total of at least 36 dams with a breach status reported in the Northern Piedmont Region. All dams are classified as low hazard potential including 5 in Caswell County, 1 in Davie County, 9 in Forsyth

County, 7 in Rockingham County, 4 in Stokes County, 7 in Surry County, and 3 in Yadkin County. In addition, it should be noted that several breach scenarios of high hazard dams in the area could be catastrophic.

5.10.4 Changing Future Conditions

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

5.10.5 Probability of Future Occurrence

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events. No further analysis beyond information from the North Carolina Department of Environmental Quality Dam Safety Program will be completed in ***Section 6: Vulnerability Assessment*** as more sophisticated dam breach plans continue to be explored and developed for regional dams of concern.

5.11 FLOODING

5.11.1 Background and Description

Flooding is the most frequent and costly natural hazard in the United States and is a hazard that has caused more than 10,000 deaths since 1900. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major component. Flooding is also a uniquely dangerous hazard due to the wide range of compounding hazards (e.g., hurricanes, thunderstorms, heat waves, earthquakes) that can exacerbate its frequency, intensity, and scale of impact.

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

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff. Urban flooding and the stormwater management it requires poses significant challenges for critical facility operations, emergency response, transportation access, and utility services as developed areas continue to grow. In the event of road inundation, structural breaches, or mechanical failures due to floodwaters the response times to many hazard events may take much longer than originally anticipated. Increasing needs for flood mitigation measures are ongoing across every municipality included in this plan (especially in highly urbanized areas).

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

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

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

probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year and the 500-year flood has a 0.2 percent chance of occurring in any given year.

5.11.2 Location and Spatial Extent

There are areas in the Northern Piedmont Region that are susceptible to flood events. Floodplain maps for each jurisdiction in the region can be viewed in **Appendix F**. Special Flood Hazard Areas (SFHAs) in the Northern Piedmont Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM)[38]. 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 3,011 square miles that make up the Northern Piedmont Region (including the area of Caswell County, Davie County, Forsyth County, Rockingham County, Stokes County, Surry County, and Yadkin County), there are approximately 191.3 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 5.4 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.27.**

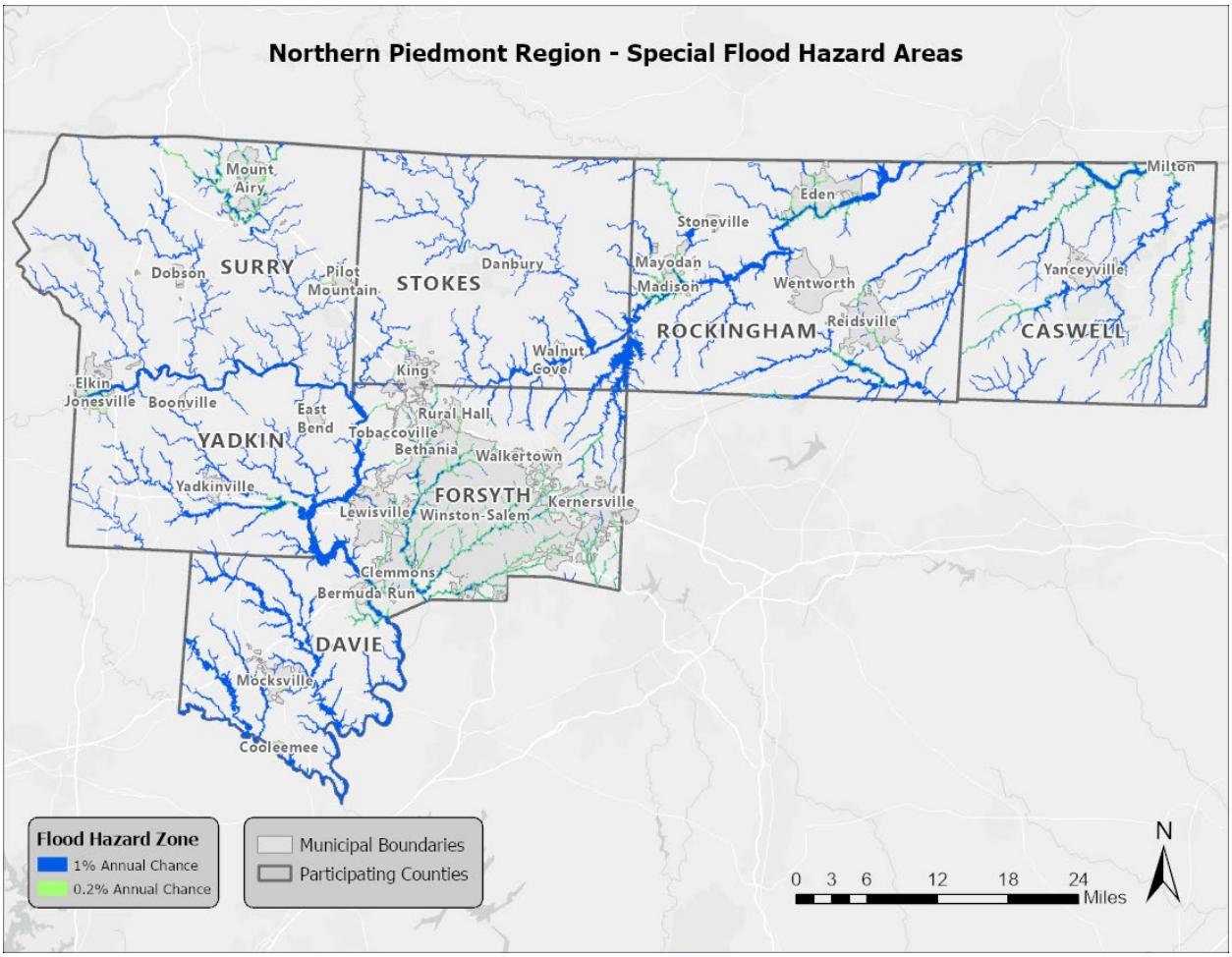
TABLE 5.27: SUMMARY OF FLOODPLAIN AREAS

Location	100-year area (square miles)	500-year area (square miles)
Caswell County	25.6	0.9
Davie County	29.9	0.2
Forsyth County	29.2	1.7
Rockingham County	41.8	1.2
Stokes County	21.7	0.1
Surry County	21.0	1.0
Yadkin County	22.0	0.3
NORTHERN PIEDMONT REGION TOTAL	**191.3**	**5.4**

These flood zone values account for roughly 6.5 percent of the total land area in the Northern Piedmont 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 5.17** illustrates the location and extent of currently mapped Special Flood Hazard Areas for the Northern Piedmont Region based on best available FEMA DFIRM data.

[38] The county-level DFIRM map data used for Caswell County was updated in 2017, Davie County in 2022, Forsyth County in 2024, Rockingham County in 2023, Stokes County in 2018, Surry County in 2023, and Yadkin County in 2017.

FIGURE 5.17: SPECIAL FLOOD HAZARD AREAS



Source: Federal Emergency Management Agency

5.11.3 Historical Occurrences

Information from the National Centers for Environmental Information was used to ascertain historical flood events. The National Centers for Environmental Information reported a total of 342 events throughout the Northern Piedmont Region since 1993[39]. A summary of these events is presented in **Table 5.28**. These events accounted for over $16.1 million in property damage throughout the region.

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

TABLE 5.28: SUMMARY OF FLOOD OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023 dollars)
Caswell County	**32**	**0/0**	**$1,131,344**
Milton	4	0/0	$0
Yanceyville	5	0/0	$0
Unincorporated Areas	23	0/0	$1,131,344
Davie County	**13**	**0/0**	**$1,760,974**
Bermuda Run	0	0/0	0
Cooleemee	1	0/0	$608
Mocksville	1	0/0	0
Unincorporated Areas	11	0/0	$1,760,366
Forsyth County	**61**	**0/0**	**$826,597**
Bethania	3	0/0	$0
Clemmons	5	0/0	$24,412
Kernersville	3	0/0	$0
Lewisville	3	0/0	$0
Rural Hall	1	0/0	$0
Tobaccoville	2	0/0	$0
Walkertown	2	0/0	$12,165
Winston-Salem	12	0/0	$172,690
Unincorporated Area	30	0/0	$617,330
Rockingham County	**90**	**0/0**	**$4,878,582**
Eden	4	0/0	$0
Madison	12	0/0	$85,507
Mayodan	3	0/0	$563,515
Reidsville	12	0/0	$85,050
Stoneville	8	0/0	$678,880
Wentworth	2	0/0	$0
Unincorporated Area	49	0/0	$3,465,630
Stokes County	**29**	**0/0**	**$3,268,891**
Danbury	3	0/0	$0
King	4	0/0	$1,758,830
Walnut Cove	3	0/0	$1,403
Unincorporated Area	19	0/0	$1,508,658
Surry County	**84**	**0/0**	**$3,464,061**
Dobson	7	0/0	$330,084
Elkin	9	0/0	$0
Mount Airy	9	0/0	$1,415,226
Pilot Mountain	3	0/0	$816,893
Unincorporated Area	56	0/0	$901,858
Yadkin County	**33**	**0/0**	**$814,725**
Boonville	0	0/0	$0
East Bend	2	0/0	$0
Jonesville	2	0/0	$11,858
Yadkinville	5	0/0	$0
Unincorporated Area	24	0/0	$802,867
Northern Piedmont Regional Total	**342**	**0/0**	**$16,145,174**

Source: National Centers for Environmental Information

5.11.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of February 2024, there have been 621 flood losses reported in the Northern Piedmont Region through the National Flood Insurance Program (NFIP) since 1978, totaling over $6.5 million in claims payments. A summary of these figures for each county is provided in **Table 5.29**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in the Northern Piedmont Region were either uninsured, denied claims payment, or not reported.

TABLE 5.29: SUMMARY OF INSURED FLOOD LOSSES

Location	Flood Losses	Claims Payments
Caswell County	**1**	**$0**
Milton*	-	-
Yanceyville	0	$0
Unincorporated Areas	1	$0
Davie County	**12**	**$146,848**
Bermuda Run	6	$119,251
Cooleemee	0	$0
Mocksville	0	$0
Unincorporated Areas	6	$27,597
Forsyth County	**415**	**$4,060,877**
Bethania	0	$0
Clemmons	6	$56,318
Kernersville	6	$157,501
Lewisville	5	$14,438
Rural Hall	0	$0
Tobaccoville	0	$0
Walkertown	0	$0
Winston-Salem	307	$2,665,061
Unincorporated Area	91	$1,167,559
Rockingham County	**111**	**$966,183**
Eden	54	$363,336
Madison	24	$142,567
Mayodan	12	$1,930
Reidsville	6	$10,804
Stoneville	0	$0
Wentworth	0	$0
Unincorporated Area	15	$447,546
Stokes County	**15**	**$182,995**
Danbury	0	$0
King	3	$6,832
Walnut Cove	1	$6,669
Unincorporated Area	11	$169,494
Surry County	**65**	**$1,163,638**
Dobson*	-	-
Elkin	1	$3,582
Mount Airy	43	$741,202
Pilot Mountain	0	$0

Location	Flood Losses	Claims Payments
Unincorporated Area	21	$418,854
Yadkin County	**2**	**$2,110**
Boonville*	-	-
East Bend*	-	-
Jonesville	-	-
Yadkinville	-	-
Unincorporated Area	2	$2,110
Northern Piedmont Regional Total	**621**	**$6,522,650**

**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

5.11.5 Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 150,000 repetitive loss properties nationwide. A severe repetitive loss property is any insurable building for which four or more claims of more than $5,000 were paid by the NFIP, where at least two of the claims are made within 10 years of each other.

As of February 2024 records, there are 61 non-mitigated repetitive loss properties located in the Northern Piedmont Region, which accounted for 202 losses (with nearly $2.9 million in claims payments under the NFIP last recorded across 51 properties in 2018). Additionally, 16 of the properties are considered severe repetitive loss properties (11 in Forsyth County, 3 in Rockingham County, and 2 in Surry County). The majority of the properties are residential buildings, 43 are single-family residential, 3 are multifamily residential, 1 is other residential, and 14 are non-residential. Without mitigation these properties will likely continue to experience flood losses. **Table 5.30** presents a summary of these figures for the Northern Piedmont Region.

TABLE 5.30: SUMMARY OF REPETITIVE LOSS PROPERTIES

Location	Number of Properties	Number of Losses
Caswell County	**0**	**0**
Milton*	--	--
Yanceyville	0	0
Unincorporated Areas	0	0
Davie County	**0**	**0**
Bermuda Run	0	0
Cooleemee	0	0
Mocksville	0	0
Unincorporated Areas	0	0
Forsyth County	**42**	**148**
Bethania	0	0
Clemmons	3	11
Kernersville	2	4
Lewisville	0	0
Rural Hall	0	0
Tobaccoville	0	0
Walkertown	0	0
Winston-Salem	30	109
Unincorporated Area	7	24

Location	Number of Properties	Number of Losses
Rockingham County	**13**	**37**
Eden	8	25
Madison	2	6
Mayodan	0	0
Reidsville	0	0
Stoneville	0	0
Wentworth	0	0
Unincorporated Area	3	6
Stokes County	**0**	**0**
Danbury	0	0
King	0	0
Walnut Cove	0	0
Unincorporated Area	0	0
Surry County	**6**	**17**
Dobson*	--	--
Elkin	0	0
Mount Airy	5	13
Pilot Mountain	0	0
Unincorporated Area	1	4
Yadkin County	**0**	**0**
Boonville*	--	--
East Bend*	--	--
Jonesville	0	0
Yadkinville	0	0
Unincorporated Area	0	0
Northern Piedmont Regional Total	**61**	**202**

**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

5.11.6 Changing Future Conditions

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

5.11.7 Probability of Future Occurrences

Flood events will remain a threat in the Northern Piedmont Region, especially among recognized floodplains or Special Flood Hazard Areas (SFHAs), and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those

areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain). As of 2024, the FEMA National Risk Index rates the riverine flooding hazard as "very low" in Caswell County, Davie County, Stokes County, and Yadkin County compared to "relatively low" in Forsyth County, Rockingham County, and Surry County.

5.12 WILDFIRES

5.12.1 Background and Description

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed[40]. 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.

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

5.12.2 Location and Spatial Extent

The entire region is at risk of a wildfire occurrence. Wildfire risk maps for each jurisdiction in the region can be viewed in **Appendix G**. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the wildland urban interface (WUI) are particularly susceptible to fire hazard as populations abut formerly undeveloped areas.

5.12.3 Historical Occurrences

Information from the National Association of State Foresters through 2018 was used to ascertain historical wildfire events. The National Association of State Foresters reported that a total of 1,444 events that impacted an area greater than 1 acre have occurred throughout the Northern Piedmont Region since 2001[41]. A summary of these events is presented in **Table 5.31**. The largest of these events was the Lumber Plant Fire, which occurred in Surry County in 2011 and impacted 737 acres. Additionally, the 2020 North Carolina Forest Action Plan notes that each county in the region experiences between 0 to 80 wildfires each year based on average rates of occurrence from 2010 to 2020.

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

Location	Number of Occurrences	Acres Burned
Caswell County	**137**	**918.59**
Milton	0	0.00
Yanceyville	0	0.00
Unincorporated Areas	137	918.59
Davie County	**89**	**193.15**
Bermuda Run	0	
Cooleemee	0	
Mocksville	2	2.73
Unincorporated Areas	89	193.15
Forsyth County	**174**	**385.77**
Bethania	0	0.00
Clemmons	3	5.00
Kernersville	3	9.10
Lewisville	11	22.00
Rural Hall	2	5.00
Tobaccoville	9	26.70
Walkertown	3	3.43
Winston-Salem	16	37.70
Unincorporated Area	127	276.84
Rockingham County	**346**	**1162.59**

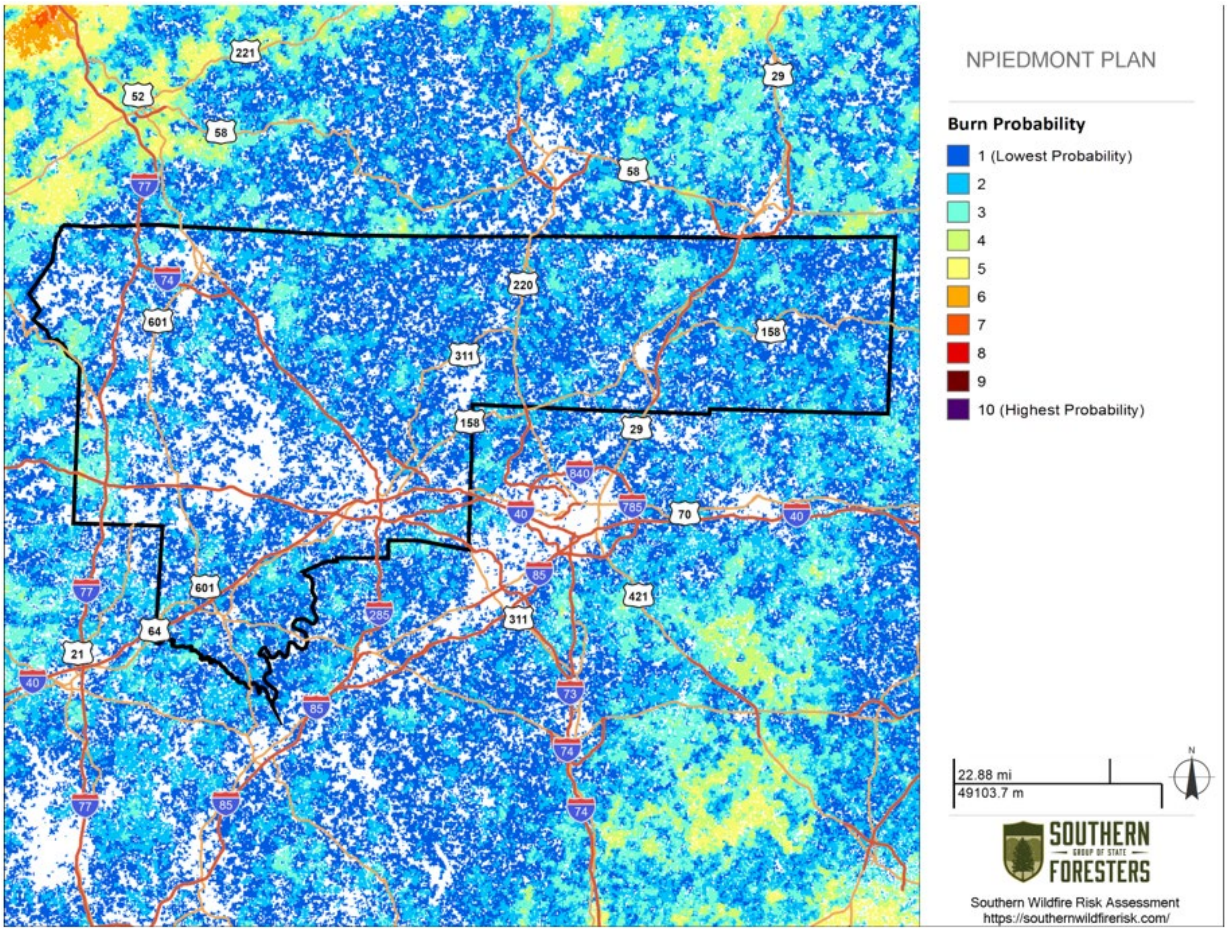
[41] These events are only inclusive of those reported by NASFI. It is likely that additional occurrences have occurred and have gone unreported.

Location	Number of Occurrences	Acres Burned
Eden	5	32.10
Madison	1	1.00
Mayodan	2	4.00
Reidsville	4	12.70
Stoneville	0	0.00
Wentworth	10	26.40
Unincorporated Area	324	1086.39
Stokes County	**211**	**1069.46**
Danbury	0	0.00
King	1	1.50
Walnut Cove	0	0.00
Unincorporated Area	210	1067.96
Surry County	**313**	**3073.73**
Dobson	1	2.00
Elkin	0	0.00
Mount Airy	5	9.50
Pilot Mountain	0	0.00
Unincorporated Area	307	3062.23
Yadkin County	**174**	**423.97**
Boonville	1	1.00
East Bend	3	5.00
Jonesville	1	1.20
Yadkinville	0	0.00
Unincorporated Area	169	416.77
Northern Piedmont Regional Total	**1,444**	**7227.26**

Source: National Association of State Foresters

Figure 5.18 shows the burn probability for each county in the Northern Piedmont Region based on data from the Southern Wildfire Risk Assessment. This data represents the likelihood of an area burning based on landscape conditions, percentile weather, historical ignition patterns, and historical fire suppression efforts.

FIGURE 5.18: BURN PROBABILITY IN THE NORTHERN PIEDMONT REGION

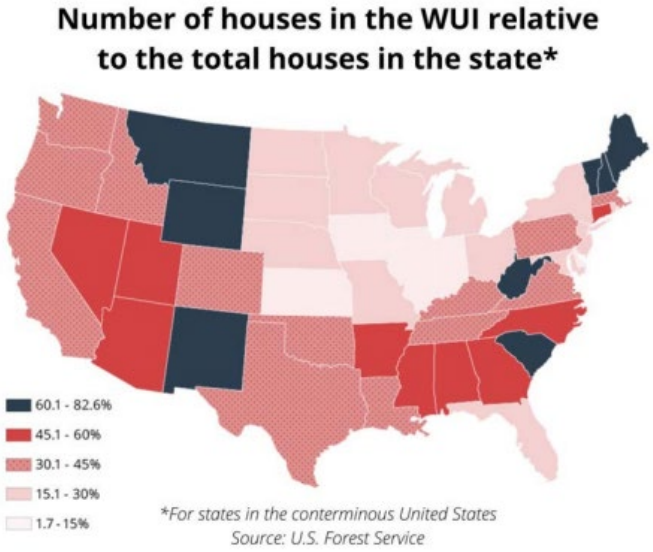


Source: Southern Wildfire Risk Assessment

Every state also has a Wildland Urban Interface (WUI), which is the rating of potential impact of wildfires on people and their homes. The WUI is not a fixed geographical location, but rather a combination of human development and vegetation where wildfires have the greatest potential to result in negative impacts. Nationally, one-third of all homes lie in the WUI, which is a growing danger. Below, **Figure 5.19** shows a map of each state's share of houses in the WUI as of 2022. According to the U.S. Fire Administration, the states with the greatest number of houses in the WUI include California, Texas, Florida, North Carolina, and Pennsylvania[42]. Based on past data from the US Department of Agriculture, approximately 52% of homes in North Carolina lie within the WUI.

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

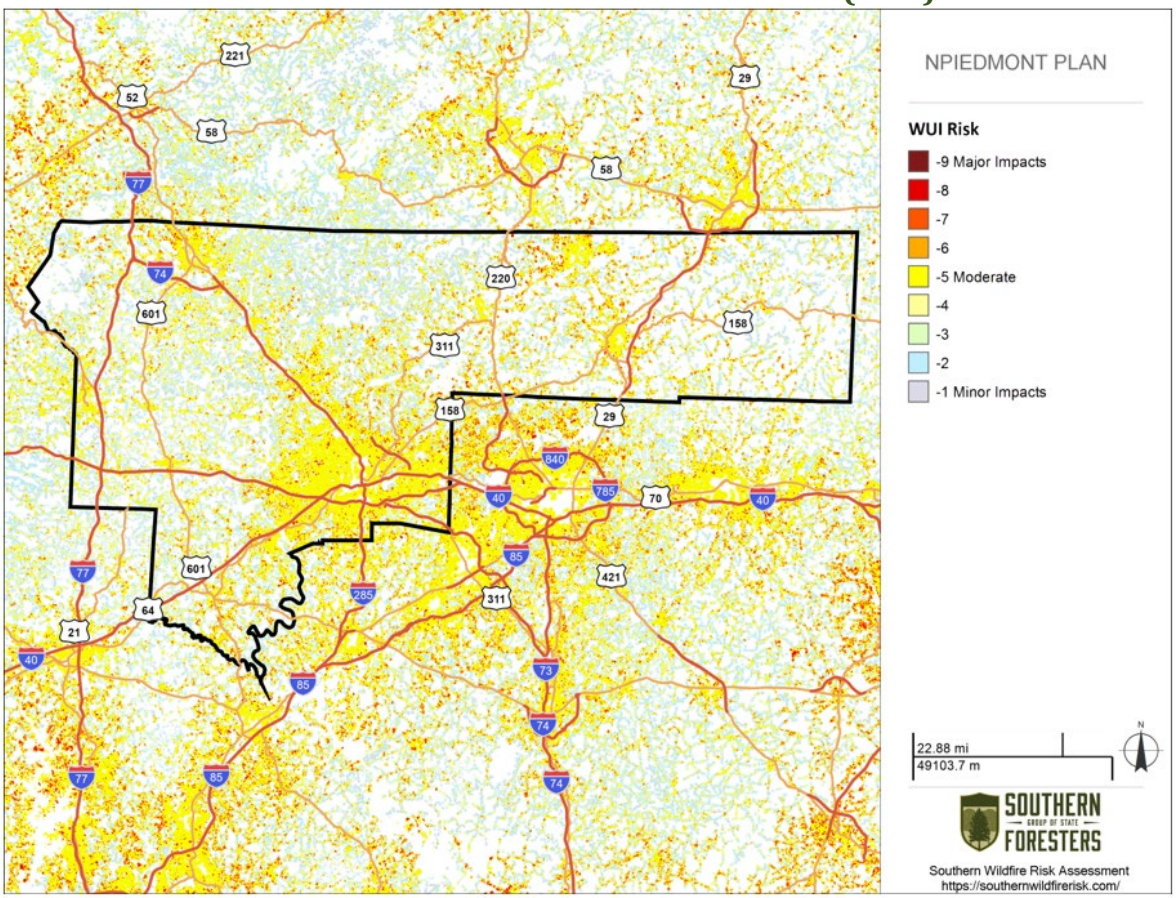
FIGURE 5.19: PERCENT OF TOTAL HOMES IN THE WILDLAND URBAN INTERFACE



Source: US Fire Administration

Below, **Figure 5.20** displays the WUI Risk Index specifically for the Northern Piedmont Region.

FIGURE 5.20: WILDLAND URBAN INTERFACE (WUI) RISK INDEX



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, the Northern Piedmont Region experienced an average of 343 wildfires annually which burn a combined 767 acres, on average per year. The data indicates that most of these fires are small, averaging two acres per fire. Although it is certain that wildfires have occurred in the region, NCEI reports that none have taken place in recent history.

5.12.4 Changing Future Conditions

According to the 2020 North Carolina Forest Action Plan, the state has experienced 41,551 wildfires burning a combined total of over 399,125 acres since 2010. The cost of wildfire response, WUI acreage, fuel loading related to fire exclusion and plant mortality, and warming climate stressors are also all increasing in the context of growing wildfire risks[43].

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

5.12.5 Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in the Northern Piedmont Region. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to the Northern Piedmont Region for future wildfire events is likely (10 to 100 percent annual probability). As of 2024, the FEMA National Risk Index rates the wildfire hazard as “very low” across all counties in the Northern Piedmont Region.

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

5.13 INFECTIOUS DISEASE

5.13.1 Background and Description

For the purposes of this plan, this section will assess infectious diseases, vector-borne diseases, and foreign animal diseases within the Northern Piedmont Region.

Infectious Disease

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

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

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

Other communicable diseases pose a much more frequent threat to the citizens of the region. Some of the infectious diseases of greatest concern include coronavirus, influenza, particularly in a pandemic form, as well as norovirus, and multiple antibiotic-resistant superbugs. Even in one of its normal year-to-year variants, influenza (commonly referred to as “flu”) can result in serious illness and even death in young children, the elderly and immune-compromised persons. But there is always the potential risk of the emergence of influenza in one of the pandemic H1N1 forms, such as in the “Spanish Flu” outbreak of 1918-19, which killed over 50 million people worldwide. Every year, North Carolina sees hundreds of cases of influenza, leading to hundreds of hours of lost productivity in businesses due to sick employees. Of

note, a vaccine for influenza is produced every year and, according to the CDC, is highly effective in preventing the disease.

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

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

Vector-Borne Diseases

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

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

Foreign Animal Diseases

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

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

5.13.2 Location and Spatial Extent

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

5.13.3 Historical Occurrences

Infectious Disease

Influenza is historically the most common infectious disease that has occurred in the Northern Piedmont region. Cases of the flu tend to occur in the late fall and early winter months. In recent years, substantial cases of influenza and influenza-like illnesses have been reported in hospitals. According to the North Carolina Department of Health and Human Services (NCDHHS), there were over 30,000 positive tests and 196 influenza-associated deaths during the 2022-2023 influenza season[44]. The Northern Piedmont Region is part of Flu Surveillance Region 5 (see regional map in NCDHHS annual surveillance summaries) in the state, with 2-6% of influenza-like illnesses reported among total emergency department visits during the season. The primary respiratory viruses treated during the 2022-2023 season included influenza and SARS-CoV-2 (COVID-19).

A COVID-19 Pandemic disaster declaration was declared for North Carolina on March 25, 2020, with an incident period of over 3 years. Between March 7, 2020, and May 10, 2023, NCDHHS reported 3,501,404 total cases and 29,059 total deaths due to COVID-19 statewide. This included over 6,697 total cases and 61 total deaths in Caswell County, 15,073 total cases and 127 total deaths in Davie County, 126,962 total cases and 997 total deaths in Forsyth County, 27,965 total cases and 337 total deaths in Rockingham County, 15,829 total cases and 212 total deaths in Stokes County, 28,946 total cases and 431 total deaths in Surry County, and 15,325 total cases and 146 total deaths in Yadkin County.

Vector-Borne Diseases

In 2016, North Carolina state health officials encouraged citizens to take preventative measures against mosquito bites to avoid contracting the Zika virus. Over $477,500 was allocated from the Governor's yearly budget to develop an infrastructure to detect, prevent, control, and respond to the Zika virus and other vector-borne illnesses[45]. More recently, state officials have encouraged citizens to "Fight the Bite" against both mosquito and tick bites to avoid serious vector-borne diseases after nearly 700 cases were reported in 2022[46].

Foreign Animal Diseases

No significant cases have been reported in the region.

[44] NCDHHS Respiratory Disease Surveillance Summaries (https://flu.ncdhhs.gov/data.htm)

[45] NCDHHS Press Release, August 2016 (https://www.ncdhhs.gov/news/press-releases/nc-prepared-zika-virus-risk-local-virus-carrying-mosquitoes-low)

[46] NCDHHS Press Release, March 2023 (https://www.ncdhhs.gov/news/press-releases/2023/03/30/ncdhhs-urges-north-carolinians-fight-bite-insect-repellant-and-other-prevention-tools-avoid-tick-and)

5.13.4 Changing Future Conditions

According to the Centers for Disease Control and Prevention (CDC), ongoing trends of milder winters, warmer summers, and fewer days of frost make it easier for infectious diseases and vector diseases to expand to new geographic areas and infect more people. Between 2004 and 2018, the number of reported illnesses from mosquito, tick, and flea bites more than doubled, with more than 760,000 cases reported in the United States. Additionally, nine new germs spread by mosquitoes and ticks were discovered or introduced into the United States during this time. In 2012, a mild winter, early spring, and a hot summer also set the stage for an outbreak of West Nile Virus disease in the United States, resulting in more than 5,600 illnesses and 286 deaths[47].

5.13.5 Probability of Future Occurrence

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

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

Technological Hazards

5.14 HAZARDOUS SUBSTANCES

5.14.1 Background and Description

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

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation related accidents in the air, by rail, on the nation's highways, and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents, and 266 are due to other causes[48]. In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

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

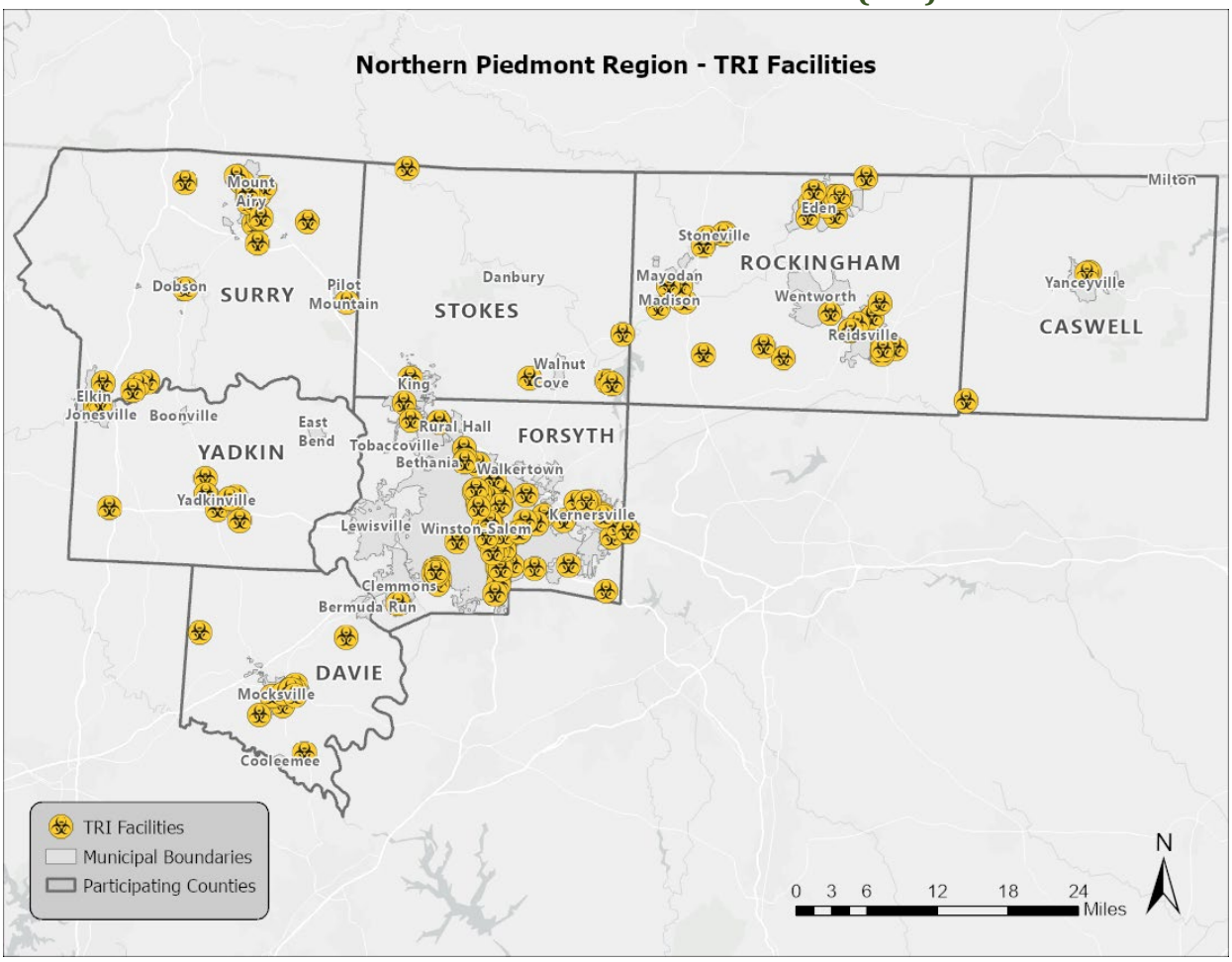
Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace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

5.14.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency (EPA) provides public information on hazardous materials. One facet of this program is to collect information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. As of 2023, the Northern Piedmont Region has 178 reported TRI facilities. These sites are shown in **Figure 5.21.**

[48] FEMA, 1997.

FIGURE 5.21: TOXIC RELEASE INVENTORY (TRI) FACILITIES



Source: Environmental Protection Agency

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

5.14.3 Historical Occurrences

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

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

- the release of a bulk quantity (over 199 gallons or 882 pounds) of a hazardous material.

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

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

Table 5.32 summarizes the serious HAZMAT incidents reported in the Northern Piedmont Region.

TABLE 5.32: SUMMARY OF HAZMAT INCIDENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Caswell County	**0**	**0/0**	**$0**
Milton	0	0/0	$0
Yanceyville	0	0/0	$0
Unincorporated Area	0	0/0	$0
Davie County	**0**	**0/0**	**$0**
Bermuda Run	0	0/0	$0
Cooleemee	0	0/0	40
Mocksville	0	0/0	$0
Unincorporated Area	0	0/0	$0
Forsyth County	**16**	**0/3**	**$706,148**
Bethania	0	0/0	$0
Clemmons	1	0/0	$149,000
Kernersville	4	0/1	$159,163
Lewisville	1	0/0	$83,473
Rural Hall	1	0/0	$33,681
Tobaccoville	0	0/0	$0
Walkertown	0	0/0	$0
Winston-Salem	9	0/2	$280,831
Unincorporated Area	0	0/0	$0
Rockingham County	**3**	**0/0**	**$26,245**
Eden	1	0/0	$5,095
Madison	0	0/0	$0
Mayodan	0	0/0	$0
Reidsville	2	0/0	$21,150
Stoneville	0	0/0	$0
Wentworth	0	0/0	$0
Unincorporated Area	0	0/0	$0
Stokes County	**0**	**0/0**	**$0**
Danbury	0	0/0	$0
King	0	0/0	$0
Walnut Cove	0	0/0	$0
Unincorporated Area	0	0/0	$0
Surry County	**3**	**0/0**	**$1,029,332**
Dobson	0	0/0	$0

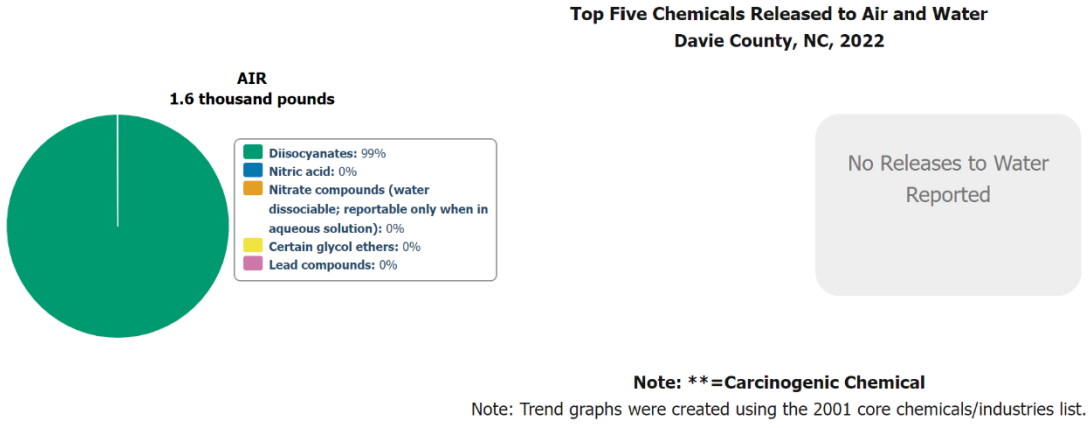
Location	Number of Occurrences	Deaths / Injuries	Property Damage
Elkin	0	0/0	$0
Mount Airy	2	0/0	$1,029,332
Pilot Mountain	0	0/0	$0
Unincorporated Area	1	0/0	$0
Yadkin County	**2**	**0/0**	**$205,935**
Boonville	0	0/0	$0
East Bend	0	0/0	$0
Jonesville	0	0/0	$0
Yadkinville	2	0/0	$205,935
Unincorporated Area	0	0/0	$0
Northern Piedmont Regional Total	**24**	**0/3**	**$1,967,660**

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

Updated information regarding county-specific chemical releases have been provided through 2021 and TRI facilities through 2023 by the EPA[49]. In Caswell County, there are 3 reported TRI facilities. No data was reported on recent chemical releases. Davie County has 13 reported TRI facilities. A larger share of releases have been conducted by off-site disposal (68%) compared to a smaller share of air releases (32%). Forsyth County has 88 reported TRI facilities. Nearly all releases (88%) have been conducted through air releases. Rockingham County has 36 reported TRI facilities. Nearly all releases (89%) have been conducted through off-site disposal. Stokes County has 6 reported TRI facilities. Roughly half of all releases have been conducted by land (47%) and air (49%) respectively. Surry County has 25 reported TRI facilities. Roughly half of all releases have been conducted by water (49%) and air (49%) respectively. Yadkin County has 7 reported TRI facilities. No data was reported on recent chemical releases.

In the figures shown below, the top five chemicals released through air and water are shown for each of the counties in the region.

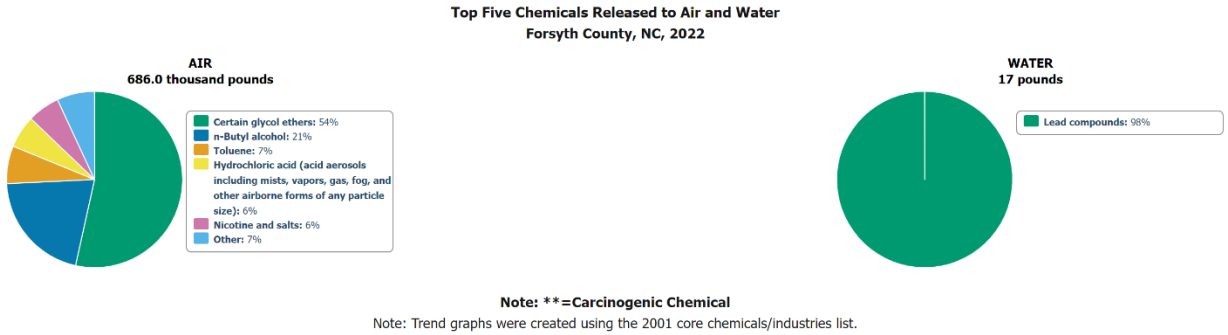
FIGURE 5.22: CHEMICALS RELEASED IN DAVIE COUNTY



Source: Environmental Protection Agency

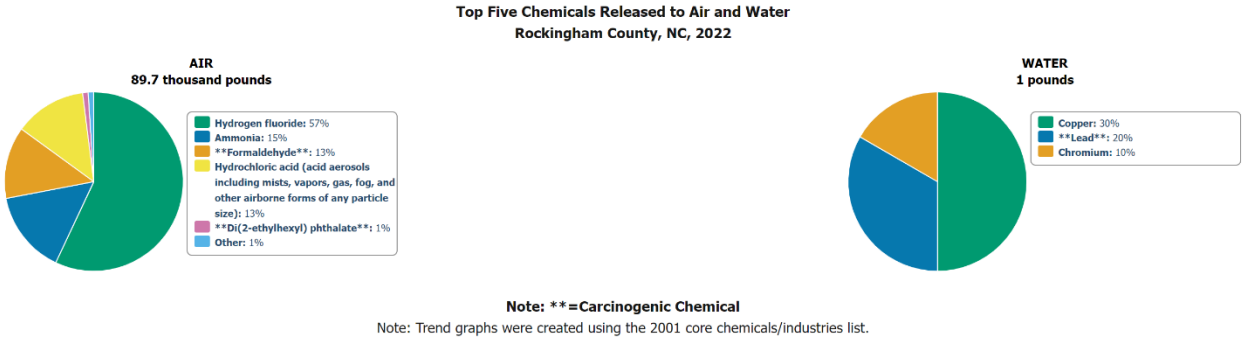
[49] EPA TRI National Analysis Where You Live Tool (https://www.epa.gov/trinationalanalysis/where-you-live) and EPA TRI Envirofacts (https://www.epa.gov/enviro/tri-search?)

FIGURE 5.23: CHEMICALS RELEASED IN FORSYTH COUNTY



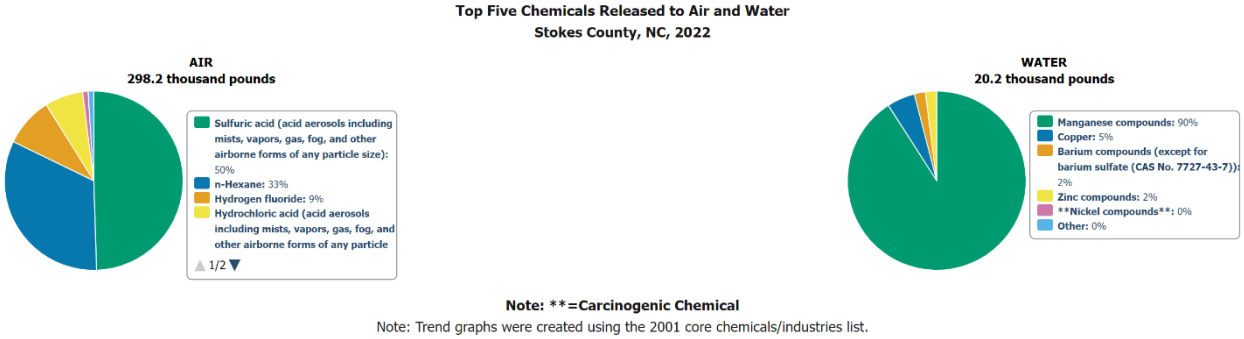
Source: Environmental Protection Agency

FIGURE 5.24: CHEMICALS RELEASED IN ROCKINGHAM COUNTY



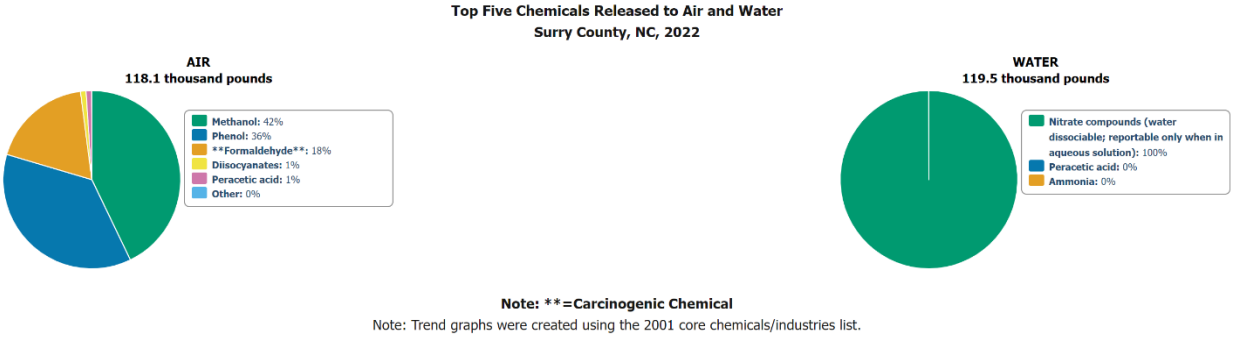
Source: Environmental Protection Agency

FIGURE 5.25: CHEMICALS RELEASED IN STOKES COUNTY



Source: Environmental Protection Agency

FIGURE 5.26: CHEMICALS RELEASED IN SURRY COUNTY



Source: Environmental Protection Agency

Also, in 2023, multiple people were hospitalized in Forsyth County (City of Winston-Salem) after a cleaning agent was accidentally left in the beer lines at a local pub.

5.14.4 Changing Future Conditions

As the population of the Northern Piedmont Region continues to grow, more people could become increasingly vulnerable to incidents involving hazardous substances. Therefore, it is important to monitor all transportation routes and continue to attempt to prevent future incidents from occurring through ongoing preparedness, monitoring, and training. Members of the planning committee also specifically noted areas of significant future HAZMAT risk surrounding the Colonial Pipeline. Unlike other hazards discussed in this plan, evolving environmental conditions are unlikely to affect the occurrence or frequency of future hazardous substance events.

5.14.5 Probability of Future Occurrence

Given the location of 178 TRI facilities in the Northern Piedmont Region and several roadway, rail, and air incidents, it is likely that a hazardous material incident may occur in the region (between 10 and 100 percent annual probability). County and municipal officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

5.15 RADIOLOGICAL EMERGENCY – FIXED NUCLEAR FACILITIES

5.15.1 Background and Description

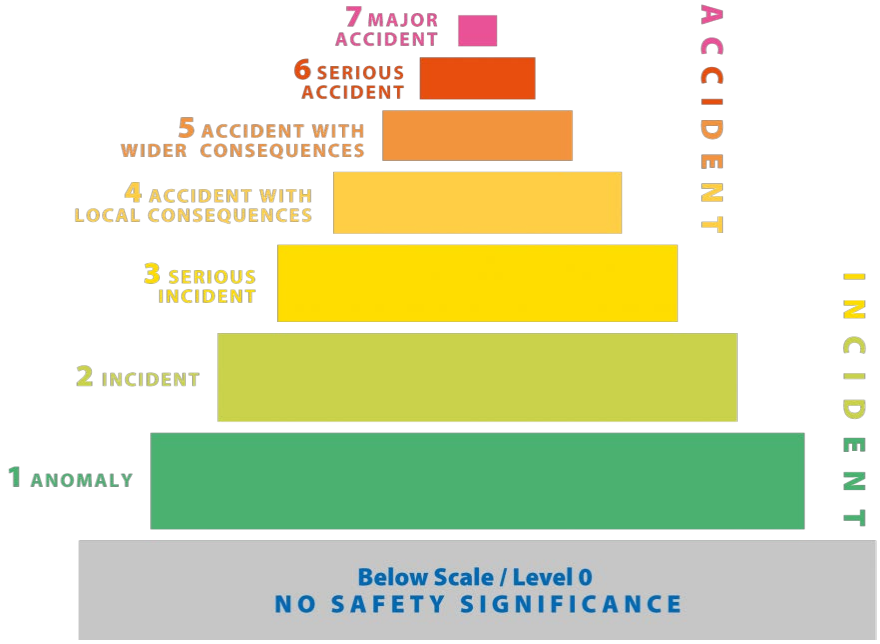
A nuclear and radiation accident is defined by the International Atomic Energy Agency as "an event that has led to significant consequences to people, the environment or the facility. Often, this type of incident results from damage to the reactor core of a nuclear power plant which can release radioactivity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

McGuire Nuclear Station (located in Huntersville, NC), which is the plant located closest to the Northern Piedmont Region, is a 2,258-megawatt power plant that began commercial operation in 1981. It uses uranium dioxide fuel, and its reactor is a pressurized water reactor. The plant operates with a very high level of security.

5.15.2 Location and Spatial Extent

The entire region is at risk to a nuclear incident. However, areas in the southwestern part of the region are more susceptible due to their proximity to the McGuire Nuclear Station. The International Atomic Energy Association has developed a scale called the International Nuclear and Radiological Event Scale (INES) which provides a quantitative means of assessing the extent of a nuclear event. This scale, like the MMI used for earthquakes, is logarithmic which means that each increasing level on the scale represents an event 10 times more severe than the previous level (**Figure 5.27**).

FIGURE 5.27: INTERNATIONAL NUCLEAR EVENT SCALE



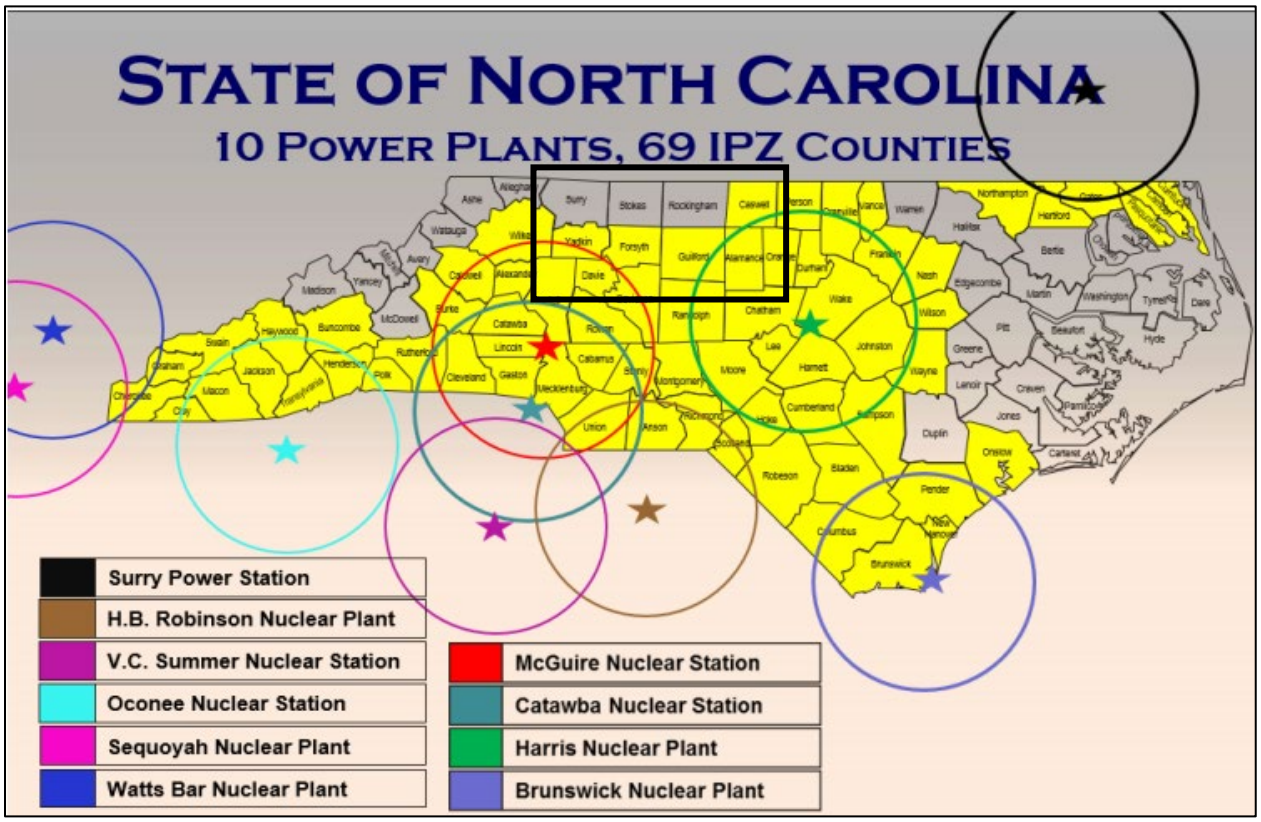
Source: International Atomic Energy Agency

The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and this radius is the designated evacuation radius recommended by the Nuclear Regulatory

Commission. Within the 10-mile zone, the primary concern is exposure to and inhalation of radioactive contamination. The most concerning effects in the secondary 50-mile zone are related to ingestion of food and liquids that may have been contaminated. All areas of the counties that are not located within the 10-mile radius are located within this 50-mile radius that is still considered to be at risk from a nuclear incident.

Davie, Forsyth, and Yadkin counties are all located within the 50-mile buffer zone of the McGuire Nuclear Station. A map of all nuclear power plants in North Carolina can be seen below in **Figure 5.28**.

FIGURE 5.28: NC NUCLEAR POWER STATIONS INCIDENT HAZARD ZONES



Source: North Carolina State Hazard Mitigation Plan

5.15.3 Historical Occurrences

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

5.15.4 Changing Future Conditions

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

5.15.5 Probability of Future Occurrences

A nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

5.16 TERRORISM

5.16.1 Background and Description

For the purpose of this report, terrorism encompasses explosive, chemical, radiological, biological, nuclear, and other threats.

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

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

Chemical

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

Biological

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

Radiological

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

Nuclear

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

Explosive

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

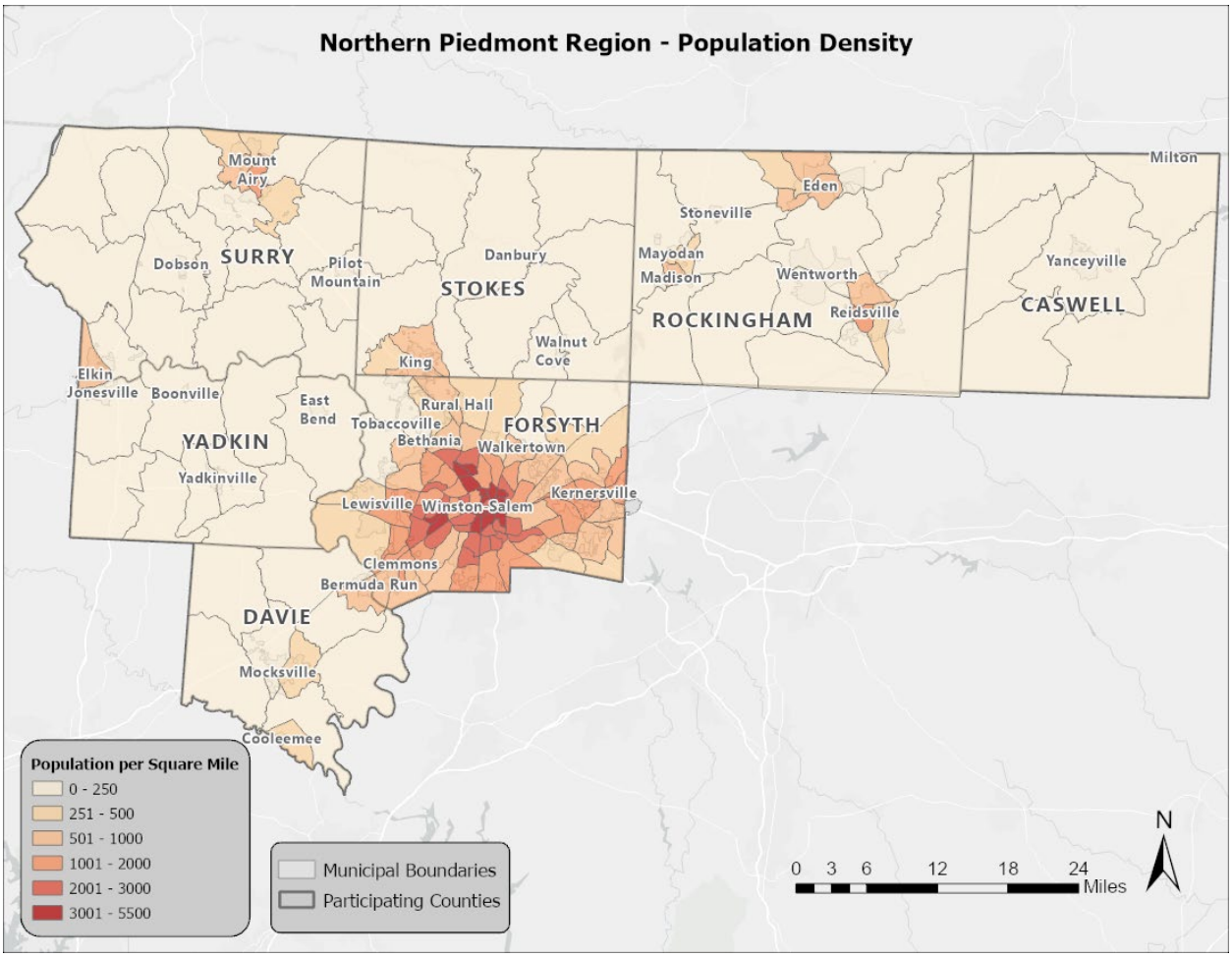
Other

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

5.16.2 Location and Spatial Extent

All parts of North Carolina are vulnerable to a terror event; however, terrorism tends to target more densely populated areas. The map in **Figure 5.29** displays the population density in the Northern Piedmont region using census tract levels.

FIGURE 5.29: POPULATION DENSITY IN THE NORTHERN PIEDMONT REGION



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

TABLE 5.33: 2022 POPULATION ESTIMATES FOR THE NORTHERN PIEDMONT REGION

Location	2022 Population Estimate	2020 Population Density (sq. mi.)
Caswell County	**22,747**	**53.5**
Milton	147	398.5
Yanceyville	2,576	279.6
Unincorporated Area	20,024	--
Davie County	**43,030**	**162.0**
Bermuda Run	3,118	1,250.5
Cooleemee	875	1,250.0
Mocksville	5,908	759.5
Unincorporated Area	33,129	--
Forsyth County	**383,739**	**937.7**
Bethania	335	506.6
Clemmons	21,281	1,722.2
Kernersville	27,177	1,461.2
Lewisville	13,509	921.9
Rural Hall	3,376	1,175.0
Tobaccoville	2,602	337.0
Walkertown	5,706	849.8
Winston-Salem	249,571	1,868.8
Unincorporated Area	60,182	--
Rockingham County	**91,209**	**161.1**
Eden	15,349	1,084.5
Madison	2,185	601.4
Mayodan	2,438	840.5
Reidsville	14,526	984.6
Stoneville	1,052	914.7
Wentworth	2,664	187.6
Unincorporated Area	52,995	--
Stokes County	**44,696**	**99.1**
Danbury	293	252.0
King	7,210	1,190.6
Walnut Cove	2,028	628.9
Unincorporated Area	35,165	--
Surry County	**71,429**	**134.0**
Dobson	1,812	719.8
Elkin	4,026	607.1
Mount Airy	10,621	911.2
Pilot Mountain	1,667	707.3
Unincorporated Area	53,303	--
Yadkin County	**37,280**	**111.1**
Boonville	1,364	988.3
East Bend	741	484.3
Jonesville	2,634	800.0
Yadkinville	2,971	1,021.8
Unincorporated Area	29,570	--

Location	2022 Population Estimate	2020 Population Density (sq. mi.)
Northern Piedmont Regional Total	694,130	236.9

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

5.16.3 Historical Occurrences

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

5.16.4 Changing Future Conditions

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

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

5.16.5 Probability of Future Occurrences

The Northern Piedmont region has experienced no major terrorist attacks, but the area's population is continuing to rise. The probability of future occurrences of a terrorist attack is entirely possible (between 1 to 10 percent annual probability) and preparedness must be ensured across all populated areas of the region.

5.17 CYBERSECURITY

5.17.1 Background and Description

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

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

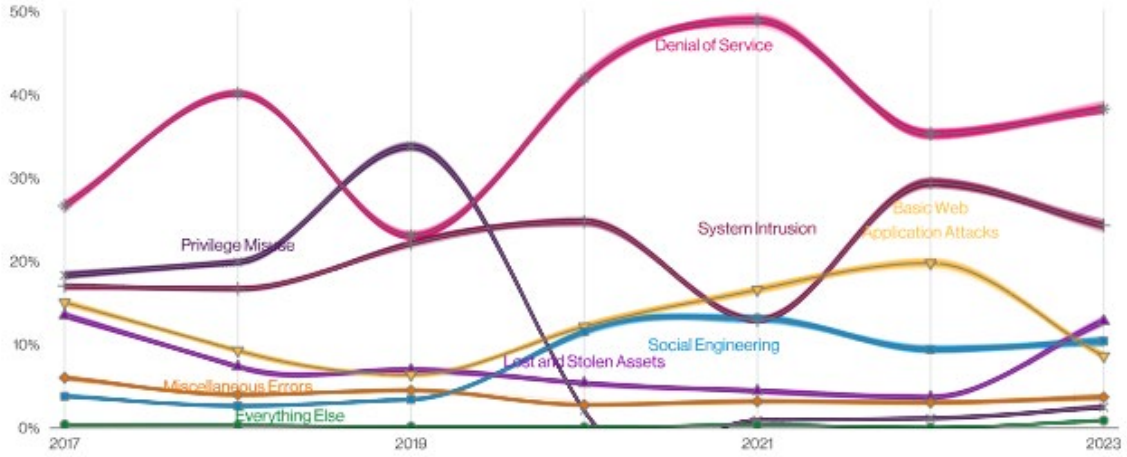
Cyberattacks can happen in both the public and private sector. They may be carried out by a specific individual, or by groups from afar. Many attacks attempt to steal money or to disturb normal operations. According to the 2023 Verizon Report of Data Breaching, 83% of breaches involved external actors,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

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

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

Figure 5.30 below displays nationwide cyberattack incident patterns over time (2017 to 2023) from the 2023 Verizon Data Breach Investigations Report (DBIR).

FIGURE 5.30: PERCENTAGES AND PATTERNS OF INCIDENTS OVER TIME



Source: 2023 Verizon Data Breach Investigations Report

5.17.2 Location and Spatial Extent

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

5.17.3 Historical Occurrences

In North Carolina and the Northern Piedmont region, the Department of Information Technology specializes in cybersecurity and risk management. Within the department, the NC Information Sharing and Analysis Center gathers information on cyberattack threats within the State to raise cybersecurity preparedness.

In 2023, North Carolina reported the highest number of cybercrimes in the "personal data breach" sector, which can be seen in **Table 5.34** below.

TABLE 5.34: NORTH CAROLINA CYBERCRIMES AND VICTIM COUNTS IN 2023

Crime Type by Victim Count

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

Source: FBI Internet Crime Complaint Center, 2023

Although the Northern Piedmont Region has not reported any major catastrophic cyberattacks, the potential to experience one is unpredictable and can happen at any time.

5.17.4 Changing Future Conditions

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

5.17.5 Probability of Future Occurrences

As the world's dependency on technology grows, the possibility of experiencing cyberattacks rises as well. Although there have not been severe past occurrences in the region, the growing risks of cyberattack capabilities suggest that they could be highly likely (100 percent annual probability) in the near future.

5.18 ELECTROMAGNETIC PULSE

5.18.1 Background and Description

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

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

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

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

5.18.2 Location and Spatial Extent

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

5.18.3 Historical Occurrences

There have been no reports of EMP occurrences in the Northern Piedmont region.

5.18.4 Changing Future Conditions

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

5.18.5 Probability of Future Occurrences

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

5.19 CIVIL DISTURBANCE

5.19.1 Background and Description

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

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

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

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

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

5.19.2 Location and Spatial Extent

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

5.19.3 Historical Occurrences

No major incidents were found in the region.

5.19.4 Changing Future Conditions

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

5.19.5 Probability of Future Occurrences

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

5.20 FOOD EMERGENCY

5.20.1 Background and Description

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

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

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

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

5.20.2 Location and Spatial Extent

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

5.20.3 Historical Occurrences

No major incidents were found in the region.

5.20.4 Changing Future Conditions

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

5.20.5 Probability of Future Occurrences

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

5.21 CONCLUSIONS ON HAZARD RISK

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

5.21.1 Hazard Extent

Table 5.35 describes the extent of each natural hazard identified for the Northern Piedmont Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.35 EXTENT OF NORTHERN PIEDMONT REGION HAZARDS

Natural Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (Table 5.3). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Each of the participating counties has received this ranking several times over the reporting period of 20+ years.
Excessive Heat	The extent of excessive heat can be defined by the maximum temperature reached. The highest temperature recorded in the Northern Piedmont Region is 108 degrees Fahrenheit (reported on July 14, 1954). • Caswell County: 104°F • Davie County: 103°F • Forsyth County: 105°F • Rockingham County: 108°F • Stokes County: 103°F • Surry County: 105°F • Yadkin County: 105°F
Hurricane and Tropical Hazards	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Tables 5.8 and 5.9). The greatest classification of hurricanes to traverse directly through the Northern Piedmont Region was an unnamed tropical storm in 1893 which reached a maximum wind speed of 53 knots in the region. Although the region is much more likely to be impacted by the remnants of a hurricane or tropical storm, it is possible that a storm can impact the region directly.
Tornadoes/Thunderstorms	Tornadoes: Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.7) as well as the Fujita/Enhanced Fujita Scale

	(Tables 5.11 and 5.12). The greatest magnitude reported was an F3 (last reported on May 8, 2008). It should be noted that an F5 tornado is possible. • Caswell County: F2 • Davie County: F0 • Forsyth County: F3 • Rockingham County: F3 • Stokes County: F1 • Surry County: F1 • Yadkin County: F1 Thunderstorms: Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 73+ year history from the National Centers for Environmental Information, the strongest recorded wind event in the Northern Piedmont Region was reported on July 16, 1962, at 100 knots (approximately 115 mph). It should be noted that future events may exceed these historical occurrences. • Caswell County: 80 knots • Davie County: 65 knots • Forsyth County: 100 knots • Rockingham County: 80 knots • Stokes County: 70 knots • Surry County: 75 knots • Yadkin County: 86 knots Lightning: According to the Vaisala flash density map (Figure 5.8), the Northern Piedmont Region is located in an area that experiences 8 to 12 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures. Hailstorms: Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the Northern Piedmont Region was 3.0 inches (reported on June 5, 1985). It should be noted that future events may exceed this. • Caswell County: 2.50 inches • Davie County: 2.50 inches • Forsyth County: 2.75 inches • Rockingham County: 2.75 inches • Stokes County: 2.25 inches • Surry County: 3.0 inches • Yadkin County: 2.0 inches
Severe Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in the region was 18 inches on December 17, 1930. Due to unpredictable variations in snowfall throughout the region, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not abundantly available. • Caswell County: 13 inches • Davie County: 11 inches • Forsyth County: 18 inches • Rockingham County: 14 inches • Stokes County: 12 inches • Surry County: 12 inches • Yadkin County: 16 inches
Earthquakes	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 Northern Piedmont Region. According to data provided by

	the USGS and NOAA NCEI records, the greatest MMI to impact the region was VI (strong) with a correlating Richter Scale measurement of approximately 3.3 (reported on September 13, 1976). The epicenter of this earthquake was located 16.1 km away. • Caswell County: V; 193.0 km to epicenter • Davie County: V; 80.0 km to epicenter • Forsyth County: V; 61.0 km to epicenter • Rockingham County: V; 469.0 km to epicenter • Stokes County: IV; 130.0 km to epicenter • Surry County: VI; 16.0 km to epicenter • Yadkin County: V; 50.0 km to epicenter
Geological	Landslide: As noted above in the landslide profile, the landslide data provided by the North Carolina Geological Survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is generally low throughout the region. Sinkhole: The western part of North Carolina and the Northern Piedmont region is susceptible to sinkholes; however, there are no historical records of sinkholes in the region. Erosion: The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records available for the Northern Piedmont region.
Dam Failure	Dam failure extent is defined using the North Carolina Division of Energy, Mineral, and Land Resources criteria (Table 5.23). Of the 1,185 dams in Northern Piedmont Region, 150 are classified as high hazard. • Caswell County: 5 high hazard dams • Davie County: 9 high hazard dams • Forsyth County: 56 high hazard dams • Rockingham County: 17 high hazard dams • Stokes County: 29 high hazard dams • Surry County: 21 high hazard dams • Yadkin County: 13 high hazard dams
Flooding	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 6.5 percent of the total land area in the Northern Piedmont Region. Flood depth and velocity are recorded via the United States Geological Survey (USGS) stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the region was reported in July 1916. Water reached a discharge of 94,300 cubic feet per second and the stream gage height was recorded at 36.3 feet. Additional peak discharge readings and gage heights are in the table below. Depth of flooding inside structures across the region during a maximum flood event ranges from 1-3 feet and varies based on the structure's location in the floodplain and the elevation of the structure.

Location/Jurisdiction	Date	Peak Discharge (cfs)	Gauge Height (ft)
Caswell County			
Moon Creek near Yanceyville	6/21/1972	4,010	13.81

	Hyco Creek near Leasburg	9/6/1996	9,140	40.47
	Davie County			
	South Yadkin River at Cooleemee	10/3/1929	24,800	32.25
	Yadkin River at Yadkin College	7/1916	94,300	36.30
	Forsyth County			
	South Fork Muddy Creek near Clemmons	8/10/1970	2,980	16.30
	Belews Creek near Kernersville	8/16/1969	3,600	24.36
	Muddy Creek near Lewisville	6/21/1972	8,000	21.83
	North Fork Swannanoa River near Walkertown	5/29/2018	8,380	10.60
	Salem Creek at Winston-Salem	6/13/1970	5,590	12.93
	Yadkin River at Enon	6/21/1972	73,300	27.83
	Rockingham County			
	Smith River at Eden	8/15/1940	45,600	19.28
	Wolf Island Creek below SR 1998 at Reidsville	2/6/2004	512	5.62
	Dan River near Wentworth	6/22/1972	54,200	31.60
	Dan River at Leaksville	9/18/1945	54,200	28.27
	Stokes County			
	Dan River at Pine Hall	1/25/2010	27,800	25.77
	Surry County			
	Fisher River near Dobson	10/2/1929	8,300	12.10
	Elkin River at Elkin	9/20/1971	6,900	15.03
	Ararat River at Dam near Pilot Mountain	6/14/1947	40,000	106.50
	Yadkin River at Siloam	9/22/1979	40,600	26.72
	Yadkin County			
	South Deep Creek near Yadkinville	10/10/1959	6,750	24.87
	Logan Creek near Smithtown	6/22/1957	496	23.08

Wildfires

Wildfire data was provided by the North Carolina Forest Serviceand is reported annually by county from 2003-2018. Analyzing the data by county indicates the following wildfire hazard extent for each county.

Caswell County

	• The greatest number of fires to occur in any year was 30 in 2006. • The greatest number of acres to burn in a single year occurred in 2005 when 184.2 acres were burned. ***Davie County*** • The greatest number of fires to occur in any year was 45 in 2006. • The greatest number of acres to burn in a single year occurred in 2006 when 35.6 acres were burned ***Forsyth County*** • The greatest number of fires to occur in any year was 98 in 2007. • The greatest number of acres to burn in a single year occurred in 2006 when 50.8 acres were burned. ***Rockingham County*** • The greatest number of fires to occur in any year was 77 in 2006. • The greatest number of acres to burn in a single year occurred in 2006 when 173.6 acres were burned. ***Stokes County*** • The greatest number of fires to occur in any year was 72 in 2012. • The greatest number of acres to burn in a single year occurred in 2008 when 394.3 acres were burned. ***Surry County*** • The greatest number of fires to occur in any year was 101 in 2006. • The greatest number of acres to burn in a single year occurred in 2011 when 832.0 acres were burned. ***Yadkin 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 2006 when 44.1 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the region.
Infectious Disease	There is no available method for determining dollar losses due to infectious diseases at this time; however, $477,500 was allocated from the Governor's yearly budget in 2016 for preventative measures regarding the Zika Virus. The entire Northern Piedmont Region is susceptible to infectious diseases such as the flu, which kills hundreds of people annually.
Technological Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest severe hazardous materials incident reported in the region was 9,000 LGA released on the highway on July 29, 1997. It should be noted that larger events are possible. • Caswell County: 0 LGA • Davie County: 0 LGA • Forsyth County: 9,000 LGA • Rockingham County: 1,500 SLB • Stokes County: 0 LGA • Surry County: 7,800 LGA • Yadkin County: 8,900 LGA
Radiological Emergency – Fixed Nuclear Facilities	Although there is no history of a nuclear accident at the McGuire Nuclear Station, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at McGuire is possible.

Terrorism	Although no severe terrorism attacks have been reported in the Northern Piedmont Region, the entire area is still at risk to a future event. Densely populated areas, such as cities, are considered more susceptible. Terror events have the potential to affect the human population, buildings and infrastructure, and the economy in the region.
Cybersecurity	No cyberattacks have been historically reported in the Northern Piedmont Region. Technology usage, however, is increasing. A cyberattack could potentially devastate the region's economy and could have lasting negative impacts.
Electromagnetic Pulse	Electromagnetic Pulse (EMP) occurrences have not taken place in the Northern Piedmont Region, but the risk still exists. If an EMP were to occur, the effects would negatively impact first responders and communication efforts and may cause panic within the area.
Civil Disturbance	No major instances of civil disturbances have been identified in the Northern Piedmont Region. However, established social systems of the area are still changing every year in response to new social, political, and/or cultural events.
Food Emergency	Some instances of food emergencies, especially in the form of mass foodborne illness (e.g., *E. coli* and *Salmonella*) or contamination, have been historically reported in the Northern Piedmont Region. Additionally, established food systems of the area are still changing every year in response to new hazard events, changing climatic conditions, and evolving contamination threats.

5.21.2 Priority Risk Index

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

The prioritization and categorization of identified hazards for the Northern Piedmont 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 Northern Piedmont Regional Hazard Mitigation Planning Committee in gaining consensus on the determination of those hazards that pose the most significant threat to the Northern Piedmont 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 Northern Piedmont 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[50], as summarized in **Table 5.36**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

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

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for the Northern Piedmont Region, the highest PRI value out of 4.0 will indicate the hazard with the greatest potential priority. Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the Regional Hazard Mitigation Planning Committee.

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

TABLE 5.36: PRIORITY RISK INDEX

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

5.21.3 Priority Risk Index Results

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

TABLE 5.37: SUMMARY OF PRI RESULTS

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought	Agricultural, Hydrological	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Excessive Heat		Likely	Critical	Large	More than 24 hours	More than 1 week	**3.1**
Hurricane and Tropical Hazards	Severe Weather	Possible	Critical	Large	More than 24 hours	Less than 1 week	**2.7**
Tornadoes/ Thunderstorms	High Wind, Hail, Lightning	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	**3.1**
Severe Winter Weather	Snow, Blizzards, Wind Chill, Extreme Cold, Ice Storms, Freezing Rain	Likely	Critical	Large	More than 24 hours	Less than one week	**3.0**
Earthquakes		Possible	Limited	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Geological	Landslide, Sinkholes, Erosion	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	**2.1**
Dam Failure		Unlikely	Critical	Moderate	Less than 6 hours	Less than 1 week	**2.5**
Flooding		Likely	Critical	Moderate	6 to 12 hours	Morethan 1 week	**3.1**
Wildfires		Likely	Critical	Moderate	12 to 24 hours	More than 1 week	**3.0**
Infectious Disease	Vector-Borne Disease, Foreign Animal Disease	Likely	Critical	Large	More than 24 hours	More than 1 week	**3.1**
Technological Hazards							
Hazardous Substances	Hazardous Materials, Hazardous Chemicals, Oil Spill, Road/Rail Incidents	Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.5**
Radiological Emergency	Fixed Nuclear Facilities	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	**2.4**

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Terrorism	Explosive, Chemcial, Radiological, Biological, Nuclear	Possible	Critical	Small	Less than 6 hours	Less than 24 hours	**2.5**
Cybersecurity	Mass power/utility disruption	Highly Likely	Critical	Moderate	Less than 6 hours	More than one week	**3.5**
Electromagnetic Pulse		Unlikely	Critical	Moderate	12 to 24 hours	More than one week	**2.4**
Civil Disturbance		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Food Emergency		Possible	Critical	Moderate	More than 24 hours	More than 1 week	**2.6**

5.22 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the Northern Piedmont Region, including the PRI results and input from the Regional Hazard Mitigation Planning Committee, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk. For the purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of the Northern Piedmont Region. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

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

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

TABLE 5.38: 2025 CONCLUSIONS ON HAZARD RISK FOR THE NORTHERN PIEDMONT REGION

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

SECTION 6
VULNERABILITY ASSESSMENT

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

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

44 CFR Requirement

44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description must include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

6.1 OVERVIEW

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

This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the asset inventory as compiled for jurisdictions in the Northern Piedmont 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 the GIS-based risk assessment and NCEM's Risk Management Tool (both described in more detail below). This involves the consideration of annualized loss estimates and impacts of current and future buildings and populations. Annualized loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction or county). This methodology is applied primarily to hazards that do not have geographically-definable boundaries and are therefore excluded from spatial analysis through GIS. A stochastic risk methodology was used for the following hazards:

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

The hazards listed above are considered natural and have the potential to affect all current and future buildings and all populations. **Table 6.1** provides information about all improved property in the Northern Piedmont region that is vulnerable to these hazards. For all hazards annualized loss estimates were determined using the best available data on historical losses from sources including NOAA's National Centers for Environmental Information records, the previous Northern Piedmont Regional Hazard Mitigation Plan, 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], infectious disease, radiological emergency, terrorism, cybersecurity, EMP, and geological hazards, no data with historical property damages was available. Therefore, a detailed vulnerability assessment could not be completed for these hazards at this time.

The results for these hazards are found at the end of this section in **Table 6.26**.

6.2.2 GIS-Based Analysis

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

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

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

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the Northern Piedmont Region using best available geospatial data[2]. Digital data was collected from local, regional, state, and national sources for hazards and buildings. This included local tax assessor records for individual parcels and buildings and georeferenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.) when available. ESRI® ArcGIS Pro™ was used to assess hazard vulnerability utilizing digital hazard data, as well as local building data. Using these data layers, hazard vulnerability can be quantified by estimating the assessed building value for parcels and/or buildings determined to be in identified hazard areas. To estimate vulnerable populations in hazard areas, digital Census 2020 data by census tract was obtained and was supplemented with current population estimates from the US Census Bureau. This was intersected with hazard areas to determine exposed population counts. Unfortunately, due to the large scale of census tracts, the results are limited, but will be revised as data by census block becomes available for all areas in the region. The results of the analysis provided an estimate of the number of people and critical facilities, as well as the assessed value of parcels and improvements, determined to be potentially at risk to those hazards with delineable geographic hazard boundaries.

6.2.3 Risk Management Tool

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

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

Finally, the Risk Management Tool also assesses vulnerable populations, such as children and elderly persons. Data used to assess these populations is from the US 2020 Decennial Census. According to the US Census Bureau, those defined as “elderly,” are 65 years old or older, while those defined as “children” are 5 years old or younger.

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

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

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

A list of the hazards assessed by the RMT follows:

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

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

Hazard Prioritization

When it comes to evaluating hazards and determining which hazards a jurisdiction should spend the most time and effort addressing, a number of factors affect prioritization. As discussed in *Section 5: Hazard Profiles,* the risk (magnitude, probability, location) of a hazard is one of the primary driving forces that helps determine the relative importance of addressing the potential impacts of a hazard. However, the assessment of a hazard's risk is generally focused on the hazard itself and how severe or likely it could be within the geographic scope of the study area. This assessment does not necessarily analyze the potential effects of that hazard on humans and the built environment. This is a critical component of planning for hazards since a hazard that does not impact human life, safety, or welfare is typically not considered as important to address through mitigation. The analysis that follows attempts to bring this consideration into the planning process by estimating the impacts on humans and the built environment and prioritizing hazards accordingly.

6.3 EXPLANATION OF DATA SOURCES

Hurricane and Tropical Hazards

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

Tornadoes/Thunderstorms

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

Earthquakes

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

Geological (Landslide)

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

Flooding

FEMA Digital Flood Insurance Rate Maps (DFIRMs) were used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes and, they identify several features including floodplain boundaries and base flood elevations. Identified areas on the DFIRM represent some features of a Flood Insurance Rate Maps including the 100-year flood areas (1.0-percent annual chance flood), and the 500-year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local parcel data and critical facilities were overlaid on the 100-year floodplain areas and 500-year floodplain areas. This data was also supplemented with the NCEM RMT data, which assessed structure type and vulnerable populations within the floodplain areas. It should be noted that NCEM's RMT analysis does account for building elevation.

Wildfires

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

Hazardous Substances

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

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage, and disposal (TSD) facilities; and solvent recovery services;
- Has 10 or more full-time employee equivalents; and

- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bioaccumulative, and toxic (PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds, or 0.1 grams depending on the chemical.

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

6.4 ASSET INVENTORY

An inventory of geo-referenced assets within Caswell, Davie, Forsyth, Rockingham, Stokes, Surry, and Yadkin Counties and jurisdictions was compiled in order to identify and characterize those properties potentially at risk to the identified hazards[3]. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Under this assessment, two categories of physical assets were created and then further assessed through GIS analysis. Additionally, social assets are addressed to determine population at risk to the identified hazards. These are presented below in Section 6.4.2.

6.4.1 Physical and Improved Assets

The two categories of physical assets consist of:

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

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

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

Table 6.1 lists the number of parcels, total value of parcels, estimated number of buildings, and the total assessed value of improvements for participating areas of the Northern Piedmont

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

Region (study area of vulnerability assessment)[4]. For reference, the total area of the Northern Piedmont Region is approximately 1,927,517 acres, or 3,012 square miles. The U.S. Census Bureau also notes the following information for each county as of vintage year 2023:

- **Caswell County**
  - Land area in square miles (2020): 425.37
  - Population per square mile (2020): 53.5
  - Building permits (2023): 43
  - Total employer establishments (2022): 247

- **Davie County**
  - Land area in square miles (2020): 263.70
  - Population per square mile (2020): 162.0
  - Building permits (2023): 239
  - Total employer establishments (2022): 880

- **Forsyth County**
  - Land area in square miles (2020): 407.85
  - Population per square mile (2020): 938.1
  - Building permits (2023): 3,454
  - Total employer establishments (2022): 9,026

- **Rockingham County**
  - Land area in square miles (2020): 565.64
  - Population per square mile (2020): 161.0
  - Building permits (2023): 279
  - Total employer establishments (2022): 1,670

- **Stokes County**
  - Land area in square miles (2020): 449.35
  - Population per square mile (2020): 99.1
  - Building permits (2023): 191
  - Total employer establishments (2022): 655

- **Surry County**
  - Land area in square miles (2020): 532.65
  - Population per square mile (2020): 134.0
  - Building permits (2023): 210
  - Total employer establishments (2022): 1,640

- **Yadkin County**
  - Land area in square miles (2020): 334.94
  - Population per square mile (2020): 111.1
  - Building permits (2023): 113
  - Total employer establishments (2022): 629

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

TABLE 6.1: IMPROVED PROPERTY IN THE NORTHERN PIEDMONT REGION

Location[5]	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Caswell County	**17,026**	**$1,946,649,268**	**18,948**	**$1,080,530,905**
Milton	206	$11,800,004	167	$9,398,190
Yanceyville	979	$154,006,249	1,038	$123,405,240
Unincorporated Areas	15,841	$1,780,843,015	17,743	$947,727,475
Davie County	**25,887**	**$5,000,868,951**	**42,273**	**$3,583,757,774**
Bermuda Run	1,818	$738,380,813	1,407	$563,515,683
Cooleemee	542	$48,773,000	898	$39,309,650
Mocksville	3,061	$768,718,148	3,482	$576,424,658
Unincorporated Areas	20,466	$3,444,996,990	36,486	$2,404,507,783
Forsyth County	**163,886**	**$40,361,485,785**	**202,231**	**$30,520,161,023**
Bethania	268	$40,909,800	327	$31,251,600
Clemmons	8,124	$2,483,744,618	9,236	$1,925,781,570
Kernersville	10,809	$3,313,800,000	11,243	$2,576,765,200
Lewisville	6,522	$1,554,399,700	7,765	$1,186,377,900
Rural Hall	1,560	$407,627,200	1,925	$344,174,700
Tobaccoville	1,660	$265,612,400	2,662	$182,084,800
Walkertown	2,868	$536,430,600	3,979	$413,290,800
Winston-Salem	97,512	$25,023,913,213	113,509	$19,167,052,801
Unincorporated Area	34,563	$6,735,048,254	51,585	$4,693,381,652
Rockingham County	**55,605**	**$7,129,221,087**	**73,836**	**$5,181,344,210**
Eden	8,894	$948,265,935	8,810	$796,359,958
Madison	1,493	$188,215,835	1,560	$154,099,639
Mayodan	1,403	$180,127,598	1,827	$148,650,882
Reidsville	7,604	$1,024,289,582	7,899	$851,636,189
Stoneville	724	$67,258,777	847	$56,755,196
Wentworth	1,703	$333,234,187	2,251	$267,157,233
Unincorporated Area	33,784	$4,387,829,173	50,642	$2,906,685,113
Stokes County	**31,374**	**$4,093,268,896**	**32,407**	**$2,540,363,507**
Danbury	145	$29,437,900	106	$24,832,600
King	3,328	$679,351,578	3,712	$513,169,604
Walnut Cove	931	$121,690,200	768	$90,022,700
Unincorporated Area	26,970	$3,262,789,218	27,821	$1,912,338,603
Surry County	**44,131**	**$5,950,225,049**	**64,213**	**$4,509,021,282**
Dobson	683	$260,483,910	854	$221,626,400
Elkin	2,296	$522,699,460	2,609	$404,830,620
Mount Airy	5,743	$1,262,141,000	6,898	$984,799,090
Pilot Mountain	970	$179,666,380	1,014	$141,437,860

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

Location[5]	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Unincorporated Area	34,439	$3,725,234,299	52,838	$2,756,327,312
Yadkin County	**28,073**	**$3,282,341,278**	**30,105**	**$2,377,682,999**
Boonville	736	$102,982,350	596	$87,562,841
East Bend	529	$62,363,750	482	$48,551,893
Jonesville	1,475	$183,795,539	1,229	$138,075,581
Yadkinville	1,604	$333,262,063	1,494	$267,998,502
Unincorporated Area	4,344	$682,403,702	26,304	$542,188,817
Northern Piedmont Regional Total	**365,982**	**$67,764,060,314**	**464,013**	**$49,792,861,700**

Source: Local governments

The following table lists the fire stations, police stations, emergency operations centers (EOCs), licensed medical care facilities, schools, and other critical facilities located in the Northern Piedmont Region as listed on NC OneMap[6]. Local governments at the county level provided a majority of the data for this analysis. In addition, **Figure 6.1** shows the locations of essential facilities in the Northern Piedmont Region. **Table 6.27**, at the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all inclusive and only includes information provided by the counties using georeferenced data and updated municipal boundaries.

TABLE 6.2: CRITICAL FACILITY INVENTORY

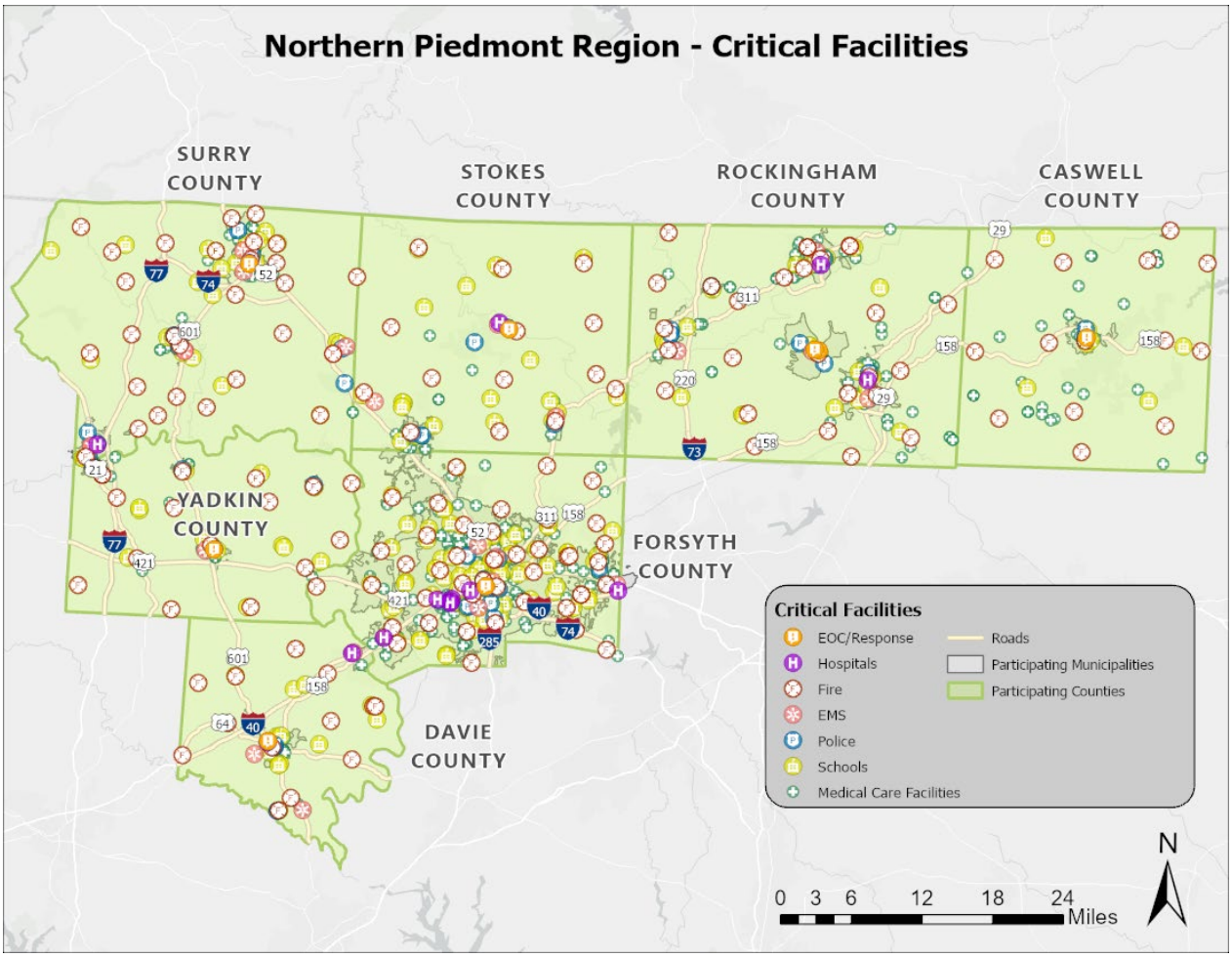
Location	Fire/EMS Stations	Police Stations	Medical Care Facilities	Schools	Other
Caswell County	**15**	**3**	**36**	**1**	**6**
Milton	1	0	0	0	0
Yanceyville	3	3	8	1	3
Unincorporated Area	11	0	28	0	3
Davie County	**17**	**4**	**25**	**1**	**13**
Bermuda Run	1	0	1	0	0
Cooleemee	1	1	0	0	1
Mocksville	2	3	20	1	5
Unincorporated Area	13	0	4	0	7
Forsyth County	**49**	**14**	**215**	**1**	**123**
Bethania	0	0	0	0	0
Clemmons	2	0	8	0	6
Kernersville	6	1	19	0	8
Lewisville	2	0	3	0	2
Rural Hall	1	0	1	0	1
Tobaccoville	1	0	0	0	1
Walkertown	1	0	1	0	5
Winston-Salem	25	13	174	1	88
Unincorporated Area	11	0	9	0	12

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

Location	Fire/EMS Stations	Police Stations	Medical Care Facilities	Schools	Other
Rockingham County	**31**	**8**	**87**	**2**	**38**
Eden	8	1	26	0	6
Madison	2	1	1	0	3
Mayodan	1	2	0	0	2
Reidsville	4	1	23	2	8
Stoneville	1	1	0	0	1
Wentworth	2	1	5	0	6
Unincorporated Area	13	1	32	0	12
Stokes County	**17**	**5**	**25**	**1**	**23**
Danbury	1	1	1	1	0
King	1	2	9	0	3
Walnut Cove	2	1	5	0	2
Unincorporated Area	13	1	10	0	18
Surry County	**36**	**9**	**50**	**1**	**32**
Dobson	2	3	3	0	3
Elkin	1	2	10	0	4
Mount Airy	3	2	24	1	5
Pilot Mountain	1	1	2	0	3
Unincorporated Area	29	1	11	0	17
Yadkin County	**19**	**5**	**27**	**1**	**17**
Boonville	1	1	2	0	1
East Bend	1	1	0	0	1
Jonesville	3	1	3	0	2
Yadkinville	3	2	14	1	3
Unincorporated Area	11	0	8	0	10
Northern Piedmont Regional Total	**184**	**48**	**465**	**8**	**252**

Source: Local governments, NC OneMap

FIGURE 6.1: CRITICAL FACILITIES IN THE NORTHERN PIEDMONT REGION



Source: Local governments, NC OneMap

6.4.2 Social Vulnerability

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

Table 6.3 lists the population by county according to U.S. Census Bureau population estimates. The population estimates are updated using the most recent vintage tables as per 2018-2022 American Community Survey (ACS) 5-Year Estimates findings. The total population in the Northern Piedmont Region according to 2022 Census data is reported as 694,130 Key factors that may provide additional insights regarding socially vulnerable populations of the region include spoken language, disability status, and poverty status listed in the table.

According to the Social Vulnerability Index (SVI)[7] published by the Centers for Disease Control and Prevention (CDC), 2022 findings are highly variable between the counties in the Northern Piedmont Region. The overall SVI score for Caswell County is 0.4646 (low to medium level of vulnerability) compared to 0.1212 (low vulnerability) for Davie County, 0.6869 (medium to high vulnerability) for Forsyth County, 0.6869 (medium to high vulnerability) for Rockingham County, 0.1818 (low vulnerability) for Stokes County, 0.6768 (medium to high vulnerability) for Surry County, and 0.4444 (low to medium vulnerability) for Yadkin County.

Additionally, the Environmental Justice Index (EJI)[8] published by the CDC ranks census tracts by level of environmental burden using quartiles from low to high. Caswell County and Davie County both contain 2 tracts ranked as high and 2 ranked as moderate to high. Forsyth County contains approximately 25 high and 12 moderate to high tracts whereas Rockingham County contains 9 high and 8 moderate to high tracts, Stokes County contains 1 high and 2 moderate to high tracts, Surry County contains 7 high and 12 moderate to high tracts, and Yadkin County contains 3 high and 2 moderate to high tracts.

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

For Caswell County, the risk index rating is very low (25.01 out of 100) and social vulnerability is rated as relatively high (75.3 out of 100) compared to very low community resilience (14.29 out of 100). The risk index for Davie County is very low (36.97), social vulnerability is relatively moderate (45.83), and community resilience is relatively moderate (48.6). The risk index for Forsyth County is relatively low (81.29), social vulnerability is relatively high (77.66), and community resilience is relatively high (60.03). The risk index for Rockingham County is relatively low (56.6), social vulnerability is very high (81.51), and community resilience is relatively low (38.73). The risk index for Stokes County is very low (16.54), social vulnerability is relatively moderate (43.41), and community resilience is relatively low (25.78). The risk index for Surry County is very low (47.28), social vulnerability is very high (80.43), and community resilience is relatively low (24.06). The risk index for Yadkin County is very low (24.4), social vulnerability is relatively high (62.16), and community resilience is relatively low (31.73).

TABLE 6.3: TOTAL POPULATION IN THE NORTHERN PIEDMONT REGION

Location	2022 Population Estimate	% population speaking a language other than English	% population with a disability	% population below the poverty level
Caswell County	22,747	5.2%	19.9%	15.4%
Davie County	43,030	7.9%	18.1%	11.6%
Forsyth County	383,739	15.0%	12.3%	15.2%
Rockingham County	91,209	6.3%	17.6%	18.8%
Stokes County	44,696	2.6%	19.8%	12.0%
Surry County	71,429	8.5%	14.7%	17.9%

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

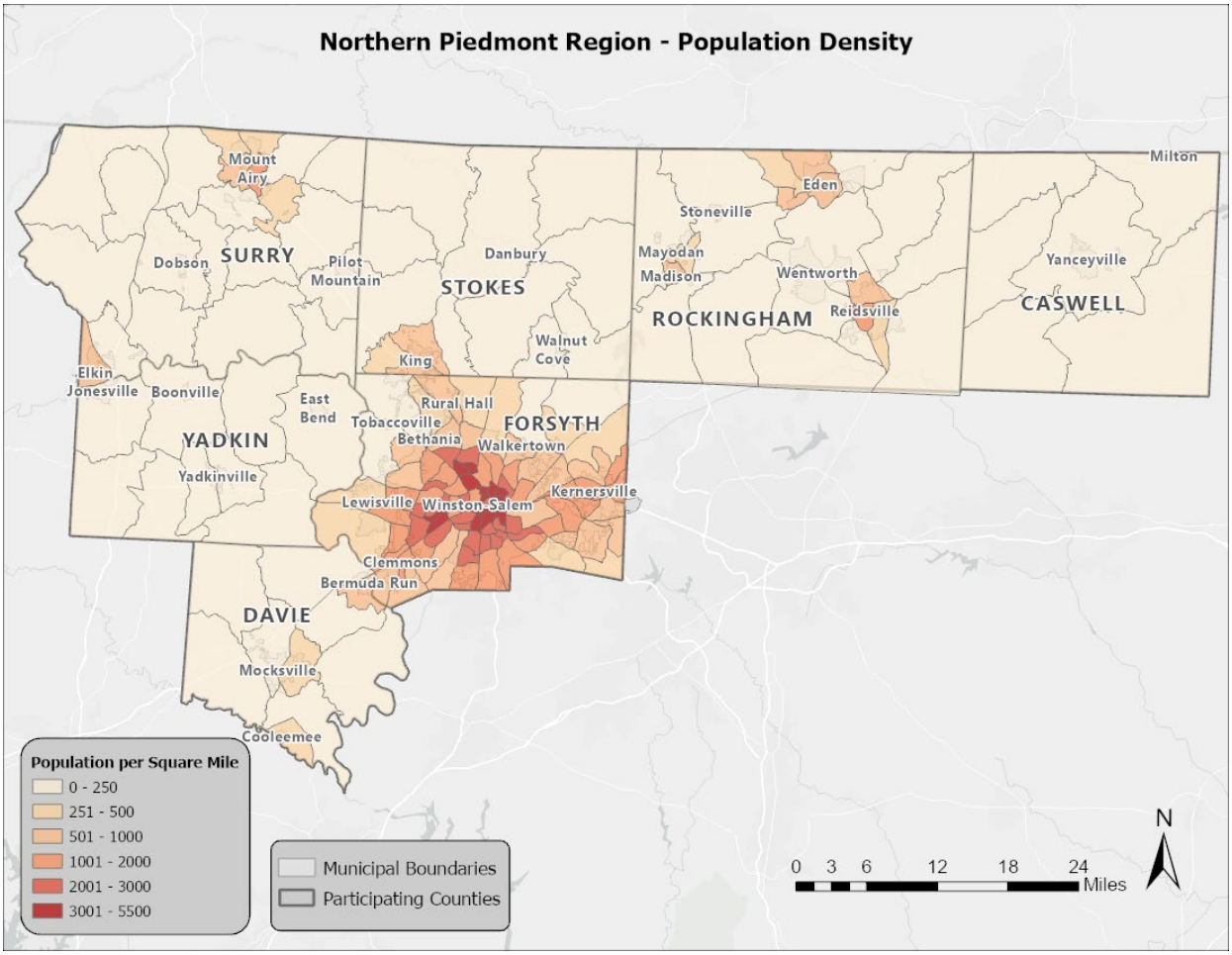
Location	2022 Population Estimate	% population speaking a language other than English	% population with a disability	% population below the poverty level
Yadkin County	37,280	9.8%	15.6%	13.8%
Northern Piedmont Regional Total	**694,130**	--	--	--

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

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

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

FIGURE 6.2: POPULATION DENSITY IN THE NORTHERN PIEDMONT REGION



Source: US Census Bureau

6.4.3. Development Trends and Changes in Vulnerability

Since the previous regional hazard mitigation plan was approved (in 2020), the Northern Piedmont Region has experienced some growth and development, mainly in Forsyth and Davie counties. **Table 6.4** shows the number of building units constructed since 2010 and 1970 compared to recently updated totals by jurisdiction according to the US Census Bureau.

TABLE 6.4: BUILDING COUNTS FOR THE NORTHERN PIEDMONT REGION

Location	Total Housing Units (2022)	Units Built 2010 or Later	% Building Stock Built Post-2010	Units Built 1970 or Later	% Building Stock Built Post-1970
Caswell County	**10,493**	**649**	**6.19%**	**7,137**	**68.02%**
Milton	93	0	0.00%	27	29.03%
Yanceyville	1,109	4	0.36%	682	61.50%
Unincorporated Area	9,291	645	6.94%	6,428	69.19%
Davie County	**18,845**	**1,287**	**6.83%**	**14,476**	**76.82%**
Bermuda Run	1,572	149	9.48%	1,399	88.99%
Cooleemee	424	0	0.00%	50	11.79%
Mocksville	2,485	290	11.67%	1,710	68.81%
Unincorporated Area	14,364	848	5.90%	11,317	78.79%
Forsyth County	**171,040**	**16,212**	**9.48%**	**118,892**	**69.51%**
Bethania	171	15	8.77%	116	67.84%
Clemmons	9,425	962	10.21%	7,938	84.22%
Kernersville	12,641	2,011	15.91%	10,854	85.86%
Lewisville	27,376	4,698	17.16%	22,803	83.30%
Rural Hall	1,790	285	15.92%	1,079	60.28%
Tobaccoville	1,157	79	6.83%	848	73.29%
Walkertown	2,693	558	20.72%	1,924	71.44%
Winston-Salem	112,191	9,157	8.16%	71,950	64.13%
Unincorporated Area	167,444	17,765	10.61%	117,512	70.18%
Rockingham County	**43,586**	**2,332**	**5.35%**	**27,699**	**63.55%**
Eden	7,261	237	3.26%	3,263	44.94%
Madison	1,125	42	3.73%	465	41.33%
Mayodan	1,264	5	0.40%	439	34.73%
Reidsville	7,217	347	4.81%	3,554	49.24%
Stoneville	553	26	4.70%	309	55.88%
Wentworth	1,120	63	5.63%	940	83.93%
Unincorporated Area	25,046	1,612	6.44%	18,729	74.78%
Stokes County	**21,285**	**1,217**	**5.72%**	**16,498**	**77.51%**
Danbury	107	0	0.00%	25	23.36%
King	3,172	206	6.49%	2,751	86.73%
Walnut Cove	800	15	1.88%	492	61.50%
Unincorporated Area	4,079	221	5.42%	3,268	80.12%
Surry County	**33,549**	**1,634**	**4.87%**	**21,922**	**65.34%**
Dobson	644	10	1.55%	484	75.16%
Elkin	1,961	102	5.20%	849	43.29%
Mount Airy	5,582	200	3.58%	2,566	45.97%
Pilot Mountain	822	9	1.09%	377	45.86%
Unincorporated Area	24,540	1,313	5.35%	17,646	71.91%
Yadkin County	**17,065**	**762**	**4.47%**	**12,220**	**71.61%**
Boonville	642	4	0.62%	419	65.26%
East Bend	263	0	0.00%	158	60.08%
Jonesville	1,399	2	0.14%	627	44.82%
Yadkinville	1,234	119	9.64%	802	64.99%
Unincorporated Area	13,527	125	0.92%	10,214	75.51%

Location	Total Housing Units (2022)	Units Built 2010 or Later	% Building Stock Built Post-2010	Units Built 1970 or Later	% Building Stock Built Post-1970
Northern Piedmont Regional Total	315,863	24,093	7.63%	218,844	69.28%

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

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

TABLE 6.5: POPULATION GROWTH ESTIMATES FOR THE NORTHERN PIEDMONT REGION

Location	2010	2020	2021	2022	% Change 2010-2020
Caswell County	**23,719**	**22,736**	**22,785**	**22,747**	**-4.14%**
Milton	159	155	144	147	-2.52%
Yanceyville	2,085	1,937	2,848	2,576	-7.10%
Unincorporated Area	21,475	20,644	19,793	20,024	-3.87%
Davie County	**41,240**	**42,712**	**42,543**	**43,030**	**3.57%**
Bermuda Run	2,509	3,120	3,021	3,118	24.35%
Cooleemee	962	940	821	875	-2.29%
Mocksville	5,052	5,900	5,714	5,908	16.79%
Unincorporated Area	32,717	32,752	32,987	33,129	0.11%
Forsyth County	**350,670**	**382,590**	**380,583**	**383,739**	**9.10%**
Bethania	328	344	331	335	4.88%
Clemmons	18,685	21,163	21,032	21,281	13.26%
Kernersville	23,133	26,449	26,376	27,177	14.33%
Lewisville	12,750	13,381	13,413	13,509	4.95%
Rural Hall	2,940	3,351	3,332	3,376	13.98%
Tobaccoville	2,442	2,578	2,582	2,602	5.57%
Walkertown	4,722	5,692	5,626	5,706	20.54%
Winston-Salem	230,033	249,545	247,917	249,571	8.48%
Unincorporated Area	55,637	60,087	59,974	60,182	8.00%
Rockingham County	**93,643**	**91,096**	**90,903**	**91,209**	**-2.72%**
Eden	15,672	15,421	15,317	15,349	-1.60%
Madison	2,240	2,129	2,244	2,185	-4.96%
Mayodan	2,477	2,418	2,428	2,438	-2.38%
Reidsville	14,452	14,583	14,463	14,526	0.91%
Stoneville	1,290	1,308	1,174	1,052	1.40%
Wentworth	2,779	2,662	2,655	2,664	-4.21%
Unincorporated Area	54,733	52,575	52,622	52,995	-3.94%
Stokes County	**47,401**	**44,520**	**44,588**	**44,696**	**-6.08%**
Danbury	189	189	311	293	0.00%
King	6,870	7,197	7,258	7,210	4.76%
Walnut Cove	851	1,586	2,419	2,028	86.37%
Unincorporated Area	39,491	35,548	34,600	35,165	-9.98%
Surry County	**73,673**	**71,359**	**71,439**	**71,429**	**-3.14%**
Dobson	1,586	1,462	1,547	1,812	-7.82%
Elkin	4,024	4,122	4,051	4,026	2.44%

Location	2010	2020	2021	2022	% Change 2010-2020
Mount Airy	10,406	10,676	10,547	10,621	2.59%
Pilot Mountain	1,473	1,440	1,747	1,667	-2.24%
Unincorporated Area	56,184	53,659	53,547	53,303	-4.49%
Yadkin County	**38,406**	**37,214**	**37,198**	**37,280**	**-3.10%**
Boonville	1,192	1,185	1,450	1,364	-0.59%
East Bend	615	634	793	741	3.09%
Jonesville	2,286	2,308	2,549	2,634	0.96%
Yadkinville	2,976	2,995	2,801	2,971	0.64%
Unincorporated Area	31,337	30,092	29,605	29,570	-3.97%
Northern Piedmont Regional Total	**668,752**	**692,227**	**690,039**	**694,130**	**3.51%**

Source: US Census Bureau

Based on the above data, the rate of residential development and population growth in the region since 2020 has increased overall, most dramatically in Forsyth and Davie Counties. The overall population has decreased in the remaining counties. Changes in development may have a significant impact on the region's vulnerability since the last update. The greater the population, the greater the risk is that people are impacted by hazards. It should be noted that if future development occurs in vulnerable areas, those populations and associated infrastructure will be increasingly exposed to potential hazards.

Conversely, it can be expected that development has slowed or is minimal in those jurisdictions experiencing population loss. Therefore, there is limited future development being conducted in hazard zones and less people vulnerable to hazards.

6.5 VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results are presented here. All other hazards are assumed to impact the entire planning region (drought, excessive heat, hailstorm, lightning, and severe winter weather) or, due to lack of authoritative data, analysis would not lead to credible results (sinkholes, erosion, dam failure, infectious disease, terrorism, cyber, EMP). The total region exposure for critical facilities, and thus risk, is presented in **Table 6.27**.

The annualized loss estimate for all hazards, where available, is presented at the end of this section in **Table 6.26.** For additional information related to vulnerability and expected annual losses for a wide range of hazards, the FEMA NRI[10] is a publicly available online tool that allows users to create reports and download data for both county and census tract geographies.

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

6.5.1. Hurricane and Tropical Hazards

Historical evidence indicates that the Northern Piedmont Region has a significant risk to the hurricane and tropical storm hazard, mostly due to the location of the state of North Carolina as a coastal state. In recent years, there have been six disaster declarations from hurricanes and tropical storms in the region

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

(Hurricane Hugo, Hurricane Fran, Hurricane Floyd, Hurricane Ivan, Hurricane Michael, and Tropical Storm Eta). The most recent hurricane or tropical storm experienced by the region was Tropical Storm Eta in 2020. Many more storm tracks have come near or traversed through the region, as shown and discussed in **Section 5: Hazard Profiles**.

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

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

It is assumed that all existing and future buildings and populations are at risk from hurricanes and tropical storm hazards.

TABLE 6.6: BUILDING VULNERABILITIES TO HURRICANE WINDS IN THE NORTHERN PIEDMONT REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Caswell County	**18,224**	**16,789**	**$4,384,457**	**920**	**$546,326**	**510**	**$821,378**	**18,219**	**$5,752,161**
Milton	162	135	$13,979	16	$570	11	$499	162	$15,048
Yanceyville	979	671	$183,190	178	$37,030	123	$229,128	972	$449,348
Unincorporated Area	17,083	15,983	$4,187,288	726	$508,726	376	$591,751	17,085	$5,287,765
Davie County	**20,240**	**27,318**	**$9,135,034**	**1,965**	**$3,645,006**	**430**	**$1,171,582**	**29,713**	**$13,951,620**
Bermuda Run	401	1,440	$1,008,480	117	$352,551	10	$59,378	1,567	$1,420,409
Cooleemee	624	574	$151,197	22	$23,683	25	$41,695	621	$216,574
Mocksville	3,688	3,124	$1,039,758	461	$790,768	95	$97,625	3,680	$1,928,150
Unincorporated Area	15,527	22,180	$6,935,599	1,365	$2,478,004	300	$972,884	23,845	$10,386,487
Forsyth County	**79,646**	**138,657**	**$37,852,129**	**7,892**	**$9,042,077**	**2,287**	**$3,301,038**	**148,836**	**$49,835,734**
Bethania	202	210	$49,952	13	$4,581	5	$763	228	$55,295
Clemmons	1,954	7,007	$2,061,636	372	$253,516	83	$69,907	7,462	$2,385,059
Kernersville	8,524	9,530	$2,555,070	927	$660,737	174	$102,297	10,631	$3,318,105
Lewisville	1,620	5,567	$1,616,693	139	$88,166	61	$24,992	5,767	$1,729,851
Rural Hall	777	1,163	$267,847	133	$171,838	22	$16,941	1,318	$456,627
Tobaccoville	730	1,609	$338,284	31	$11,560	17	$9,666	1,657	$359,51
Walkertown	1,561	2,512	$585,746	152	$36,814	61	$33,316	2,725	$655,876
Winston-Salem	52,252	80,833	$23,267,486	5,548	$7,440,150	1,576	$2,828,870	87,957	$33,536,505
Unincorporated Area	12,026	30,226	$7,109,415	577	$374,715	288	$214,286	31,091	$7,698,416
Rockingham County	**49,927**	**53,821**	**$14,838,731**	**7,551**	**$7,205,518**	**2,150**	**$2,000,232**	**63,522**	**$24,044,482**
Eden	9,025	9,573	$2,916,191	1,421	$2,051,029	403	$357,518	11,397	$5,324,738
Madison	1,705	1,622	$850,118	559	$222,067	93	$113,425	2,274	$1,185,610
Mayodan	1,731	1,664	$475,502	388	$224,448	56	$27,936	2,108	$727,886
Reidsville	6,489	6,343	$2,073,975	1,377	$901,851	375	$274,029	8,095	$3,249,855
Stoneville	1,275	1,098	$320,978	144	$108,173	48	$24,038	1,290	$453,189

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Wentworth	1,355	1,536	$326,741	160	$90,397	197	$228,481	1,893	$645,619
Unincorporated Area	28,347	31,985	$7,875,226	3,502	$3,607,553	978	$974,805	36,465	$12,457,585
Stokes County	**29,549**	**23,309**	**$6,539,949**	**5,975**	**$932,547**	**447**	**$472,005**	**29,731**	**$7,944,501**
Danbury	205	163	$37,188	30	$8,526	21	$6,704	214	$52,418
King	5,107	4,601	$1,451,421	615	$164,499	81	$43,566	5,297	$1,659,486
Walnut Cove	1,731	1,442	$461,682	219	$84,996	69	$29,839	1,730	$576,517
Unincorporated Area	22,506	17,103	$4,589,658	5,111	$674,526	276	$391,896	22,490	$5,656,080
Surry County	**50,662**	**46,026**	**$13,086,211**	**5,313**	**$4,003,379**	**1,096**	**$1,624,573**	**52,435**	**$18,714,162**
Dobson	1,481	1,110	$446,470	281	$110,475	86	$90,800	1,477	$647,745
Elkin	2,330	2,240	$719,700	374	$271,569	97	$95,728	2,711	$1,086,996
Mount Airy	10,029	8,831	$2,815,495	927	$1,302,945	255	$391,447	10,013	$4,509,886
Pilot Mountain	1,628	1,432	$521,614	138	$147,423	53	$37,218	1,623	$706,256
Unincorporated Area	35,194	32,413	$8,582,932	3,593	$2,170,967	605	$1,009,380	36,611	$11,763,279
Yadkin County	**23,490**	**26,126**	**$8,332,030**	**1,444**	**$796,667**	**548**	**$614,405**	**28,118**	**$9,743,102**
Boonville	1,055	934	$277,263	94	$25,000	29	$34,571	1,057	$336,834
East Bend	445	374	$98,830	59	$7,890	12	$9,351	445	$116,071
Jonesville	1,581	1,615	$431,573	156	$43,503	45	$61,847	1,816	$536,923
Yadkinville	2,417	2,021	$664,336	307	$240,305	102	$60,481	2,430	$965,122
Unincorporated Area	17,992	21,182	$6,860,028	828	$479,969	360	$448,155	22,370	$7,788,152
Northern Piedmont Regional Total	**221,811**	**278,225**	**$79,329,810**	**23,509**	**$18,966,002**	**5,318**	**$8,004,981**	**307,052**	**$105,941,280**

Source: NCEM Risk Management Tool

TABLE 6.7: POPULATION VULNERABILITIES TO HURRICANE WINDS IN THE NORTHERN PIEDMONT REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Caswell County	**4,908**	**1,060**	**22,884**
Milton	4	0	15
Yanceyville	85	19	336
Unincorporated Areas	4,819	1,041	22,533
Davie County	**8,965**	**2,126**	**43,172**
Bermuda Run	881	89	2,607
Cooleemee	29	17	268
Mocksville	738	236	4,183
Unincorporated Areas	7,317	1,784	36,114
Forsyth County	**61,667**	**22,689**	**385,641**
Bethania	64	16	331
Clemmons	3,079	881	16,421
Kernersville	4,843	1,391	24,746
Lewisville	1,600	662	9,506
Rural Hall	243	77	1,407
Tobaccoville	632	123	2,887
Walkertown	877	191	4,110
Winston-Salem	33,493	13,913	231,954

Location	Elderly at Risk	Children at Risk	Total at Risk
Unincorporated Area	16,836	5,435	94,279
Rockingham County	**18,920**	**4,710**	**92,315**
Eden	3,557	845	16,468
Madison	633	144	3,080
Mayodan	496	92	1,908
Reidsville	3,178	736	12,956
Stoneville	124	33	711
Wentworth	419	48	1,719
Unincorporated Area	10,513	2,812	55,473
Stokes County	**9,465**	**1,922**	**45,487**
Danbury	56	9	205
King	1,653	374	8,300
Walnut Cove	306	88	1,475
Unincorporated Area	7,450	1,451	35,507
Surry County	**14,812**	**3,797**	**71,885**
Dobson	188	67	1,128
Elkin	1,003	243	4,485
Mount Airy	3,290	775	14,126
Pilot Mountain	253	72	1,330
Unincorporated Area	10,078	2,640	50,816
Yadkin County	**7,387**	**1,895**	**37,528**
Boonville	165	19	735
East Bend	23	8	126
Jonesville	306	51	1,340
Yadkinville	403	132	1,823
Unincorporated Area	6,490	1,685	33,504
Northern Piedmont Regional Total	**126,124**	**38,199**	**698,912**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

Given the equal susceptibility across the entire Northern Piedmont Region, it can be assumed that the entire population is at risk from hurricanes and tropical storm hazards. Timely sheltering and evacuations of elderly and young individuals, disabled individuals, and individuals requiring specialized care or equipment are of critical importance to reducing risk during a severe hurricane.

CRITICAL FACILITIES

Given equal vulnerability across the Northern Piedmont Region, all critical facilities are considered to be at risk. Although some buildings may perform better than others in the face of such an event due to construction, age, and other factors, determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table 6.27** 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 Northern Piedmont Region. Hurricane events can cause substantial

damage in their wake including numerous fatalities, road closures, water contamination, gas leaks, extensive debris clean-up, and extended power outages.

6.5.2 Tornadoes/Thunderstorms

Tornadoes

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

TABLE 6.8: BUILDING VULNERABILITY TO THE TORNADOES HAZARD IN THE NORTHERN PIEDMONT REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Caswell County	**18,224**	**16,789**	**$1,567,990,629**	**920**	**$323,923,428**	**510**	**$321,707,405**	**18,219**	**$2,213,621,461**
Milton	162	135	$11,895,984	16	$1,550,595	11	$1,744,626	162	$15,191,205
Yanceyville	979	671	$64,815,226	178	$61,135,083	123	$86,563,201	972	$212,513,510
Unincorporated Area	17,083	15,983	$1,491,279,419	726	$261,237,750	376	$233,399,578	17,085	$1,985,916,746
Davie County	**20,240**	**27,318**	**$3,146,821,595**	**1,965**	**$1,715,871,677**	**430**	**$365,791,125**	**29,713**	**$5,228,484,398**
Bermuda Run	401	1,440	$299,814,478	117	$130,285,318	10	$22,549,630	1,567	$452,649,427
Cooleemee	624	574	$51,989,175	22	$20,488,180	25	$12,904,760	621	$85,382,115
Mocksville	3,688	3,124	$392,278,042	461	$581,114,925	95	$80,788,345	3,680	$1,054,181,312
Unincorporated Area	15,527	22,180	$2,402,739,900	1,365	$983,983,254	300	$249,548,390	23,845	$3,636,271,544
Forsyth County	**79,646**	**138,657**	**$15,144,140,465**	**7,892**	**$8,403,433,111**	**2,287**	**$2,136,537,546**	**148,836**	**$25,684,111,124**
Bethania	202	210	$21,444,925	13	$4,074,074	5	$1,702,921	228	$27,221,919
Clemmons	1,954	7,007	$884,189,265	372	$254,972,136	83	$57,898,200	7,462	$1,197,059,602
Kernersville	8,524	9,530	$1,076,414,509	927	$823,679,328	174	$110,461,463	10,631	$2,010,555,301
Lewisville	1,620	5,567	$697,927,430	139	$78,504,178	61	$33,960,425	5,767	$810,392,033
Rural Hall	777	1,163	$110,470,041	133	$284,967,802	22	$16,694,187	1,318	$412,132,030
Tobaccoville	730	1,609	$148,540,494	31	$11,511,660	17	$9,139,475	1,657	$169,191,629
Walkertown	1,561	2,512	$224,050,650	152	$52,126,391	61	$37,296,998	2,725	$313,474,039
Winston-Salem	52,252	80,833	$8,966,056,046	5,548	$6,422,078,058	1,576	$1,701,629,087	87,957	$17,089,763,191
Unincorporated Area	12,026	30,226	$3,015,047,105	577	$471,519,484	288	$167,754,790	31,091	$3,654,321,380
Rockingham County	**49,927**	**53,821**	**$5,361,770,028**	**7,551**	**$4,985,684,180**	**2,150**	**$1,070,983,859**	**63,522**	**$11,418,438,068**
Eden	9,025	9,573	$982,541,235	1,421	$1,452,835,699	403	$222,067,405	11,397	$2,657,444,338
Madison	1,705	1,622	$300,137,884	559	$254,723,378	93	$80,946,496	2,274	$635,807,759
Mayodan	1,731	1,664	$160,585,806	388	$318,920,154	56	$17,845,064	2,108	$497,351,024
Reidsville	6,489	6,343	$735,170,657	1,377	$1,014,851,166	375	$182,166,673	8,095	$1,932,188,496
Stoneville	1,275	1,098	$113,732,409	144	$119,816,516	48	$17,010,719	1,290	$250,559,644
Wentworth	1,355	1,536	$140,789,007	160	$70,152,581	197	$128,453,339	1,893	$339,394,927
Unincorporated Area	28,347	31,985	$2,928,813,030	3,502	$1,754,384,686	978	$422,494,163	36,465	$5,105,691,880
Stokes County	**29,564**	**23,315**	**$2,521,313,412**	**5,982**	**$1,289,693,888**	**449**	**$327,361,190**	**29,746**	**$4,138,368,489**
Danbury	205	163	$17,545,251	30	$15,427,774	21	$10,085,082	214	$43,058,107
King	5,107	4,601	$507,601,048	615	$196,976,714	81	$47,879,792	5,297	$752,457,555
Walnut Cove	1,731	1,442	$158,643,060	219	$112,525,061	69	$34,896,904	1,730	$306,065,024
Unincorporated Area	22,521	17,109	$1,837,524,053	5,118	$964,764,339	278	$234,499,412	22,505	$3,036,787,803

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Surry County	**50,754**	**46,114**	**$4,775,640,142**	**5,315**	**$2,702,540,852**	**1,098**	**$805,407,418**	**52,527**	**$8,283,588,412**
Dobson	1,481	1,110	$148,678,377	281	$66,587,302	86	$94,601,728	1,477	$309,867,407
Elkin	2,330	2,240	$261,048,251	374	$508,319,155	97	$88,553,458	2,711	$857,920,864
Mount Airy	10,029	8,831	$1,025,256,997	927	$907,550,697	255	$214,885,811	10,013	$2,147,693,504
Pilot Mountain	1,628	1,432	$200,808,412	138	$165,441,307	53	$40,457,163	1,623	$406,706,883
Unincorporated Area	35,286	32,501	$3,139,848,105	3,595	$1,054,642,391	607	$366,909,258	36,703	$4,561,399,754
Yadkin County	**23,490**	**26,126**	**$2,660,135,207**	**1,444**	**$721,931,712**	**548**	**$287,580,466**	**28,118**	**$3,669,647,382**
Boonville	1,055	934	$86,683,042	94	$42,514,292	29	$15,275,279	1,057	$144,472,612
East Bend	445	374	$31,696,735	59	$16,714,615	12	$6,916,318	445	$55,327,667
Jonesville	1,581	1,615	$154,764,832	156	$51,819,639	45	$37,512,213	1,816	$244,096,683
Yadkinville	2,417	2,021	$208,037,990	307	$337,911,418	102	$42,911,632	2,430	$588,861,040
Unincorporated Area	17,992	21,182	$2,178,952,608	828	$272,971,748	360	$184,965,024	22,370	$2,636,889,380
Northern Piedmont Regional Total	**271,845**	**332,140**	**$35,177,811,478**	**31,069**	**$20,143,078,848**	**7,472**	**$5,315,369,009**	**370,681**	**$60,636,259,334**

Source: NCEM Risk Management Tool

TABLE 6.9: POPULATION VULNERABILITY TO THE TORNADOES HAZARD IN THE NORTHERN PIEDMONT REGION

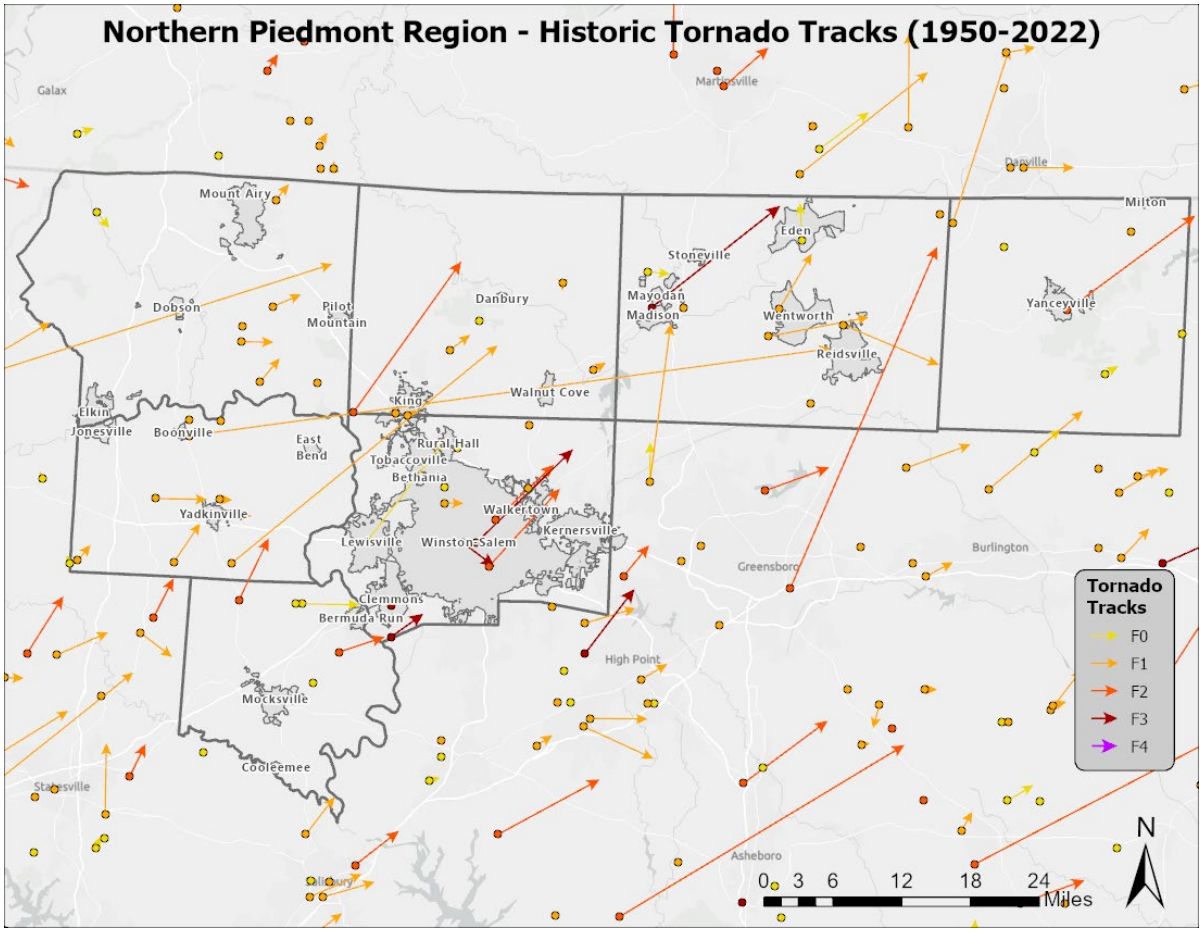
Location	Elderly at Risk	Children at Risk	Total at Risk
Caswell County	**4,908**	**1,060**	**22,884**
Milton	4	0	15
Yanceyville	85	19	336
Unincorporated Area	4,819	1,041	22,533
Davie County	**8,965**	**2,126**	**43,172**
Bermuda Run	881	89	2,607
Cooleemee	29	17	268
Mocksville	738	236	4,183
Unincorporated Area	7,317	1,784	36,114
Forsyth County	**61,667**	**22,689**	**385,641**
Bethania	64	16	331
Clemmons	3,079	881	16,421
Kernersville	4,843	1,391	24,746
Lewisville	1,600	662	9,506
Rural Hall	243	77	1,407
Tobaccoville	632	123	2,887
Walkertown	877	191	4,110
Winston-Salem	33,493	13,913	231,954
Unincorporated Area	16,836	5,435	94,279
Rockingham County	**18,920**	**4,710**	**92,315**
Eden	3,557	845	16,468
Madison	633	144	3,080

Location	Elderly at Risk	Children at Risk	Total at Risk
Mayodan	496	92	1,908
Reidsville	3,178	736	12,956
Stoneville	124	33	711
Wentworth	419	48	1,719
Unincorporated Area	10,513	2,812	55,473
Stokes County	**9,468**	**1,923**	**45,499**
Danbury	56	9	205
King	1,653	374	8,300
Walnut Cove	306	88	1,475
Unincorporated Area	7,453	1,452	35,519
Surry County	**14,839**	**3,804**	**72,023**
Dobson	188	67	1,128
Elkin	1,003	243	4,485
Mount Airy	3,290	775	14,126
Pilot Mountain	253	72	1,330
Unincorporated Area	10,105	2,647	50,954
Yadkin County	**7,387**	**1,895**	**37,528**
Boonville	165	19	735
East Bend	23	8	126
Jonesville	306	51	1,340
Yadkinville	403	132	1,823
Unincorporated Area	6,490	1,685	33,504
Northern Piedmont Regional Total	**126,154**	**38,207**	**699,062**

Source: NCEM Risk Management Tool

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

FIGURE 6.3: HISTORICAL TORNADO TRACKS



Source: NOAA

Thunderstorms

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

TABLE 6.10: BUILDING VULNERABILITY TO THUNDERSTORM WINDS IN THE NORTHERN PIEDMONT REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Caswell County	**18,224**	**16,789**	**$6,801,876**	**920**	**$1,095,801**	**510**	**$1,661,043**	**18,219**	**$9,558,721**
Milton	162	135	$26,388	16	$1,125	11	$914	162	$28,427
Yanceyville	979	671	$285,002	178	$74,766	123	$471,876	972	$831,644
Unincorporated Area	17,083	15,983	$6,490,486	726	$1,019,910	376	$1,188,253	17,085	$8,698,650
Davie County	**20,240**	**27,318**	**$9,355,700**	**1,965**	**$3,872,723**	**430**	**$1,292,763**	**29,713**	**$14,521,185**
Bermuda Run	401	1,440	$1,037,309	117	$362,333	10	$59,378	1,567	$1,459,020
Cooleemee	624	574	$151,197	22	$23,683	25	$41,695	621	$216,574
Mocksville	3,688	3,124	$1,039,758	461	$790,768	95	$97,625	3,680	$1,928,150
Unincorporated Area	15,527	22,180	$7,127,436	1,365	$2,695,939	300	$1,094,065	23,845	$10,917,441
Forsyth County	**79,646**	**138,657**	**$61,039,810**	**7,892**	**$18,267,018**	**2,287**	**$6,724,139**	**148,836**	**$86,030,968**
Bethania	202	210	$81,352	13	$9,606	5	$1,297	228	$92,255
Clemmons	1,954	7,007	$3,370,039	372	$532,230	83	$144,973	7,462	$4,047,242
Kernersville	8,524	9,530	$4,253,583	927	$1,343,511	174	$213,574	10,631	$5,810,667
Lewisville	1,620	5,567	$2,284,112	139	$168,848	61	$41,509	5,767	$2,494,470
Rural Hall	777	1,163	$439,804	133	$344,085	22	$34,291	1,318	$818,180
Tobaccoville	730	1,609	$541,265	31	$24,090	17	$19,346	1,657	$584,701
Walkertown	1,561	2,512	$940,738	152	$78,124	61	$70,211	2,725	$1,089,073
Winston-Salem	52,252	80,833	$38,071,966	5,548	$15,022,777	1,576	$5,775,054	87,957	$58,869,798
Unincorporated Area	12,026	30,226	$11,056,951	577	$743,747	288	$423,884	31,091	$12,224,582
Rockingham County	**49,927**	**53,821**	**$23,367,552**	**7,551**	**$14,456,410**	**2,150**	**$4,062,849**	**63,522**	**$41,886,812**
Eden	9,025	9,573	$4,559,007	1,421	$4,046,472	403	$731,740	11,397	$9,337,219
Madison	1,705	1,622	$1,372,138	559	$466,378	93	$240,278	2,274	$2,078,794
Mayodan	1,731	1,664	$744,917	388	$473,882	56	$57,783	2,108	$1,276,582
Reidsville	6,489	6,343	$3,288,557	1,377	$1,864,616	375	$574,991	8,095	$5,728,164
Stoneville	1,275	1,098	$497,372	144	$215,276	48	$47,555	1,290	$760,203
Wentworth	1,355	1,536	$527,054	160	$178,902	197	$475,256	1,893	$1,181,213
Unincorporated Area	28,347	31,985	$12,378,507	3,502	$7,210,884	978	$1,935,246	36,465	$21,524,637
Stokes County	**29,549**	**23,309**	**$9,390,556**	**5,975**	**$1,721,661**	**447**	**$740,996**	**29,731**	**$11,853,212**
Danbury	205	163	$60,150	30	$18,850	21	$15,028	214	$94,028
King	5,107	4,601	$2,189,736	615	$308,162	81	$82,518	5,297	$2,580,416
Walnut Cove	1,731	1,442	$727,776	219	$149,216	69	$57,615	1,730	$934,606
Unincorporated Area	22,506	17,103	$6,412,894	5,111	$1,245,433	276	$585,835	22,490	$8,244,162
Surry County	**50,662**	**46,026**	**$13,086,211**	**5,313**	**$4,003,379**	**1,096**	**$1,624,573**	**52,435**	**$18,714,162**
Dobson	1,481	1,110	$446,470	281	$110,475	86	$90,800	1,477	$647,745
Elkin	2,330	2,240	$719,700	374	$271,569	97	$95,728	2,711	$1,086,996
Mount Airy	10,029	8,831	$2,815,495	927	$1,302,945	255	$391,447	10,013	$4,509,886
Pilot Mountain	1,628	1,432	$521,614	138	$147,423	53	$37,218	1,623	$706,256
Unincorporated Area	35,194	32,413	$8,582,932	3,593	$2,170,967	605	$1,009,380	36,611	$11,763,279

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Yadkin County	**23,490**	**26,126**	**$8,332,030**	**1,444**	**$796,667**	**548**	**$614,405**	**28,118**	**$9,743,102**
Boonville	1,055	934	$277,263	94	$25,000	29	$34,571	1,057	$336,834
East Bend	445	374	$98,830	59	$7,890	12	$9,351	445	$116,071
Jonesville	1,581	1,615	$431,573	156	$43,503	45	$61,847	1,816	$536,923
Yadkinville	2,417	2,021	$664,336	307	$240,305	102	$60,481	2,430	$965,122
Unincorporated Area	17,992	21,182	$6,860,028	828	$479,969	360	$448,155	22,370	$7,788,152
Northern Piedmont Regional Total	**271,738**	**332,046**	**$131,373,735**	**31,060**	**$44,213,659**	**7,468**	**$16,720,768**	**370,574**	**$192,308,162**

Source: NCEM Risk Management Tool

TABLE 6.11: POPULATION VULNERABILITY TO THUNDERSTORM WINDS IN THE NORTHERN PIEDMONT REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Caswell County	**4,908**	**1,060**	**22,884**
Milton	4	0	15
Yanceyville	85	19	336
Unincorporated Area	4,819	1,041	22,533
Davie County	**8,965**	**2,126**	**43,172**
Bermuda Run	881	89	2,607
Cooleemee	29	17	268
Mocksville	738	236	4,183
Unincorporated Area	7,317	1,784	36,114
Forsyth County	**61,667**	**22,689**	**385,641**
Bethania	64	16	331
Clemmons	3,079	881	16,421
Kernersville	4,843	1,391	24,746
Lewisville	1,600	662	9,506
Rural Hall	243	77	1,407
Tobaccoville	632	123	2,887
Walkertown	877	191	4,110
Winston-Salem	33,493	13,913	231,954
Unincorporated Area	16,836	5,435	94,279
Rockingham County	**18,920**	**4,710**	**92,315**
Eden	3,557	845	16,468
Madison	633	144	3,080
Mayodan	496	92	1,908
Reidsville	3,178	736	12,956
Stoneville	124	33	711
Wentworth	419	48	1,719
Unincorporated Area	10,513	2,812	55,473
Stokes County	**9,465**	**1,922**	**45,487**
Danbury	56	9	205
King	1,653	374	8,300
Walnut Cove	306	88	1,475

Location	Elderly at Risk	Children at Risk	Total at Risk
Unincorporated Area	7,450	1,451	35,507
Surry County	**14,812**	**3,797**	**71,885**
Dobson	188	67	1,128
Elkin	1,003	243	4,485
Mount Airy	3,290	775	14,126
Pilot Mountain	253	72	1,330
Unincorporated Area	10,078	2,640	50,816
Yadkin County	**7,387**	**1,895**	**37,528**
Boonville	165	19	735
East Bend	23	8	126
Jonesville	306	51	1,340
Yadkinville	403	132	1,823
Unincorporated Area	6,490	1,685	33,504
Northern Piedmont Regional Total	**126,124**	**38,199**	**698,912**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

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

CRITICAL FACILITIES

All critical facilities should still be considered at-risk of damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.27**.

6.5.3. Earthquakes

A probabilistic scenario was created to estimate building and population vulnerabilities in the Northern Piedmont Region for the earthquake hazard with a 500-year frequency (return period). The RMT analyzed this information which has been reported below in **Table 6.12** and **Table 6.13**.

TABLE 6.12: BUILDING VULNERABILITY TO THE EARTHQUAKE HAZARD IN THE NORTHERN PIEDMONT REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Caswell County	**18,224**	**16,789**	**$610,533**	**920**	**$487,393**	**510**	**$467,469**	**18,219**	**$1,565,396**
Milton	162	135	$3,413	16	$2,375	11	$2,781	162	$8,569
Yanceyville	979	671	$29,567	178	$107,838	123	$125,473	972	$262,878
Unincorporated Areas	17,083	15,983	$577,553	726	$377,180	376	$339,215	17,085	$1,293,949
Davie County	**20,240**	**27,318**	**$2,918,891**	**1,965**	**$4,505,571**	**430**	**$916,594**	**29,713**	**$8,341,058**
Bermuda Run	401	1,440	$260,027	117	$287,743	10	$46,870	1,567	$594,641
Cooleemee	624	574	$50,723	22	$43,842	25	$40,752	621	$135,317
Mocksville	3,688	3,124	$448,882	461	$1,744,877	95	$226,306	3,680	$2,420,066
Unincorporated Areas	15,527	22,180	$2,159,259	1,365	$2,429,109	300	$602,666	23,845	$5,191,034
Forsyth County	**79,646**	**138,657**	**$16,534,216**	**7,892**	**$19,194,928**	**2,287**	**$4,324,128**	**148,836**	**$40,053,272**

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Bethania	202	210	$20,304	13	$8,304	5	$5,720	228	$34,328
Clemmons	1,954	7,007	$1,040,138	372	$550,768	83	$112,590	7,462	$1,703,495
Kernersville	8,524	9,530	$1,091,631	927	$1,645,637	174	$202,242	10,631	$2,939,510
Lewisville	1,620	5,567	$717,123	139	$140,490	61	$72,604	5,767	$930,217
Rural Hall	777	1,163	$121,605	133	$541,110	22	$38,425	1,318	$701,141
Tobaccoville	730	1,609	$146,008	31	$19,056	17	$21,714	1,657	$186,778
Walkertown	1,561	2,512	$227,499	152	$107,953	61	$72,664	2,725	$408,116
Winston-Salem	52,252	80,833	$10,289,166	5,548	$15,176,356	1,576	$3,493,594	87,957	$28,959,116
Unincorporated Area	12,026	30,226	$2,880,742	577	$1,005,254	288	$304,575	31,091	$4,190,571
Rockingham County	**49,927**	**53,821**	**$2,920,374**	**7,551**	**$8,700,702**	**2,150**	**$1,795,974**	**63,522**	**$13,417,046**
Eden	9,025	9,573	$545,281	1,421	$2,384,475	403	$331,238	11,397	$3,260,993
Madison	1,705	1,622	$182,203	559	$494,035	93	$147,270	2,274	$823,508
Mayodan	1,731	1,664	$113,492	388	$620,930	56	$34,339	2,108	$768,760
Reidsville	6,489	6,343	$438,948	1,377	$1,698,888	375	$279,171	8,095	$2,417,007
Stoneville	1,275	1,098	$72,032	144	$250,502	48	$33,738	1,290	$356,271
Wentworth	1,355	1,536	$68,167	160	$123,798	197	$189,956	1,893	$381,921
Unincorporated Area	28,347	31,985	$1,500,251	3,502	$3,128,074	978	$780,262	36,465	$5,408,586
Stokes County	**29,564**	**23,315**	**$1,732,164**	**5,982**	**$2,594,828**	**449**	**$779,678**	**29,746**	**$5,106,671**
Danbury	205	163	$12,864	30	$39,431	21	$25,563	214	$77,858
King	5,107	4,601	$378,585	615	$471,936	81	$132,649	5,297	$983,170
Walnut Cove	1,731	1,442	$104,280	219	$300,845	69	$96,312	1,730	$501,438
Unincorporated Area	22,521	17,109	$1,236,435	5,118	$1,782,616	278	$525,154	22,505	$3,544,205
Surry County	**50,754**	**46,114**	**$4,499,809**	**5,315**	**$7,210,711**	**1098**	**$2,303,199**	**52,527**	**$14,013,718**
Dobson	1,481	1,110	$141,134	281	$174,577	86	$315,833	1,477	$631,544
Elkin	2,330	2,240	$249,404	374	$1,539,111	97	$260,948	2,711	$2,049,462
Mount Airy	10,029	8,831	$1,170,912	927	$2,687,667	255	$624,288	10,013	$4,482,867
Pilot Mountain	1,628	1,432	$231,340	138	$409,925	53	$122,105	1,623	$763,370
Unincorporated Area	35,286	32,501	$2,707,019	3,595	$2,399,431	607	$980,025	36,703	$6,086,475
Yadkin County	**23,490**	**26,126**	**$2,604,337**	**1,444**	**$2,237,462**	**548**	**$802,312**	**28,118**	**$5,644,108**
Boonville	1,055	934	$87,935	94	$129,644	29	$40,233	1,057	$257,811
East Bend	445	374	$29,003	59	$44,685	12	$22,875	445	$96,563
Jonesville	1,581	1,615	$186,019	156	$136,298	45	$94,452	1,816	$416,768
Yadkinville	2,417	2,021	$202,410	307	$1,186,247	102	$120,124	2,430	$1,508,781
Unincorporated Area	17,992	21,182	$2,098,970	828	$740,588	360	$524,628	22,370	$3,364,185
Northern Piedmont Regional Total	**271,845**	**332,140**	**$31,820,324**	**31,069**	**$44,931,595**	**7,472**	**$11,389,354**	**370,681**	**$88,141,269**

Source: NCEM Risk Management Tool

TABLE 6.13: POPULATION VULNERABILITY TO THE EARTHQUAKE HAZARD IN THE NORTHERN PIEDMONT REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Caswell County	**4,908**	**1,060**	**22,884**
Milton	4	0	15
Yanceyville	85	19	336

Location	Elderly at Risk	Children at Risk	Total at Risk
Unincorporated Areas	4,819	1,041	22,533
Davie County	**8,965**	**2,126**	**43,172**
Bermuda Run	881	89	2,607
Cooleemee	29	17	268
Mocksville	738	236	4,183
Unincorporated Areas	7,317	1,784	36,114
Forsyth County	**61,667**	**22,689**	**385,641**
Bethania	64	16	331
Clemmons	3,079	881	16,421
Kernersville	4,843	1,391	24,746
Lewisville	1,600	662	9,506
Rural Hall	243	77	1,407
Tobaccoville	632	123	2,887
Walkertown	877	191	4,110
Winston-Salem	33,493	13,913	231,954
Unincorporated Area	16,836	5,435	94,279
Rockingham County	**18,920**	**4,710**	**92,315**
Eden	3,557	845	16,468
Madison	633	144	3,080
Mayodan	496	92	1,908
Reidsville	3,178	736	12,956
Stoneville	124	33	711
Wentworth	419	48	1,719
Unincorporated Area	10,513	2,812	55,473
Stokes County	**9,468**	**1,923**	**45,499**
Danbury	56	9	205
King	1,653	374	8,300
Walnut Cove	306	88	1,475
Unincorporated Area	7,453	1,452	35,519
Surry County	**14,839**	**3,804**	**72,023**
Dobson	188	67	1,128
Elkin	1,003	243	4,485
Mount Airy	3,290	775	14,126
Pilot Mountain	253	72	1,330
Unincorporated Area	10,105	2,647	50,954
Yadkin County	**7,387**	**1,895**	**37,528**
Boonville	165	19	735
East Bend	23	8	126
Jonesville	306	51	1,340
Yadkinville	403	132	1,823
Unincorporated Area	6,490	1,685	33,504
Northern Piedmont Regional Total	**126,154**	**38,207**	**699,062**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

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

requiring specialized care or equipment are of critical importance to reducing risk during a severe earthquake event.

CRITICAL FACILITIES

All critical facilities should still be considered at risk to minor damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.27**.

In conclusion, an earthquake could potentially impact all existing and future buildings, facilities, and populations in the Northern Piedmont region. Though minor earthquakes are often recorded but not felt, they may rattle breakables and cause minimal damage. Furthermore, major earthquakes have the potential to damage structures. Severe impacts of earthquakes may result in debris clean-up, service disruption, building collapse, and fatalities. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

6.5.4. Geological (Landslide)

GIS analysis was used to complete the vulnerability assessment for landslides in the Northern Piedmont Region. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section 5: *Hazard Profiles*), county level tax parcel data, and GIS analysis. **Table 6.14** presents the potential at-risk property where available. All areas of the Northern Piedmont Region are identified as moderate or high incidence areas by the USGS landslide data. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE 6.14: TOTAL POTENTIAL AT-RISK PARCELS FOR THE GEOLOGICAL (LANDSLIDE) HAZARD

Location	Number of Parcels at Risk		Number of Improvements at Risk		Total Value of Improvements at Risk ($)	
Incidence Level	**Moderate**	**High**	**Moderate**	**High**	**Moderate**	**High**
Caswell County	**17,026**	**0**	**11,462**	**0**	**$1,080,530,905**	**$0**
Milton	206	0	135	0	$9,398,190	$0
Yanceyville	979	0	688	0	$123,405,240	$0
Unincorporated Area	15,841	0	10,639	0	$947,727,475	$0
Davie County	**25,887**	**0**	**18,196**	**0**	**$3,583,757,774**	**$0**
Bermuda Run	1,818	0	1,662	0	$563,515,683	$0
Cooleemee	542	0	458	0	$39,309,650	$0
Mocksville	3,061	0	2,457	0	$576,424,658	$0
Unincorporated Area	20,466	0	13,619	0	$2,404,507,783	$0
Forsyth County	**163,886**	**0**	**137,639**	**0**	**$30,520,161,023**	**$0**
Bethania	268	0	192	0	$31,251,600	$0
Clemmons	8,124	0	7,328	0	$1,925,781,570	$0
Kernersville	10,809	0	9,149	0	$2,576,765,200	$0
Lewisville	6,522	0	5,514	0	$1,186,377,900	$0
Rural Hall	1,560	0	1,288	0	$344,174,700	$0
Tobaccoville	1,660	0	1,218	0	$182,084,800	$0

Location	Number of Parcels at Risk		Number of Improvements at Risk		Total Value of Improvements at Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Walkertown	2,868	0	2,320	0	$413,290,800	$0
Winston-Salem	97,512	0	84,570	0	$19,167,052,801	$0
Unincorporated Area	34,563	0	26,060	0	$4,693,381,652	$0
Rockingham County	**54,751**	**936**	**41,850**	**578**	**$5,135,844,323**	**$49,612,921**
Eden	8,894	0	6,996	0	$796,359,958	$0
Madison	1,493	0	1,117	0	$154,099,639	$0
Mayodan	1,403	0	1,167	0	$148,650,882	$0
Reidsville	7,604	0	5,983	0	$851,636,189	$0
Stoneville	724	0	554	0	$56,755,196	$0
Wentworth	1,703	0	1,295	0	$267,157,233	$0
Unincorporated Area	32,930	936	24,738	578	$2,861,185,226	$49,612,921
Stokes County	**23,791**	**7,774**	**16,325**	**4,436**	**$2,125,007,607**	**$429,731,800**
Danbury	145	0	88	0	$24,832,600	$0
King	3,328	0	2,778	0	$513,169,604	$0
Walnut Cove	931	0	652	0	$90,022,700	$0
Unincorporated Area	19,387	7,774	12,807	4,436	$1,496,982,703	$429,731,800
Surry County	**3,950**	**40,323**	**2,846**	**30,385**	**$411,125,470**	**$4,116,014,812**
Dobson	0	683	0	515	$0	$221,626,400
Elkin	0	2,296	0	1,735	$0	$404,830,620
Mount Airy	0	5,743	0	4,744	$0	$984,799,090
Pilot Mountain	789	209	625	155	$105,669,350	$45,277,830
Unincorporated Area	3,161	31,392	2,221	23,236	$305,456,120	$2,459,480,872
Yadkin County	**22,584**	**5,687**	**14,300**	**3,725**	**$1,933,576,401**	**$470,740,733**
Boonville	683	107	510	72	$74,657,794	$20,480,273
East Bend	529	0	368	0	$48,551,893	$0
Jonesville	0	1,475	0	1,081	$0	$138,075,581
Yadkinville	1,604	0	1,263	0	$267,998,502	$0
Unincorporated Area	19,768	4,105	12,159	2,572	$1,542,368,212	$312,184,879
Northern Piedmont Regional Total	**311,875**	**54,720**	**242,618**	**39,124**	**$44,790,003,503**	**$5,066,100,266**

Source: United States Geological Survey, Local governments

SOCIAL VULNERABILITY

Given moderate to high susceptibility across the entire Northern Piedmont Region, it is assumed that a moderate amount of population is at risk. Additionally, social vulnerability does not intersect as much with landslide hazards as it does with other, more wide-ranging hazards.

CRITICAL FACILITIES

There are at least 144 critical facilities located in a high susceptibility area, including the following: 53 medical facilities, 41 fire/EMS stations, 8 police stations, 41 schools, and 1 emergency operations center. The remaining critical facilities are located in moderate to low incidence areas. A list of specific critical facilities and their associated risk can be found in **Table 6.27** at the end of this section.

In conclusion, a landslide has the potential to impact many existing and future buildings, facilities, and

populations in the Northern Piedmont 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 Northern Piedmont regional assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

6.5.5 Flooding

Historical evidence indicates that the Northern Piedmont Region is susceptible to flood events. A total of 342 flood events have been reported by the National Centers for Environmental Information since 1993, resulting in over $16.1 million (2023 dollars) in damages.

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

TABLE 6.15: ESTIMATED EXPOSURE OF PARCELS TO THE FLOODING HAZARD

Location	1% Annual Chance of Flooding (100-year)			0.2% Annual Chance of Flooding (500-year)		
	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings
Caswell County	**1,991**	**1,049**	**$100,240,661**	**745**	**406**	**$41,534,226**
Milton	53	25	$2,466,801	59	27	$2,488,039
Yanceyville	28	14	$963,766	2	0	$0
Unincorporated Area	1,910	1,010	$96,810,094	684	379	$39,046,187
Davie County	**2,324**	**1,253**	**$414,507,553**	**361**	**285**	**$164,625,610**
Bermuda Run	122	102	$111,859,110	111	94	$110,924,870
Cooleemee	14	5	$1,717,220	0	0	$0
Mocksville	115	64	$59,508,160	42	30	$6,767,840
Unincorporated Area	2,073	1,082	$241,423,063	208	161	$46,932,900
Forsyth County	**8,187**	**5,560**	**$2,476,706,242**	**7,002**	**5,063**	**$2,476,706,242**
Bethania	43	28	$3,650,400	44	32	$3,799,300
Clemmons	509	420	$115,732,000	477	400	$108,291,400
Kernersville	392	281	$310,427,500	313	227	$240,328,300
Lewisville	225	179	$45,714,100	146	123	$30,701,100
Rural Hall	43	25	$10,472,800	42	25	$10,472,800
Tobaccoville	90	53	$17,448,600	75	44	$7,929,900
Walkertown	63	43	$4,318,700	71	49	$5,207,000
Winston-Salem	4,260	3,031	$1,564,293,042	4,389	3,248	$1,690,281,442

Location	1% Annual Chance of Flooding (100-year)			0.2% Annual Chance of Flooding (500-year)		
	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings
Unincorporated Area	2,562	1,500	$404,649,100	1,445	915	$379,695,000
Rockingham County	**3,762**	**2,193**	**$445,749,863**	**1,478**	**902**	**$220,004,629**
Eden	553	340	$46,400,995	528	337	$45,048,016
Madison	165	100	$26,613,301	171	120	$29,704,200
Mayodan	32	13	$4,723,034	36	17	$5,076,532
Reidsville	270	157	$60,316,107	133	84	$32,709,745
Stoneville	-	-	$-	-	-	$-
Wentworth	15	10	$1,472,589	-	-	$-
Unincorporated Area	2,727	1,573	$306,223,837	610	344	$107,466,136
Stokes County	**2,441**	**1,191**	**$189,124,400**	**187**	**117**	**$17,660,100**
Danbury	28	15	$1,260,700	-	-	$-
King	116	85	$15,315,200	84	62	$10,171,800
Walnut Cove	83	40	$11,990,900	-	-	$-
Unincorporated Area	2,214	1,051	$160,557,600	103	55	$7,488,300
Surry County	**3,358**	**2,058**	**$499,986,080**	**999**	**661**	**$303,104,390**
Dobson	-	-	$-	-	-	$-
Elkin	214	138	$76,688,040	201	145	$82,217,160
Mount Airy	337	229	$136,423,900	368	267	$145,435,140
Pilot Mountain	29	13	$10,582,580	28	13	$10,595,580
Unincorporated Area	2,778	1,678	$276,291,560	402	236	$64,856,510
Yadkin County	**2,603**	**1,256**	**$176,257,497**	**360**	**184**	**$36,493,872**
Boonville	-	-	$-	-	-	$-
East Bend	4	1	$96,844	-	-	$-
Jonesville	153	67	$13,274,938	160	76	$14,550,644
Yadkinville	8	2	$700,287	-	-	$-
Unincorporated Area	2,438	1,186	$162,185,428	200	108	$21,943,228
Northern Piedmont Regional Total	**24,666**	**14,560**	**$4,302,572,296**	**11,132**	**7,618**	**$3,260,129,069**

Source: FEMA DFIRM, Local tax data

To assess flood risk, the NCEM RMT analyzed buildings located in the 1-percent annual chance area, or 100-year return period, of floodplains. The buildings are assessed by the type of building (commercial, residential, or public) and also assessed by status as pre-FIRM buildings, or structures built before flood ordinance regulations were implemented. This data is shown by jurisdiction in **Table 6.16**.

TABLE 6.16: BUILDING VULNERABILITY FOR THE 100-YEAR FLOODPLAINS IN NORTHERN PIEDMONT REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Caswell County	**10**	**9**	**$77,184**	**1**	**$6,618**	**0**	**0**	**10**	**$83,802**
Milton	0	0	$0	0	$0	0	$0	0	$0

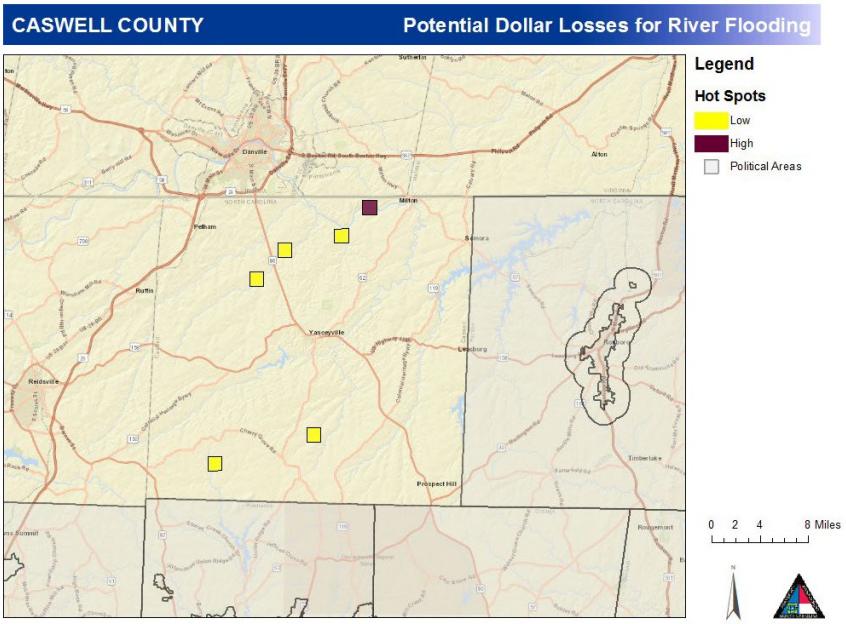
Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Yanceyville	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	10	9	$77,184	1	$6,618	0	$0	10	$83,802
Davie County	**72**	**92**	**$737,496**	**15**	**$68,096**	**1**	**$5,712**	**108**	**$811,305**
Bermuda Run	0	9	$103,242	0	$0	0	$0	9	$103,242
Cooleemee	0	0	$0	0	$0	0	$0	0	$0
Mocksville	1	0	$0	0	$0	1	$5,712	1	$5,712
Unincorporated Area	71	83	$634,254	15	$68,096	0	$0	98	$702,351
Forsyth County	**310**	**374**	**$5,876,071**	**119**	**$8,418,100**	**16**	**$1,041,346**	**509**	**$15,335,518**
Bethania	2	2	$28,923	0	$0	0	$0	2	$28,923
Clemmons	13	20	$167,675	2	$16,771	0	$0	22	$184,446
Kernersville	8	9	$23,856	1	$3,083	0	$0	10	$26,939
Lewisville	1	3	$8,903	0	$0	0	$0	3	$8,903
Rural Hall	2	3	$32,911	0	$0	0	$0	3	$32,911
Tobaccoville	1	1	$2,313	0	$0	0	$0	1	$2,313
Walkertown	0	3	$12,948	0	$0	0	$0	3	$12,948
Winston-Salem	262	276	$5,122,252	114	$8,339,709	15	$835,517	405	$14,297,478
Unincorporated Area	21	57	$476,290	2	$58,537	1	$205,829	60	$740,657
Rockingham County	**260**	**254**	**$2,139,729**	**46**	**$3,259,170**	**3**	**$124,896**	**303**	**$5,523,795**
Eden	99	96	$1,165,346	25	$1,490,371	3	$124,896	124	$2,780,614
Madison	17	10	$71,126	9	$407,645	0	$0	19	$478,771
Mayodan	7	4	$52,081	3	$103,040	0	$0	7	$155,121
Reidsville	26	29	$211,488	7	$1,168,899	0	$0	36	$1,380,386
Stoneville	0	0	$0	0	$0	0	$0	0	$0
Wentworth	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	111	115	$639,688	2	$89,215	0	$0	117	$728,903
Stokes County	**46**	**42**	**$146,795**	**4**	**$48,310**	**0**	**0**	**46**	**$195,104**
Danbury	1	1	$1,559	0	$0	0	$0	1	$1,559
King	17	14	$41,246	3	$46,101	0	$0	17	$87,347
Walnut Cove	2	2	$911	0	$0	0	$0	2	$911
Unincorporated Area	26	25	$103,079	1	$2,209	0	$0	26	$105,287
Surry County	**129**	**82**	**$417,398**	**42**	**$2,026,439**	**5**	**$131,419**	**129**	**$2,575,254**
Dobson	1	1	$4,891	0	$0	0	$0	1	$4,891
Elkin	43	7	$180,948	30	$1,931,515	4	$128,783	41	$2,241,246
Mount Airy	26	20	$55,087	6	$43,615	0	$0	26	$98,701
Pilot Mountain	1	1	$450	0	$0	0	$0	1	$450
Unincorporated Area	58	53	$176,022	6	$51,309	1	$2,636	60	$229,966
Yadkin County	**15**	**10**	**$20,116**	**10**	**$382,540**	**2**	**$37,227**	**22**	**$439,883**
Boonville	0	0	$0	0	$0	0	$0	0	$0
East Bend	0	0	$0	0	$0	0	$0	0	$0

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Jonesville	1	0	$0	2	$161,522	0	$0	2	$161,522
Yadkinville	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	14	10	$20,116	8	$221,018	2	$37,227	20	$278,361
Northern Piedmont Regional Total	**842**	**863**	**$9,414,789**	**237**	**$14,209,273**	**27**	**$1,340,600**	**1,127**	**$24,964,661**

Source: NCEM Risk Management Tool

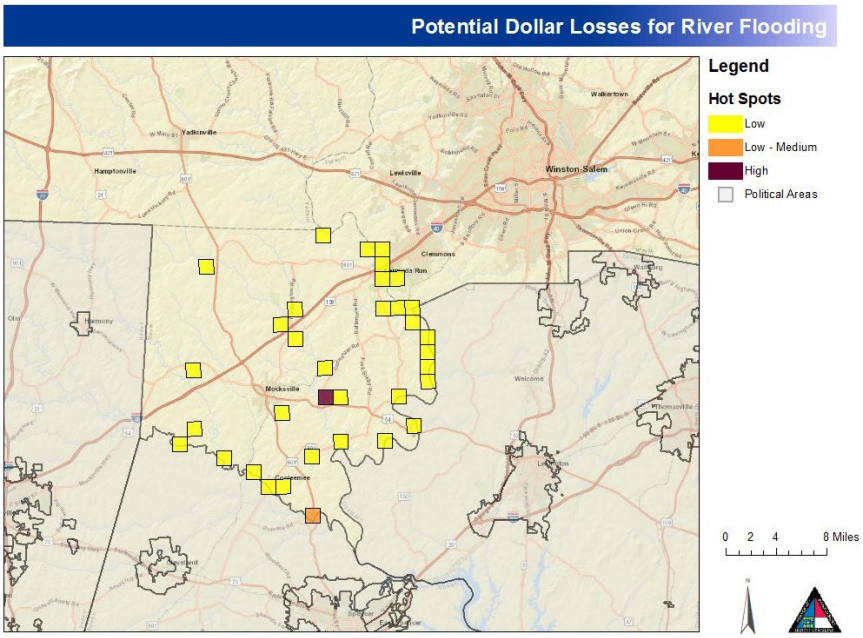
Figures 6.4 through 6.10 below display visual hotspots of potential dollar losses for the flood hazard in Caswell, Davie, Forsyth, Rockingham, Stokes, Surry and Yadkin Counties. Based on the photo, most hot spots are in an area with low vulnerability.

FIGURE 6.4: POTENTIAL DOLLAR LOSSES FOR FLOODING IN CASWELL COUNTY



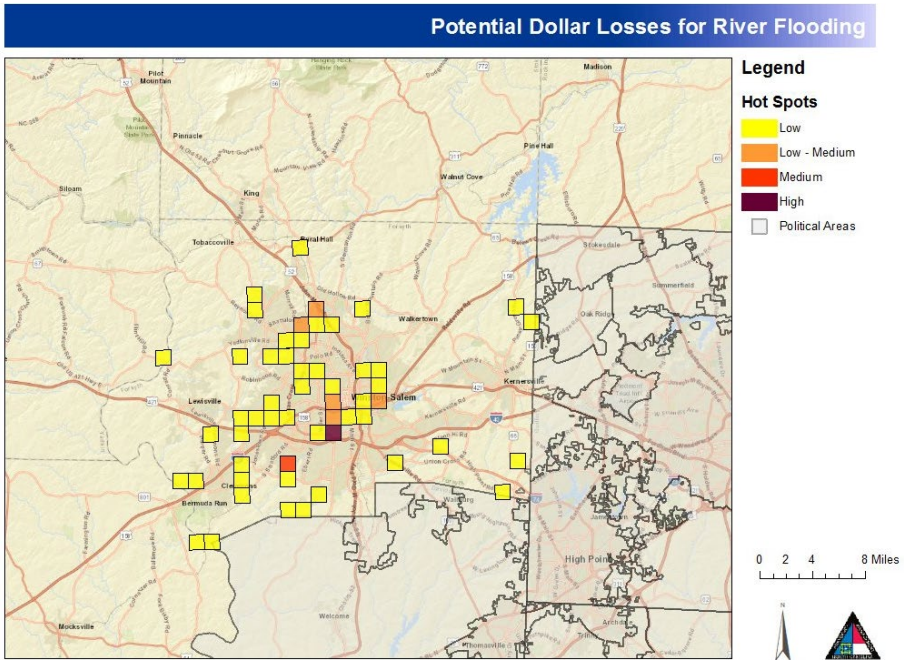
Source: NCEM Risk Management Tool

FIGURE 6.5: POTENTIAL DOLLAR LOSSES FOR FLOODING IN DAVIE COUNTY



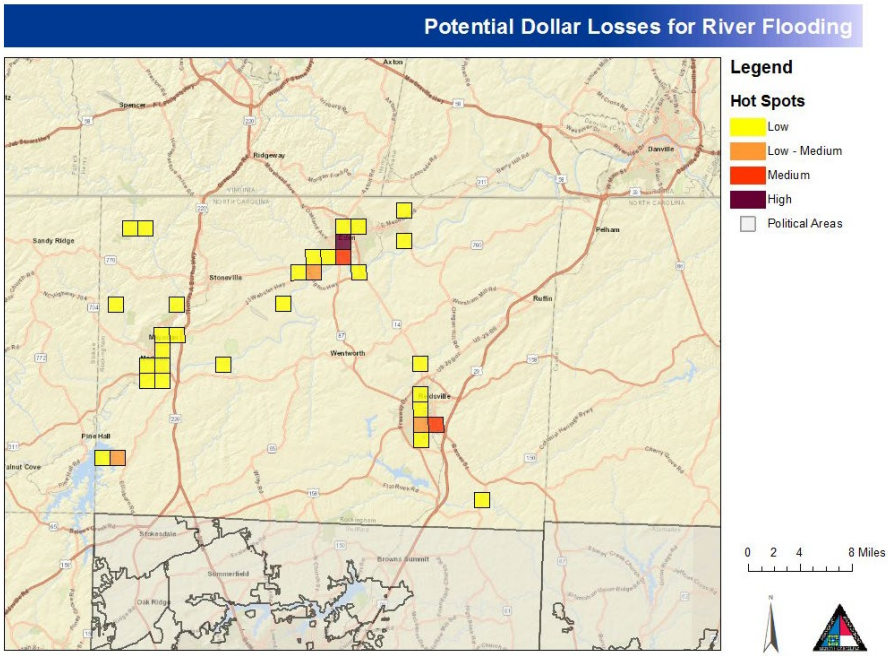
Source: NCEM Risk Management Tool

FIGURE 6.6: POTENTIAL DOLLAR LOSSES FOR FLOODING IN FORSYTH COUNTY



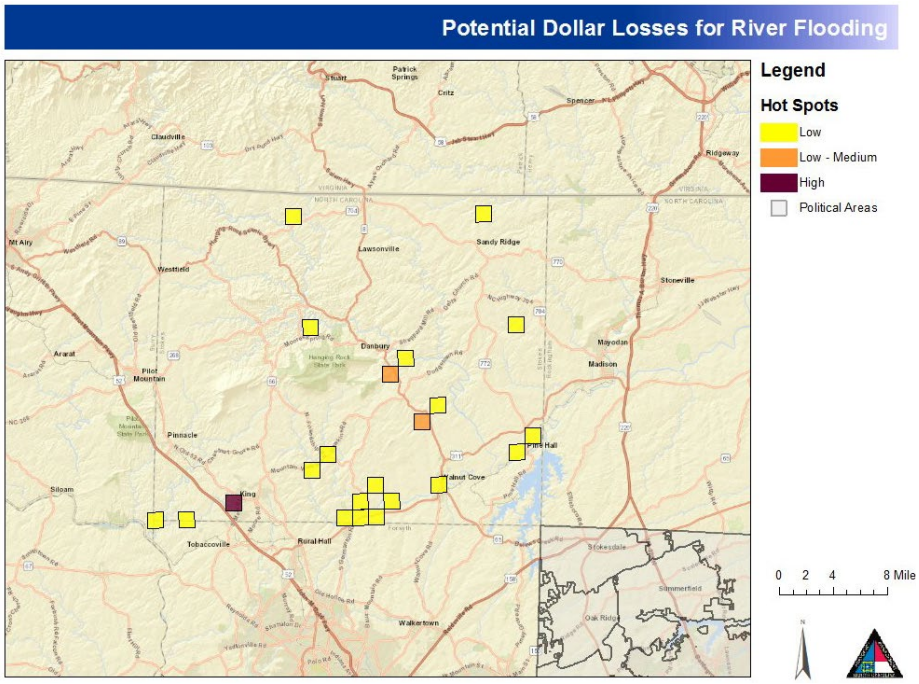
Source: NCEM Risk Management Tool

FIGURE 6.7: POTENTIAL DOLLAR LOSSES FOR FLOODING IN ROCKINGHAM COUNTY



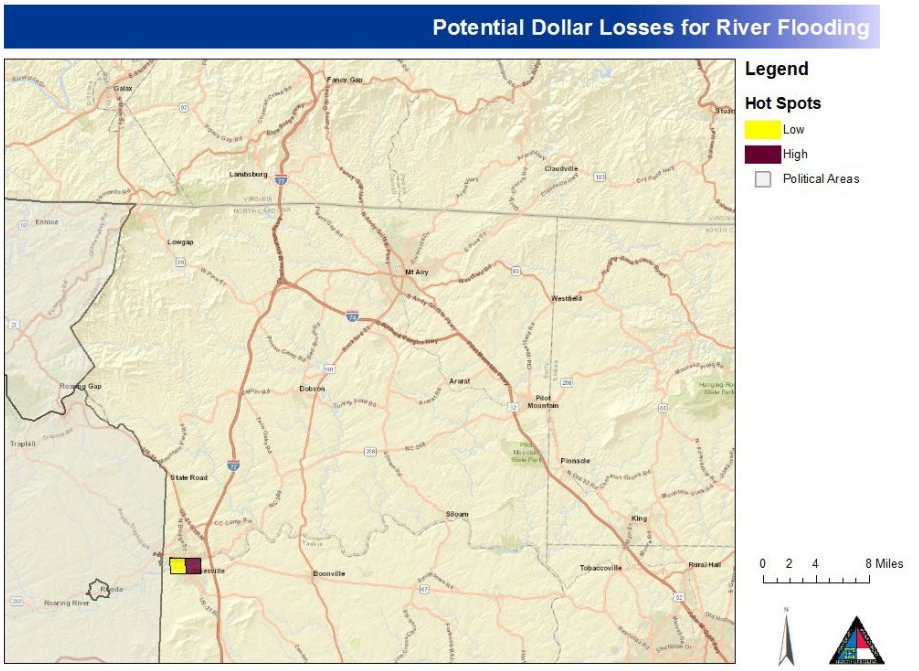
Source: NCEM Risk Management Tool

FIGURE 6.8: POTENTIAL DOLLAR LOSSES FOR FLOODING IN STOKES COUNTY



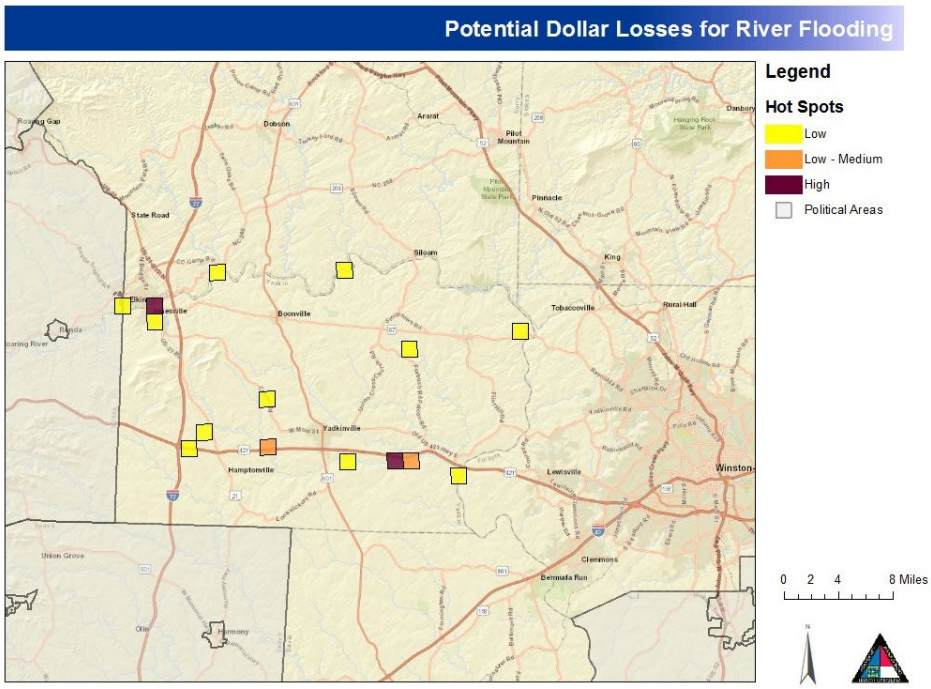
Source: NCEM Risk Management Tool

FIGURE 6.9: POTENTIAL DOLLAR LOSSES FOR FLOODING IN SURRY COUNTY



Source: NCEM Risk Management Tool

FIGURE 6.10: POTENTIAL DOLLAR LOSSES FOR FLOODING IN YADKIN COUNTY



Source: NCEM Risk Management Tool

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

TABLE 6.17: POPULATION VULNERABILITY FOR 100-YEAR FLOODPLAINS IN NORTHERN PIEDMONT REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Caswell County	**3**	**1**	**13**
Milton	0	0	0
Yanceyville	0	0	0
Unincorporated Area	3	1	13
Davie County	**32**	**8**	**151**
Bermuda Run	5	1	16
Cooleemee	0	0	0
Mocksville	0	0	0
Unincorporated Area	27	7	135
Forsyth County	**166**	**62**	**1,068**
Bethania	1	0	3
Clemmons	9	3	47
Kernersville	5	1	23
Lewisville	1	0	5
Rural Hall	1	0	4
Tobaccoville	0	0	2
Walkertown	1	0	5

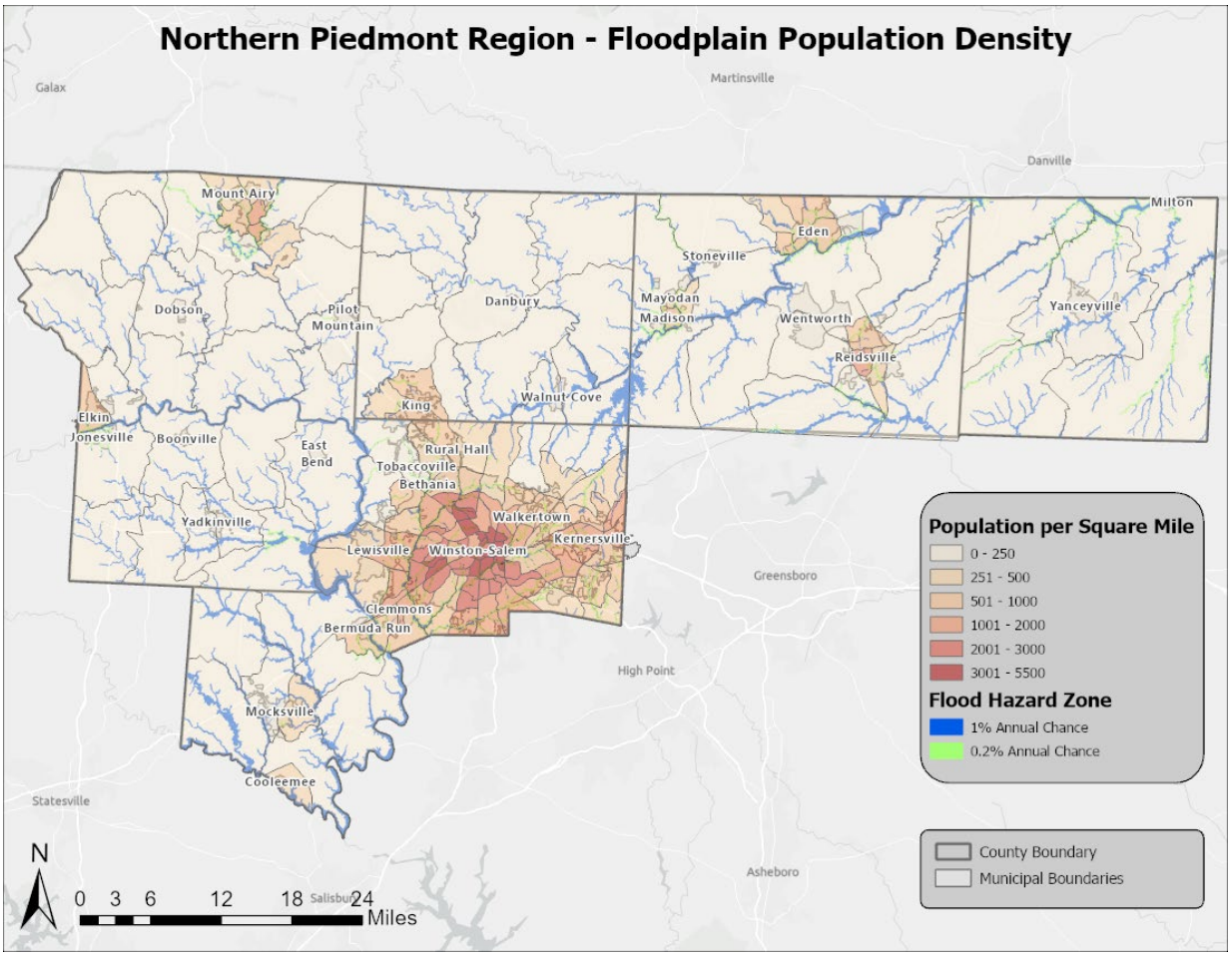
Location	Elderly at Risk	Children at Risk	Total at Risk
Winston-Salem	116	48	801
Unincorporated Area	32	10	178
Rockingham County	**92**	**22**	**445**
Eden	36	8	165
Madison	4	1	19
Mayodan	1	0	5
Reidsville	14	3	58
Stoneville	0	0	0
Wentworth	0	0	0
Unincorporated Area	37	10	198
Stokes County	**16**	**3**	**80**
Danbury	0	0	1
King	5	1	25
Walnut Cove	0	0	2
Unincorporated Area	11	2	52
Surry County	**26**	**7**	**131**
Dobson	0	0	1
Elkin	3	1	14
Mount Airy	7	2	32
Pilot Mountain	0	0	1
Unincorporated Area	16	4	83
Yadkin County	**3**	**1**	**16**
Boonville	0	0	0
East Bend	0	0	0
Jonesville	0	0	0
Yadkinville	0	0	0
Unincorporated Area	3	1	16
Northern Piedmont Regional Total	**338**	**104**	**1,904**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

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

FIGURE 6.11: POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA DFIRM, US Census Bureau

CRITICAL FACILITIES

The critical facility analysis revealed that there are at least 14 critical facilities located in the Northern Piedmont Region's 1.0-percent 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.) These facilities include 2 schools in Forsyth County, 1 school in Surry County, 1 school in Yadkin County, 9 medical facilities in Forsyth County, and 1 medical facility in Rockingham County. A list of specific critical facilities and their associated risk can be found in **Table 6.27** 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 Northern Piedmont Region, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations should be considered during future plan updates. Furthermore, areas subject to repetitive flooding

should be analyzed for potential mitigation actions. **Table 6.18** below lists repetitive loss properties and their associated number of losses for each county.

TABLE 6.18: SUMMARY OF REPETITIVE LOSS PROPERTIES

Location	Number of Properties	Number of Losses
Caswell County	**0**	**0**
Milton*	--	--
Yanceyville	0	0
Unincorporated Area	0	0
Davie County	**0**	**0**
Bermuda Run	0	0
Cooleemee	0	0
Mocksville	0	0
Unincorporated Area	0	0
Forsyth County	**42**	**148**
Bethania	0	0
Clemmons	3	11
Kernersville	2	4
Lewisville	0	0
Rural Hall	0	0
Tobaccoville	0	0
Walkertown	0	0
Winston-Salem	30	109
Unincorporated Area	7	24
Rockingham County	**13**	**37**
Eden	8	25
Madison	2	6
Mayodan	0	0
Reidsville	0	0
Stoneville	0	0
Wentworth	0	0
Unincorporated Area	3	6
Stokes County	**0**	**0**
Danbury	0	0
King	0	0
Walnut Cove	0	0
Unincorporated Area	0	0
Surry County	**6**	**17**
Dobson*	--	--
Elkin	0	0
Mount Airy	5	13
Pilot Mountain	0	0
Unincorporated Area	1	4
Yadkin County	**0**	**0**
Boonville*	--	--
East Bend*	--	--

Location	Number of Properties	Number of Losses
Jonesville	0	0
Yadkinville	0	0
Unincorporated Area	0	0
Northern Piedmont Regional Total	**61**	**202**

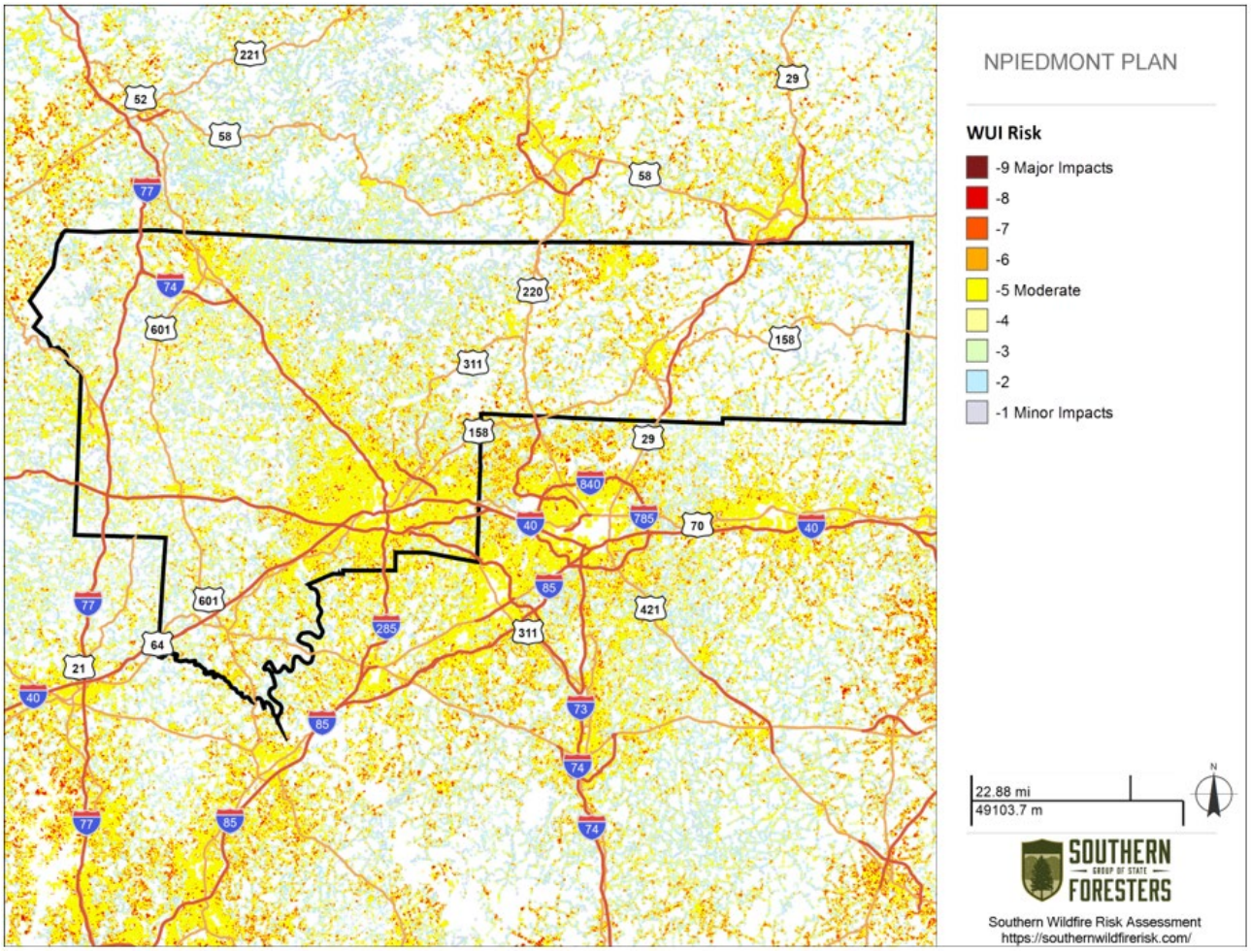
**This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.*
Source: Federal Emergency Management Agency, National Flood Insurance Program

6.5.6 Wildfires

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

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

FIGURE 6.12: WILDLAND URBAN INTERFACE RISK INDEX IN THE NORTHERN PIEDMONT REGION



Source: Southern Wildfire Risk Assessment

The region contains some lands where the value falls into the at-risk category, in particular Caswell County, while areas such as Forsyth County have less land labeled as at-risk. Overall, there is a medium wildfire ignition density risk index in the region which is somewhat higher than other areas in North Carolina. As of 2024 findings from the Southern Wildfire Risk Assessment, burn probabilities of the region range from 1 (lowest probability) to 5 on a scale rated up to 10 (highest probability). Specifically, out of 546,327 total assessed acres, 23.6% of the region is rated a probability of 1, 21.6% a 2, 23.8% a 3, 18.3% a 4, and 12.7% a 5.

SOCIAL VULNERABILITY

Even though not all areas have equal vulnerability, there is some susceptibility across the entire Northern Piedmont Region. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading. Timely sheltering/evacuations of elderly and young individuals, disabled individuals, and individuals requiring specialized care or equipment are of critical importance to reducing risk during a severe wildfire event.

CRITICAL FACILITIES

Although no county had many critical facilities in the at-risk area (-7 or higher) for wildfires, Rockingham County had the most with 10 facilities. Caswell County, Davie County, and Surry County had 4 facilities in the at-risk area whereas Forsyth County had 5 and Stokes County had 8. Yadkin County did not have any at-risk facilities.

Table 6.19 shows the results of the GIS analysis.

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

Location	Number of At-Risk Critical Facilities
Caswell County	4
Davie County	4
Forsyth County	5
Rockingham County	10
Stokes County	8
Surry County	4
Yadkin County	0
Northern Piedmont Regional Total	**35**

Source: Southern Wildfire Risk Assessment, Local governments

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

TABLE 6.20: BUILDING VULNERABILITY TO WILDFIRE HAZARDS

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Caswell County	**582**	**540**	**$64,973,884**	**31**	**$24,206,992**	**11**	**$19,990,567**	**582**	**$109,171,443**
Milton	0	0	$0	0	$0	0	$0	0	$0
Yanceyville	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	582	540	$64,973,884	31	$24,206,992	11	$19,990,567	582	$109,171,443
Davie County	**1,494**	**2,195**	**$341,605,914**	**148**	**$153,087,723**	**31**	**$35,806,212**	**2,374**	**$530,499,849**
Bermuda Run	0	92	$30,802,060	7	$9,299,974	2	$923,877	101	$41,025,911
Cooleemee	20	14	$1,816,470	2	$14,287,683	4	$4,667,233	20	$20,771,386
Mocksville	42	40	$9,887,290	2	$4,030,696	0	$0	42	$13,917,986
Unincorporated Area	1,432	2,049	$299,100,094	137	$125,469,370	25	$30,215,102	2,211	$454,784,566
Forsyth County	**2,267**	**5,812**	**$754,825,325**	**160**	**$326,909,132**	**79**	**$145,225,853**	**6,051**	**$1,226,960,309**
Bethania	1	0	$0	0	$0	1	$473,924	1	$473,924
Clemmons	71	438	$62,011,954	14	$28,747,595	19	$19,359,143	471	$110,118,693
Kernersville	161	192	$20,994,032	8	$36,993,352	12	$9,739,958	212	$67,727,342
Lewisville	326	1,195	$195,466,965	52	$49,823,500	10	$11,831,257	1,257	$257,121,721
Rural Hall	2	3	$290,677	0	$0	0	$0	3	$290,677
Tobaccoville	241	579	$60,485,087	6	$1,350,104	7	$8,467,716	592	$70,302,907

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Walkertown	187	294	$29,377,769	16	$8,204,988	2	$12,537,809	312	$50,120,566
Winston-Salem	362	838	$114,993,895	32	$157,090,642	5	$22,167,462	875	$294,251,999
Unincorporated Area	916	2,273	$271,204,946	32	$44,698,951	23	$60,648,584	2,328	$376,552,480
Rockingham County	**1,055**	**1,046**	**$117,831,609**	**144**	**$89,475,791**	**32**	**$31,779,811**	**1,222**	**$239,087,212**
Eden	45	43	$6,493,326	13	$9,228,623	2	$1,023,003	58	$16,744,952
Madison	6	0	$0	6	$2,033,204	0	$0	6	$2,033,204
Mayodan	3	4	$452,503	0	$0	0	$0	4	$452,503
Reidsville	7	8	$1,622,643	1	$136,034	0	$0	9	$1,758,677
Stoneville	0	0	$0	0	$0	0	$0	0	$0
Wentworth	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	994	991	$109,263,137	124	$78,077,930	30	$30,756,808	1,145	$218,097,876
Stokes County	**2,286**	**1,828**	**$220,282,414**	**443**	**$97,612,432**	**18**	**$24,368,048**	**2,289**	**$342,262,893**
Danbury	0	0	$0	0	$0	0	$0	0	$0
King	860	759	$101,144,200	97	$41,938,027	7	$11,030,426	863	$154,112,653
Walnut Cove	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	1,426	1,069	$119,138,214	346	$55,674,405	11	$13,337,622	1,426	$188,150,240
Surry County	**12,932**	**11,575**	**$1,420,204,980**	**1,306**	**$661,822,258**	**263**	**$395,069,697**	**13,144**	**$2,477,096,936**
Dobson	202	165	$32,175,919	25	$3,888,780	12	$46,086,484	202	$82,151,184
Elkin	17	26	$1,829,949	7	$36,122,226	2	$49,493,949	35	$87,446,124
Mount Airy	1,678	1,579	$215,041,710	72	$132,066,727	27	$30,733,973	1,678	$377,842,410
Pilot Mountain	320	290	$59,866,850	19	$38,694,935	11	$29,980,809	320	$128,542,594
Unincorporated Area	10,715	9,515	$1,111,290,552	1,183	$451,049,590	211	$238,774,482	10,909	$1,801,114,624
Yadkin County	**1,056**	**1,127**	**$142,388,997**	**59**	**$113,939,076**	**22**	**$17,614,224**	**1,208**	**$273,942,297**
Boonville	0	0	$0	0	$0	0	$0	0	$0
East Bend	0	0	$0	0	$0	0	$0	0	$0
Jonesville	0	1	$336,722	0	$0	0	$0	1	$336,722
Yadkinville	251	221	$23,886,464	22	$99,997,689	10	$6,921,053	253	$130,805,206
Unincorporated Area	805	905	$118,165,811	37	$13,941,387	12	$10,693,171	954	$142,800,369
Northern Piedmont Regional Total	**21,672**	**24,123**	**$3,062,113,123**	**2,291**	**$1,467,053,404**	**456**	**$669,854,412**	**26,870**	**$5,199,020,939**

Source: NCEM Risk Management Tool

TABLE 6.21: POPULATION VULNERABILITY TO WILDFIRE HAZARD FOR THE NORTHERN PIEDMONT REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Caswell County	**163**	**35**	**763**
Milton	0	0	0
Yanceyville	0	0	0

Location	Elderly at Risk	Children at Risk	Total at Risk
Unincorporated Areas	163	35	763
Davie County	**743**	**174**	**3,565**
Bermuda Run	57	6	170
Cooleemee	1	0	7
Mocksville	9	3	53
Unincorporated Areas	676	165	3,335
Forsyth County	**2,576**	**844**	**14,578**
Bethania	0	0	0
Clemmons	192	55	1,025
Kernersville	97	28	498
Lewisville	344	142	2,045
Rural Hall	1	0	4
Tobaccoville	227	44	1,039
Walkertown	103	22	481
Winston-Salem	346	144	2,398
Unincorporated Area	1,266	409	7,088
Rockingham County	**350**	**93**	**1,827**
Eden	17	4	77
Madison	0	0	0
Mayodan	1	0	5
Reidsville	4	1	16
Stoneville	0	0	0
Wentworth	0	0	0
Unincorporated Area	328	88	1,729
Stokes County	**738**	**153**	**3,588**
Danbury	0	0	0
King	272	62	1,367
Walnut Cove	0	0	0
Unincorporated Area	466	91	2,221
Surry County	**3,637**	**941**	**17,926**
Dobson	28	10	167
Elkin	12	3	52
Mount Airy	587	138	2,520
Pilot Mountain	51	15	268
Unincorporated Area	2,959	775	14,919
Yadkin County	**321**	**86**	**1,631**
Boonville	0	0	0
East Bend	0	0	0
Jonesville	0	0	1
Yadkinville	44	14	198
Unincorporated Area	277	72	1,432
Northern Piedmont Regional Total	**8,528**	**2,326**	**43,878**

Source: NCEM Risk Management Tool

6.5.7 Hazardous Substances

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

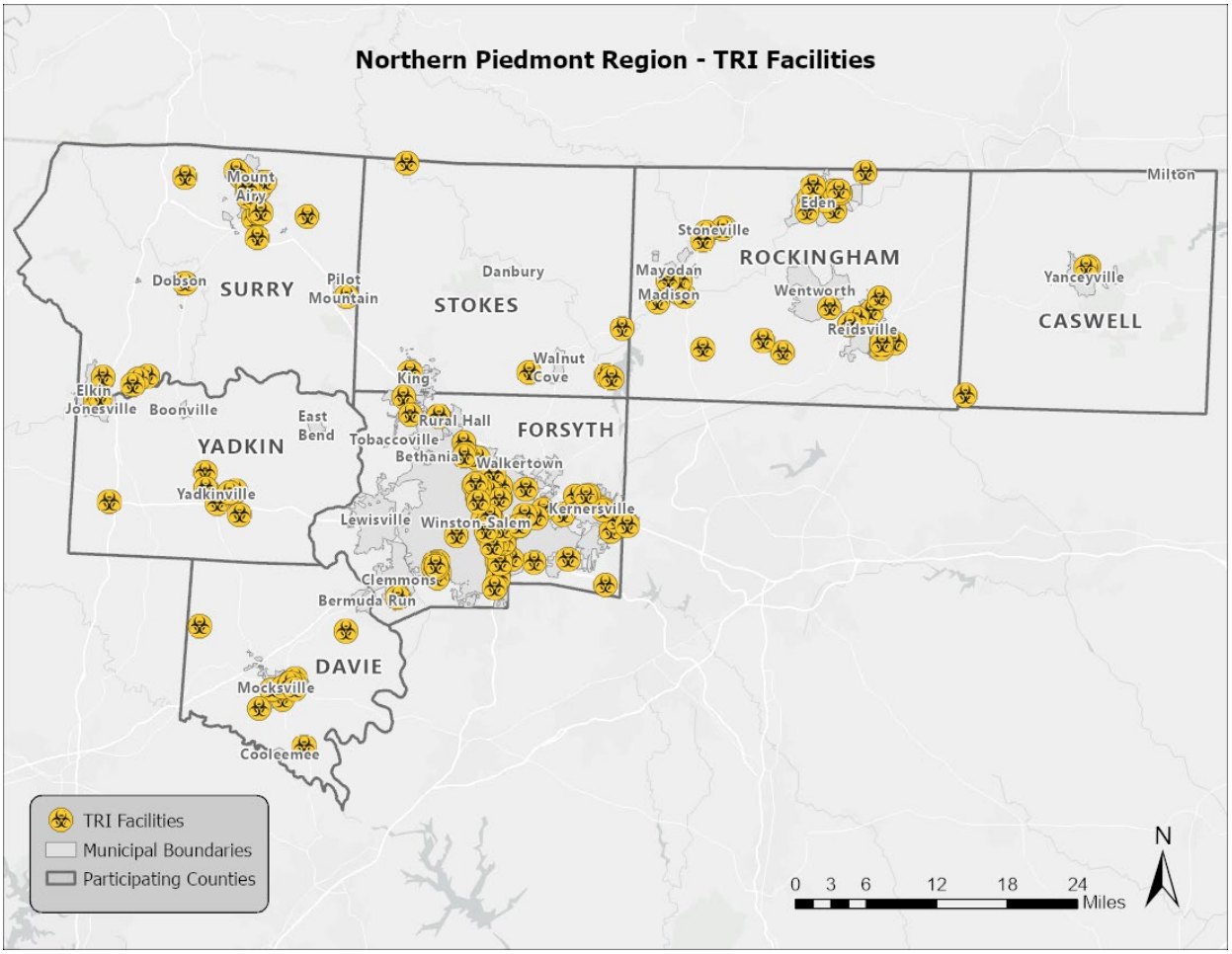
Most hazardous substance incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent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

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels[11]. In both scenarios, two sizes of buffers—0.5 mile and 1 mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in the Northern Piedmont Region, along with buffers, were used for analysis as shown in **Figure 6.13.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure 6.14** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.22** (fixed sites), **Table 6.23** (mobile road sites) and **Table 6.24** (mobile railroad sites)[12].

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

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

FIGURE 6.13: TOXIC RELEASE INVENTORY (TRI) FACILITIES IN THE NORTHERN PIEDMONT REGION



Source: EPA

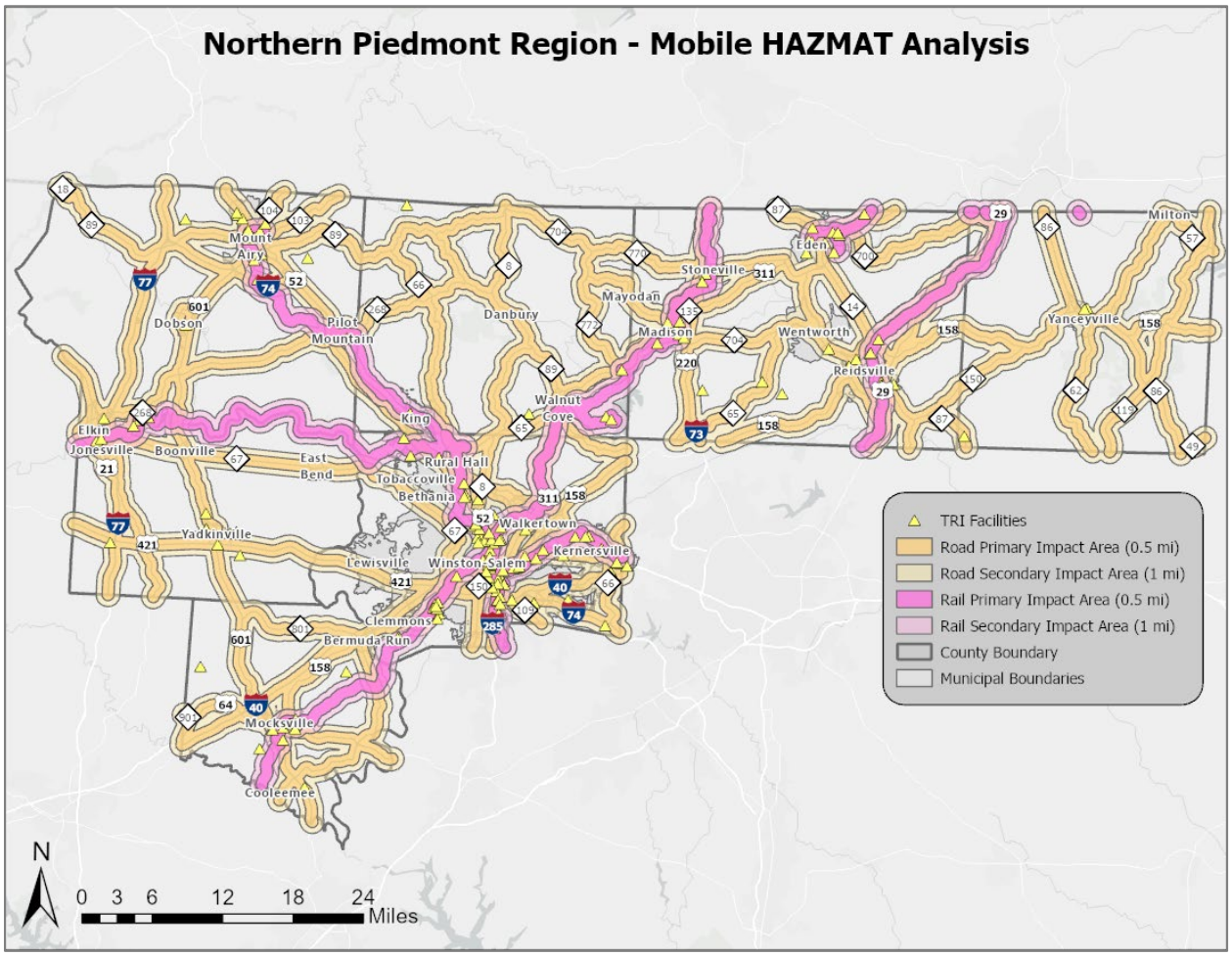
TABLE 6.22: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (FIXED SITES) IN THE NORTHERN PIEDMONT REGION

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Caswell County	**250**	**183**	**$24,128,185**	**729**	**537**	**$63,079,541**
Milton	-	-	$-	-	-	$-
Yanceyville	41	28	$12,505,296	275	195	$36,039,351
Unincorporated Area	209	155	$11,622,889	454	342	$27,040,190
Davie County	**2,102**	**1,619**	**$400,045,350**	**4,243**	**3,115**	**$662,319,660**
Bermuda Run	-	-	$-	-	-	$-
Cooleemee	-	-	$-	-	-	$-
Mocksville	1,518	1,249	$236,258,440	2,596	2,105	$391,459,510
Unincorporated Area	584	370	$163,786,910	1,647	1,010	$270,860,150
Forsyth County	**23,165**	**18,894**	**$6,138,260,540**	**56,590**	**47,190**	**$11,342,278,805**

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
Bethania	-	-	$-	-	-	$-
Clemmons	757	695	$162,122,200	2,019	1,803	$469,458,000
Kernersville	2,074	1,781	$601,805,900	5,991	5,246	$1,549,768,600
Lewisville	-	-	$-	-	-	$-
Rural Hall	4	2	$39,048,200	79	48	$148,421,200
Tobaccoville	191	136	$30,036,600	546	423	$68,666,000
Walkertown	151	114	$15,361,900	306	241	$27,734,300
Winston-Salem	19,050	15,539	$5,080,899,440	43,407	36,263	$8,395,551,805
Unincorporated Area	938	627	$208,986,300	4,242	3,166	$682,678,900
Rockingham County	**7,804**	**5,817**	**$855,099,541**	**18,873**	**14,380**	**$1,848,437,041**
Eden	2,929	2,249	$342,652,520	6,674	5,244	$655,023,583
Madison	891	629	$106,515,855	1,492	1,116	$153,968,717
Mayodan	141	99	$27,537,937	808	694	$85,615,306
Reidsville	2,438	1,825	$241,443,299	5,307	4,056	$561,770,082
Stoneville	327	249	$28,460,260	724	554	$56,755,196
Wentworth	39	22	$2,405,363	176	122	$31,695,411
Unincorporated Area	1,039	744	$106,084,307	3,692	2,594	$303,608,746
Stokes County	**669**	**526**	**$101,870,700**	**2,333**	**1,793**	**$312,436,004**
Danbury	-	-	$-	-	-	$-
King	437	376	$61,863,000	1,438	1,202	$217,456,604
Walnut Cove	-	-	$-	-	-	$-
Unincorporated Area	232	150	$40,007,700	895	591	$94,979,400
Surry County	**4,357**	**3,431**	**$781,169,120**	**11,084**	**8,760**	**$1,716,110,180**
Dobson	135	100	$71,293,690	565	429	$183,677,910
Elkin	507	375	$146,465,530	1,394	1,028	$296,709,030
Mount Airy	2,627	2,182	$464,166,800	5,049	4,203	$849,960,110
Pilot Mountain	159	125	$20,273,260	754	602	$97,303,660
Unincorporated Area	929	649	$78,969,840	3,322	2,498	$288,459,470
Yadkin County	**1,455**	**1,073**	**$228,804,816**	**4,283**	**3,051**	**$536,473,975**
Boonville	-	-	$-	-	-	$-
East Bend	-	-	$-	-	-	$-
Jonesville	112	82	$14,023,932	681	523	$69,498,336
Yadkinville	785	633	$139,845,122	1,584	1,248	$266,986,786
Unincorporated Area	558	358	$74,935,762	2,018	1,280	$199,988,853
Northern Piedmont Regional Total	**39,802**	**31,543**	**$8,529,378,252**	**98,135**	**78,826**	**$16,481,135,206**

Source: EPA, Local governments

FIGURE 6.14: MOBILE HAZMAT BUFFERS IN THE NORTHERN PIEDMONT REGION



Source: NC Department of Transportation

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

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Caswell County	**6,684**	**4,612**	**$473,669,700**	**9,748**	**6,638**	**$646,951,074**
Milton	206	135	$9,398,190	206	135	$9,398,190
Yanceyville	917	648	$118,925,707	977	686	$123,269,096
Unincorporated Area	5,561	3,829	$345,345,803	8,565	5,817	$514,283,788
Davie County	**14,523**	**10,524**	**$2,177,209,469**	**19,784**	**14,355**	**$2,904,136,909**
Bermuda Run	1,645	1,499	$527,524,203	1,818	1,662	$563,515,683
Cooleemee	492	422	$36,761,200	542	458	$39,309,650
Mocksville	2,201	1,732	$473,549,371	2,872	2,278	$553,582,438
Unincorporated Area	10,185	6,871	$1,139,374,695	14,552	9,957	$1,747,729,138
Forsyth County	**81,149**	**67,110**	**$16,591,284,573**	**124,242**	**104,271**	**$23,748,077,760**

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
Bethania	43	26	$4,087,400	203	141	$24,890,000
Clemmons	4,203	3,717	$1,048,503,569	6,880	6,145	$1,603,297,870
Kernersville	7,366	6,073	$1,951,739,800	10,617	8,992	$2,542,163,700
Lewisville	1,169	945	$220,881,900	2,712	2,286	$524,108,400
Rural Hall	1,554	1,282	$342,875,300	1,560	1,288	$344,174,700
Tobaccoville	406	289	$54,739,500	806	593	$101,211,100
Walkertown	2,710	2,183	$399,736,000	2,868	2,320	$413,290,800
Winston-Salem	50,181	42,777	$11,007,432,452	77,758	67,154	$15,639,205,638
Unincorporated Area	13,517	9,818	$1,561,288,652	20,838	15,352	$2,555,735,552
Rockingham County	**26,067**	**19,716**	**$2,793,669,833**	**39,112**	**29,596**	**$3,811,790,006**
Eden	3,881	3,061	$478,213,358	5,878	4,527	$622,978,187
Madison	1,471	1,101	$152,633,954	1,493	1,117	$154,099,639
Mayodan	1,096	904	$125,189,698	1,401	1,165	$148,001,116
Reidsville	2,894	2,195	$416,871,195	5,962	4,617	$665,886,983
Stoneville	691	535	$55,416,192	724	554	$56,755,196
Wentworth	685	504	$182,732,002	945	694	$202,809,383
Unincorporated Area	15,349	11,416	$1,382,613,434	22,709	16,922	$1,961,259,502
Stokes County	**12,759**	**8,565**	**$1,062,717,804**	**20,011**	**13,351**	**$1,656,602,607**
Danbury	145	88	$24,832,600	145	88	$24,832,600
King	661	578	$127,242,404	1,893	1,628	$313,414,304
Walnut Cove	929	651	$89,866,400	931	652	$90,022,700
Unincorporated Area	11,024	7248	$820,776,400	17,042	10,983	$1,228,333,003
Surry County	**22,768**	**17,446**	**$2,780,702,202**	**31,016**	**23,718**	**$3,520,107,132**
Dobson	671	505	$219,150,310	683	515	$221,626,400
Elkin	2,180	1,642	$391,148,640	2,296	1,735	$404,830,620
Mount Airy	4,759	3,934	$816,017,150	5,487	4,545	$940,336,770
Pilot Mountain	930	731	$137,629,870	970	760	$141,437,860
Unincorporated Area	14,228	10,634	$1,216,756,232	21,580	16,163	$1,811,875,482
Yadkin County	**11,675**	**7,687**	**$1,081,963,664**	**16,396**	**10,759**	**$1,484,882,398**
Boonville	736	550	$87,562,841	736	550	$87,562,841
East Bend	477	328	$45,480,682	529	368	$48,551,893
Jonesville	1,290	967	$130,686,522	1,454	1,068	$137,240,217
Yadkinville	1,238	972	$209,359,200	1,565	1,239	$265,244,951
Unincorporated Area	7,934	4,870	$608,874,419	12,112	7,534	$946,282,496
Northern Piedmont Regional Total	**175,625**	**135,660**	**$26,961,217,245**	**260,309**	**202,688**	**$37,772,547,886**

Source: NC Department of Transportation, Local Governments

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

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Caswell County	**737**	**468**	**$39,088,076**	**1,263**	**811**	**$67,946,317**
Milton	-	-	$-	-	-	$-
Yanceyville	-	-	$-	-	-	$-
Unincorporated Area	737	468	$39,088,076	1,263	811	$67,946,317
Davie County	**3,418**	**2,421**	**$461,599,910**	**5,911**	**4,249**	**$772,357,531**
Bermuda Run	-	-	$-	-	-	$-
Cooleemee	-	-	$-	-	-	$-
Mocksville	1,757	1,422	$278,228,390	2,872	2,278	$553,582,438
Unincorporated Area	1,661	999	$183,371,520	3,039	1,971	$218,775,093
Forsyth County	**31,900**	**25,856**	**$8,448,700,854**	**64,399**	**54,009**	**$13,341,831,903**
Bethania	-	-	$-	-	-	$-
Clemmons	873	768	$200,254,300	1,930	1,690	$400,220,900
Kernersville	3,202	2,823	$675,621,200	6,170	5,464	$1,328,078,800
Lewisville	-	-	$-	-	-	$-
Rural Hall	1,231	1,010	$217,639,700	1,560	1,288	$344,174,700
Tobaccoville	463	354	$57,451,500	800	617	$90,264,400
Walkertown	909	663	$82,824,100	1,881	1,500	$205,930,800
Winston-Salem	21,374	17,512	$6,664,474,302	44,608	37,920	$9,998,974,851
Unincorporated Area	10,526	8,344	$1,784,226,552	19,791	16,089	$3,342,857,052
Rockingham County	**11,858**	**8,850**	**$1,032,869,106**	**19,670**	**14,907**	**$1,721,377,916**
Eden	3,070	2,315	$263,154,541	5,438	4,246	$461,728,009
Madison	1,114	846	$112,948,164	1,474	1,103	$152,939,687
Mayodan	832	727	$77,915,853	1,325	1,153	$144,774,899
Reidsville	3,346	2,541	$319,071,480	5,345	4,110	$521,675,044
Stoneville	622	474	$46,987,326	724	554	$56,755,196
Wentworth	-	-	$-	-	-	$-
Unincorporated Area	2,874	1,947	$212,791,742	5,364	3,741	$383,505,081
Stokes County	**4,291**	**3,096**	**$427,352,900**	**7,601**	**5,553**	**$794,126,604**
Danbury	-	-	$-	-	-	$-
King	1,446	1,133	$201,740,300	2,816	2,348	$407,576,704
Walnut Cove	401	280	$35,289,100	706	508	$60,215,900
Unincorporated Area	2,444	1,683	$190,323,500	4,079	2,697	$326,334,000
Surry County	**5,742**	**4,413**	**$811,691,350**	**10,624**	**8,164**	**$1,431,133,810**
Dobson	-	-	$-	-	-	$-
Elkin	909	710	$123,721,090	1,468	1,131	$235,673,240
Mount Airy	2,267	1,890	$449,566,300	3,865	3,234	$688,898,770
Pilot Mountain	792	623	$103,150,840	970	760	$141,437,860

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	1,774	1,190	$135,253,120	4,321	3,039	$365,123,940
Yadkin County	**790**	**479**	**$51,058,551**	**2,473**	**1,594**	**$184,411,323**
Boonville	-	-	$-	-	-	$-
East Bend	-	-	$-	-	-	$-
Jonesville	256	197	$24,328,295	946	689	$97,157,796
Yadkinville	-	-	$-	-	-	$-
Unincorporated Area	534	282	$26,730,256	1,527	905	$87,253,527
Northern Piedmont Regional Total	**58,736**	**45,583**	**$11,272,360,747**	**111,941**	**89,287**	**$18,313,185,404**

Source: NC Department of Transportation, Local Governments

SOCIAL VULNERABILITY

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

CRITICAL FACILITIES

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are at least 636 facilities located in a HAZMAT risk zone. The primary impact zone (0.5-mile buffer) includes at least 200 facilities throughout the region. Forsyth County has the most facilities in the primary impact zone with 112 facilities. Caswell County has 2, Davie County has 16, Rockingham County has 35, Stokes County has 4, and Surry County has 22, while Yadkin County has 9. The remaining facilities are in the secondary, 1-mile zone. A list of specific critical facilities and their associated risk can be found in **Table 6.27** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors revealed that there are 640 critical facilities located in the primary (0.5-mile) mobile HAZMAT buffer areas for roads and 288 for railroads throughout the region. Although this is a worst-case scenario model, it indicates that most of the critical facilities in the Northern Piedmont region are vulnerable to a potential mobile HAZMAT incident. Additionally, there are 805 critical facilities located in the secondary (1-mile) buffer area of roads and 440 railroads, accounting for over 75 percent of the total number of critical facilities in the region. This may be the result of many critical facilities being located near major roadways for ease of access, but it is nonetheless important to recognize what a large percentage of critical facilities in the region are located in the smaller buffer area. A list of specific critical facilities and their associated risk can be found in **Table 6.27** 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 Northern Piedmont Region. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc.

6.5.8. Dam Failure

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

TABLE 6.25: SUMMARY OF HIGH-HAZARD DAM VULNERABILITY

Dam Name	NID ID	EAP	Condition (as of July 2024)	Owner Type	Max Capacity (acre-feet)	Max Discharge (ft3/s)	River/Stream
CASWELL COUNTY							
Yanceyville Water Supply Dam	NC02018	N	Fair	Local Gov	38	3675	Country Line Creek
Lunsford Dam	NC02020	N	Poor	Private	14.4	N/A	N/A
Farmer Lake Dam	NC04769	Y	Fair	Local Gov	15268	4000	Country Line Creek
Jones Dam	NC04786	N	Poor	Private	12	N/A	S. Fork Rattlesnake Creek
J.J. Pointer Dam	NC04939	N	Fair	Private	2.98	N/A	UT to Country Line Creek
DAVIE COUNTY							
Dutchman Creek WS Dam #5	NC01425	Y	Fair	Local Gov	424	4100	Howard Branch
Dutchman Creek WS Dam #2	NC01426	Y	Fair	Local Gov	1389	1450	Steelman Creek
Dutchman Creek WS Dam #6	NC01424	Y	Fair	Private	616	470	Greasy Creek
Dutchman Creek WS Dam #8	NC00259	Y	Fair	Private	991	1284	Cedar Creek
Hoffner Lake Dam	NC00415	Y	Fair	Private	48	N/A	Reedy Creek
Dutchman Creek WS Dam #15A	NC00370	Y	Fair	Local Gov	2580	5650	Ellsworth Creek
Lake Myers Family Campground Dam	NC02250	Y	Fair	Private	402	995	Beaver Creek
Dutchman Creek WS Dam #17	NC02253	Y	Fair	Local Gov	5072	10522	Dutchman Creek
Davie County Water Plant Dam	NC07070	N	Fair	Local Gov	100	0	Yadkin River
FORSYTH COUNTY							
Vogler Lake Dam	NC00425	N	Fair	Private	50	83	Muddy Creek
Alsup Lake Dam	NC00404	N	Fair	Private	50	99	Muddy Creek
Shelton Lake Dam	NC02352	Y	Poor	Private	99	N/A	Muddy Creek

Haynes Estate Lake Dam #1	NC01531	N	Fair	Private	35	30	UT to Johnson Creek
Haynes Estate Lake Dam #2	NC01396	Y	Fair	Private	22	91	Johnson Creek
Lea Lake Dam	NC02368	N	Fair	Private	43	N/A	Johnson Creek
Reynolds Lake Dam #1	NC02370	Y	Fair	Private	32	N/A	Johnson Creek
Lasater Mill Pond Dam	NC00301	N	Fair	Private	245	60	Blanket Creek
Lake Falmouth Dam	NC01647	Y	Fair	Local Gov	112	N/A	Ellison Creek
Parker Lake Dam #2	NC01544	Y	Fair	Private	32	N/A	Ellison Creek
Conrad Lake Dam	NC00389	Y	Poor	Private	176	198	Mill Creek
Shallowford Lakes Dam #1	NC00430	Y	Fair	Private	203	204	Mill Creek
Shallowford Lakes Dam #2	NC02383	Y	Fair	Private	80	296	UT to Mill Creek
Salem Lake Dam	NC00327	Y	Fair	Local Gov	9230	35112	Salem Creek
Winston Lake Dam	NC00304	Y	Fair	Local Gov	1368	83	Frazier Creek
Joyner Lake Dam	NC00420	Y	Fair	Private	96	50	Kerners Mill Creek
Hauser Lake Dam	NC02402	Y	Fair	Private	14	55	UT to Smith Creek
Kernersville Water Supply Dam	NC00315	Y	Fair	Local Gov	300	3055	Belews Creek
Sabrina Lake Dam	NC02424	N	Not Rated	Private	42	N/A	UT to S. Fork Muddy Creek
Janita Lake Dam Upper	NC02428	N	Poor	Private	16	N/A	Salem Creek
Haynes Lake Dam	NC02433	Y	Fair	Private	30	N/A	Muddy Creek
Whitaker Lake Dam	NC02434	Y	Fair	Private	27	N/A	Silas Creek
Brookberry Farm Lake Dam West	NC02436	Y	Fair	Private	58	N/A	Tomahawk Creek
Beauchamp Lake Dam	NC01543	N	Fair	Private	42	N/A	Tomahawk Creek
Town Fork Creek Watershed Dam #5	NC00423	Y	Fair	Private	112	402	Old Field Creek
Town Fork Creek Watershed Dam #6	NC00424	Y	Fair	Private	173	402	Mill Creek
Town Fork Creek Watershed Dam #2	NC00421	Y	Fair	Private	584	330	Lick Creek

Town Fork Creek Watershed Dam #1-B	NC00422	Y	Fair	Private	271	N/A	Lick Creek
Young Lake Dam #2	NC01658	Y	Fair	Private	58	0	Mill Creek
Hanes Lake Dam	NC00310	Y	Fair	Private	288	40	Bill Branch
Gambill Lake Dam Middle	NC01579	N	Fair	Private	30	N/A	Bill Branch
Fowler Lake Dam #2	NC01532	Y	Fair	Private	46	30	Muddy Creek
Fowler Lake Dam #1	NC01533	Y	Poor	Private	40	0	UT to Muddy Creek
Creeson Lake Dam	NC01539	N	Poor	Private	60	24	Leak Fork Creek
K & W Lake Dam	NC01535	Y	Fair	Private	43	N/A	Muddy Creek
Mallard Lake Dam Lower	NC00305	Y	Satisfactory	Private	170	188	Muddy Creek
Mallard Lake Dam Upper West	NC00306	Y	Fair	Private	42	452	Muddy Creek
Woodview Lake Dam Lower	NC02457	Y	Fair	Private	25	28	Mill Creek
Wall Lake Dam	NC02466	Y	Fair	Private	37	N/A	Beaver Dam Creek
Gambill Pond Dam Lower	NC02468	N	Fair	Private	22	N/A	Bill Branch
Mallard Lake Dam Upper	NC02469	Y	Fair	Private	77	N/A	Muddy Creek
Town And Country Lake Dam	NC04803	Y	Fair	Private	28.7	N/A	Mill Creek
Century Park Lake Dam	NC04808	Y	Fair	Local Gov	39	400	Smith Creek
Brookdale Lake Dam	NC05283	Y	Fair	Private	14.8	N/A	Johnson Creek
Beaver Brook Drive Dam	NC05549	N	Fair	Private	11.1	N/A	Johnson Creek
Arboretum Townhouse Dam	NC05550	Y	Fair	Private	17.1	0	Deep Creek
Swann Water Treatment Plant RWR Dam #1 (aka NW)	NC05650	Y	Fair	Local Gov	131	0	N/A
Swann Water Treatment Plant RWR Dam #1 (aka NW)	NC05651	Y	Fair	Local Gov	231	0	N/A
Dell Phase 1 SWDP Dam	NC05790	Y	Fair	Private	34	N/A	N/A

Hillcrest Towne Center Pond B Dam	NC05854	Y	Fair	Private	4	200	UT to Little Creek
Hillcrest Towne Center Pond E Dam	NC05855	Y	Fair	Private	22	210	UT to Little Creek
Kaymoore Dam	NC06118	Y	Fair	Private	9	0	UT to Muddy Creek
Mitch Allen Dam	NC06425	N	Not Rated	Private		N/A	Yadkin River
Winston-Salem Forsyth County Lagoon #1 Dam	NC06602	N	Fair	Local Gov	70	0	Salem Creek
Winston-Salem Forsyth County Lagoon #2 Dam	NC06603	N	Fair	Local Gov	50	0	Salem Creek
Winston-Salem Forsyth County Lagoon #3 Dam	NC06604	N	Fair	Local Gov	30	0	Salem Creek
ROCKINGHAM COUNTY							
Grogan Estate Lake Dam	NC00572	N	Fair	Private	56	396	Big Beaver Island Creek
Young Lake Dam	NC00555	Y	Unsatisfactory	Private	52	630	Buffalo Creek
John Smith Lake Dam	NC00570	N	Fair	Private	58	248	Matrimony Creek
Lake Hazel Dam	NC00565	N	Fair	State	195	165	Carroll Creek
Eden Presettling Impoundment Dam	NC01604	Y	Fair	Local Gov	107.2	N/A	UT to Dan River
Lake Hunt Dam	NC00551	Y	Fair	Local Gov	2972	248	Troublesome Creek
Troublesome Creek Dam	NC01599	Y	Fair	Local Gov	21161	4972	Troublesome Creek
Southern C's Farm Lake Dam	NC00564	N	Fair	Private	114	248	Troublesome Creek
Jack Neal Dam	NC03901	N	Fair	Private	12	179	Hogans Creek
Ed Wilkins Dam	NC03998	Y	Unsatisfactory	Private	62	296	Troublesome Creek
Newman-Bowman Dam	NC04031	N	Fair	Private	17	N/A	Troublesome Creek
Greensboro National Golf Course Dam #1	NC05385	N	Fair	Private	17	N/A	Haw River
Greensboro National Golf Course Dam #2	NC05386	N	Fair	Private	11	N/A	Haw River
Belews Creek Saddle Dike #4 Dam	NC05941	Y	Satisfactory	Utility	263490	26577	UT to Dan River
Belews Lake Dam	NC05942	Y	Satisfactory	Utility	263490	26577	UT to Dan River
Smiths Lake Dam #1	NC06785	N	N/A	Private	10	0	Matrimony Creek

Smiths Lake Dam #2	NC06786	N	N/A	Private	10	0	Matrimony Creek
STOKES COUNTY							
Little Yadkin River WS Dam #6	NC00347	Y	Fair	Local Gov	1240	15050	Crooked Run Creek
Town Fork Creek WS Dam #10	NC00349	Y	Fair	Local Gov	4963	12846	Town Fork Creek
Town Fork Creek WS Dam #16	NC00350	Y	Fair	Local Gov	3617	15300	Neatmans Creek
Little Yadkin River WS Dam #12	NC01498	Y	Fair	Local Gov	130	346	E. Prong Little Yadkin River
Little Yadkin River WS Dam #17	NC04185	N	Fair	Private	17	154	E. Prong Little Yadkin River
Hanging Rock State Park Dam	NC00342	Y	Fair	State	290	1855	Cascade Creek
Lilly Lake Dam	NC01508	N	Fair	Private	57	323	UT to Crooked Run Creek
Town Fork Creek WS Dam #13	NC00343	Y	Satisfactory	Local Gov	579	1380	Watts Creek
Town Fork Creek WS Dam #14A	NC00346	Y	Fair	Local Gov	773	5463	Voss Creek
Little Yadkin River WS Dam #4	NC04213	Y	Fair	Local Gov	2377	1700	W. Prong Little Yadkin River
Tedder Dam Lower	NC04237	N	Fair	Private	29	80	Timmons Creek
Lakeview Acres Dam	NC04242	N	Fair	Private	22	10	UT to Muddy Creek
Day Dam	NC04245	N	Fair	Private	5	100	Crooked Run
Little Yadkin River WS Dam #9	NC05398	Y	Fair	Local Gov	144	N/A	E. Prong Little Yadkin River
Little Yadkin River WS Dam #13A	NC05399	N	Fair	Local Gov	125.2	N/A	E. Prong Little Yadkin River
Little Yadkin River WS Dam #14, 16	NC05400	N	Fair	Local Gov	89	N/A	E. Prong Little Yadkin River
Little Yadkin River WS Dam #18	NC04854	N	Fair	Local Gov	76.3	259.64	E. Prong Little Yadkin River
Little Yadkin River WS Dam #20	NC05401	N	Fair	Local Gov	72.6	N/A	E. Prong Little Yadkin River
Little Yadkin River WS Dam #25	NC04856	Y	Fair	Local Gov	196	273.04	E. Prong Little Yadkin River

Little Yadkin River WS Dam #26	NC04857	Y	Fair	Local Gov	97.6	306	E. Prong Little Yadkin River
Little Yadkin River WS Dam #29	NC05402	Y	Fair	Local Gov	125	N/A	E. Prong Little Yadkin River
Town Fork Creek WS Dam #7	NC05441	Y	Fair	Local Gov	337.5	N/A	Red Bank Creek
Little Yadkin River WS Dam #8A	NC05822	N	Fair	Private	34	N/A	E. Prong Little Yadkin River
Belews Creek Active Ash Basin Dam	NC05937	Y	Satisfactory	Utility	7328	28	UT to Dan River
Belews Creek Saddle Dike #1 Dam	NC05938	Y	Satisfactory	Utility	263490	26577	UT to Dan River
Belews Creek Saddle Dike #2 Dam	NC05939	Y	Satisfactory	Utility	263490	26577	UT to Dan River
Belews Creek Saddle Dike #3 Dam	NC05940	Y	Satisfactory	Utility	263490	26577	UT to Dan River
Belews Creek Holding Basin Dam	NC06203	Y	Satisfactory	Utility	124	N/A	N/A
Marshall Dam	NC06791	N	N/A	Private	10	0	Timmons Creek
SURRY COUNTY							
Willowbrook Carp Lake Dam	NC04250	Y	Fair	Private	12.7	N/A	Yadkin River
Cedar Brook Lake Dam	NC01571	Y	Fair	Private	86.4	N/A	Camp Creek
Klondike Farm Dam	NC01397	Y	Fair	Private	82	289	Grassy Creek
Shopshire Dam	NC00788	Y	Fair	Private	30	80	Ararat River
Green Hill Lake Dam	NC00277	N	Fair	Private	242	504	UT to Lovills Creek
Doggett Reservoir Dam	NC01490	Y	Fair	Local Gov	40	N/A	Stewarts Creek
Town Of Pilot Mountain Dam	NC04262	Y	Fair	Local Gov	24	N/A	Toms Creek
Low Gap Wildlife Club Dam	NC00274	N	Fair	Private	206	4475	Christian Creek
Reynolds Lake Dam	NC00276	Y	Fair	Private	1380	N/A	Mill Creek
Stewarts Creek WS Dam #1A	NC00377	N	Fair	Private	5091	29400	Stewarts Creek
Jordon Dam	NC04268	N	Fair	Private	11	N/A	Ararat River
Carpenter Dam	NC04276	N	Fair	Private	12	N/A	UT to Cooks Creek

Blue Dam	NC04277	N	Fair	Private	19.4	222	UT to Fisher River
Simpson Dam	NC04289	Y	Fair	Private	19.2	1360	Davenport Creek
W. Reynolds Dam	NC04291	Y	Fair	Private	47.6	16	Long Creek
Alberty Dam	NC04293	N	Fair	Private	13.4	138	Bear Creek
Hugh Chatham Hospital Dam	NC04296	N	Fair	Private	171.4	130	UT to Dutchman Creek
Elkin Reservoir Dam	NC04298	Y	Fair	Local Gov	61.2	N/A	Elkin Creek
Scott-Harris Dam	NC04990	N	Fair	Private	33.1	N/A	Little Beaver Creek
South Key Street Dam	NC07504	N	N/A	Local Gov	10	0	Heatherly Creek
Gammons Dam	NC07679	N	N/A	Private	32	N/A	Naked Run
YADKIN COUNTY							
Deep Creek Watershed #15B Dam	NC00355	Y	Fair	Local Gov	338	650	North Deep Creek
Deep Creek Watershed #10 Dam	NC00258	Y	Fair	Local Gov	572	1100	North Deep Creek
Deep Creek Watershed #19A Dam	NC00262	Y	Fair	Local Gov	923	850	Cranberry Creek
Deep Creek Watershed #6B Dam	NC01482	Y	Fair	Local Gov	522	1330	South Deep Creek
Deep Creek Watershed #21 Dam	NC00263	Y	Fair	Local Gov	908	570	South Deep Creek
Deep Creek Watershed #22A Dam	NC00264	Y	Fair	Local Gov	457	850	South Deep Creek
Deep Creek Watershed #30A Dam	NC00266	Y	Fair	Local Gov	444	1280	South Deep Creek
Deep Creek Watershed #23 Dam	NC00384	Y	Fair	Local Gov	284	580	Fisher Creek
Deep Creek Watershed #5D Dam	NC05866	Y	Fair	Local Gov	7820	N/A	N/A
Yadkinville WTP Reservoir Dam	NC05920	Y	Fair	Local Gov	79	207	N/A
Highland Orchards Dam	NC06187	Y	Fair	Private	50	N/A	UT to Arnolds Branch
Highland Orchard Dam	NC06188	N	Not Rated	Private	N/A	N/A	N/A
Hamptonville Jones Dam	NC07605	N	Poor	Private	0	N/A	N/A

Source: NCDEQ, July 2024

6.6 CONCLUSIONS ON HAZARD VULNERABILITY

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

- Improving our understanding of the risk associated with the natural hazards in the Northern Piedmont 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 Northern Piedmont 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 Northern Piedmont 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 Caswell, Davie, Forsyth, Rockingham, Stokes, Surry, and Yadkin counties.

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

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

Table 6.26 presents a summary of estimated annual losses (EAL) for each hazard and on a composite scale in the Northern Piedmont Region as reported in 2024 by the FEMA National Risk Index[13].. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. If no historical occurrences were reported, an accurate annualized loss estimate could not be obtained. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

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

TABLE 6.26: POTENTIAL ANNUALIZED LOSSES FOR THE NORTHERN PIEDMONT REGION

Hazard	Caswell County	Davie County	Forsyth County	Rockingham County	Stokes County	Surry County	Yadkin County	Total
Drought	$2,302,979	$3,736,874	$18,656,575	$5,496,915	$1,926,290	$4,217,562	$2,347,755	$38,684,950
Excessive Heat	$1,241,660	$2,609,284	$12,104,203	$3,281,929	$1,054,448	$2,371,841	$1,124,671	$23,788,036
Hurricane and Tropical Hazards	$656,093	$870,966	$6,393,002	$1,747,821	$671,261	$1,403,781	$904,864	$12,647,788
Tornadoes/ Thunderstorms	$405,226	$256,625	$159,371	$467,165	$200,581	$441,941	$318,219	$2,249,128
Severe Winter Weather	$295,575	$182,148	$106,625	$309,393	$97,863	$67,027	$86,606	$1,145,237
Earthquakes	$19,522	$44,974	$327,901	$39,102	Negligible	Negligible	Negligible	$431,499
Geological	$868,621	$771,297	$5,968,902	$1,763,714	$604,473	$1,090,714	$488,182	$11,555,903
Dam Failure	$224,571	$330,100	$2,474,026	$524,026	$244,582	$576,627	$354,610	$4,728,542
Flooding	$35,703	$380,475	$103,358	$125,138	$13,917	$53,746	$32,733	$745,069
Wildfires	$41,486	$193,382	$1,046,055	$195,705	$81,586	$242,956	$123,830	$1,925,000
Infectious Disease	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Hazardous Substances	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Radiological Emergency	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Terrorism	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Cyber	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Electromagnetic Pulse	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Civil Disturbance	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Food Emergency	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Source: FEMA NRI

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to natural hazards including drought, hurricane and tropical hazards, tornadoes/ thunderstorms, and severe winter weather. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.27** shows an expanded count of regional critical facilities retrieved from NCEM RMT data grouped by updated FEMA community lifelines. These critical facility counts are planning estimates subject to future changes. Additionally, **Table 6.28** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

TABLE 6.27: CRITICAL FACILITIES BY FEMA COMMUNITY LIFELINE

FEMA Lifeline	Food	Comms	Hazmat	Shelter	Comms	Supply	Safety	Safety	Medical	Comms	Safety	Hazmat	Safety	Transport	Energy	Safety	Water	N/A
Location	**Food & Farm**	**Banking & Finance**	**Chemical**	**Commercial**	**Comms**	**Manufacturing**	**Defense**	**Government**	**Healthcare**	**IT**	**National Monument**	**Nuclear**	**Postal & Shipping**	**Transport**	**Energy**	**Emergency Services**	**Water**	**Total**
Caswell County	**38**	**3**	**0**	**880**	**0**	**163**	**0**	**181**	**34**	**0**	**0**	**1**	**0**	**66**	**1**	**0**	**6**	**1,373**
Milton	0	0	0	22	0	1	0	4	0	0	0	0	0	0	0	0	0	27
Yanceyville	0	1	0	177	0	10	0	97	4	0	0	1	0	5	1	0	6	302
Unincorporated Area	38	2	0	681	0	152	0	80	30	0	0	0	0	61	0	0	0	1,044
Davie County	**65**	**55**	**0**	**1,173**	**0**	**569**	**1**	**108**	**56**	**0**	**0**	**0**	**0**	**349**	**5**	**1**	**24**	**2,406**
Bermuda Run	0	7	0	60	0	25	0	2	11	0	0	0	0	21	0	0	0	126
Cooleemee	0	2	0	26	0	5	0	10	0	0	0	0	0	4	0	0	3	50
Mocksville	1	14	0	271	0	122	1	37	29	0	0	0	0	67	5	1	5	553
Unincorporated Area	64	32	0	816	0	417	0	59	16	0	0	0	0	257	0	0	16	1,677
Forsyth County	**35**	**174**	**0**	**6,901**	**0**	**822**	**1**	**1,042**	**673**	**0**	**0**	**0**	**0**	**429**	**11**	**50**	**23**	**10,161**
Bethania	1	0	0	15	0	0	0	2	0	0	0	0	0	0	0	0	0	18
Clemmons	0	12	0	299	0	37	0	42	41	0	0	0	0	21	0	2	0	454
Kernersville	1	19	0	784	0	105	0	92	50	0	0	0	0	44	0	6	0	1,101
Lewisville	2	2	0	138	0	5	0	28	19	0	0	0	0	2	0	3	0	199
Rural Hall	0	3	0	109	0	20	0	8	1	0	0	0	0	13	0	1	0	155
Tobaccoville	0	0	0	39	0	1	0	6	1	0	0	0	0	0	0	1	0	48
Walkertown	0	0	0	160	0	7	0	31	3	0	0	0	0	11	0	1	0	213
Winston-Salem	2	138	0	4,696	0	590	1	794	525	0	0	0	0	318	7	28	10	7,109
Unincorporated Area	29	0	0	661	0	57	0	39	33	0	0	0	0	20	4	8	13	864
Rockingham County	**51**	**49**	**1**	**4,771**	**0**	**2,421**	**1**	**604**	**287**	**0**	**0**	**0**	**0**	**1,198**	**5**	**0**	**1**	**9,389**
Eden	1	19	0	1,053	0	315	0	86	78	0	0	0	0	212	3	0	1	1,768
Madison	0	9	0	376	0	132	0	25	14	0	0	0	0	93	1	0	0	650
Mayodan	0	4	0	199	0	191	0	15	8	0	0	0	0	27	0	0	0	444

Reidsville	1	16	1	900	0	376	0	83	82	0	0	0	0	201	1	0	0	1,661
Stoneville	0	1	0	98	0	60	0	9	3	0	0	0	0	20	0	0	0	191
Wentworth	0	0	0	82	0	54	0	153	15	0	0	0	0	44	0	0	0	348
Unincorporated Area	49	0	0	2,063	0	1,293	1	233	87	0	0	0	0	601	0	0	0	4,327
Stokes County	**5,089**	**13**	**0**	**888**	**0**	**176**	**0**	**153**	**38**	**0**	**0**	**0**	**0**	**64**	**21**	**16**	**0**	**6,458**
Danbury	3	3	0	15	0	0	0	11	7	0	0	0	0	6	0	6	0	51
King	306	7	0	274	0	46	0	24	25	0	0	0	0	14	2	1	0	699
Walnut Cove	92	2	0	162	0	9	0	11	2	0	0	0	0	10	1	1	0	290
Unincorporated Area	4,688	1	0	437	0	121	0	107	4	0	0	0	0	34	18	8	0	5,418
Surry County	**2,397**	**112**	**0**	**2,427**	**2**	**569**	**0**	**414**	**116**	**0**	**0**	**0**	**0**	**378**	**4**	**0**	**29**	**6,448**
Dobson	111	2	0	165	1	3	0	72	2	0	0	0	0	10	1	0	4	371
Elkin	15	10	0	310	0	39	0	46	46	0	0	0	0	8	0	0	4	478
Mount Airy	9	37	0	693	1	192	0	73	44	0	0	0	0	129	1	0	16	1,195
Pilot Mountain	0	12	0	100	0	37	0	21	6	0	0	0	0	18	0	0	5	199
Unincorporated Area	2,262	51	0	1,159	0	298	0	202	18	0	0	0	0	213	2	0	0	4,205
Yadkin County	**133**	**38**	**0**	**1,166**	**0**	**217**	**0**	**185**	**43**	**0**	**0**	**0**	**0**	**206**	**0**	**0**	**0**	**1,988**
Boonville	1	3	0	80	0	12	0	11	3	0	0	0	0	11	0	0	0	121
East Bend	0	3	0	42	0	4	0	4	2	0	0	0	0	16	0	0	0	71
Jonesville	2	7	0	150	0	11	0	11	6	0	0	0	0	14	0	0	0	201
Yadkinville	0	14	0	197	0	47	0	59	21	0	0	0	0	69	0	0	0	407
Unincorporated Area	130	11	0	697	0	143	0	100	11	0	0	0	0	96	0	0	0	1,188
South Mountains Regional Total	**7,808**	**444**	**1**	**18,206**	**2**	**4,937**	**3**	**2,687**	**1,247**	**0**	**0**	**1**	**0**	**2,690**	**47**	**67**	**83**	**38,223**

TABLE 6.28: AT-RISK CRITICAL FACILITIES

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Caswell County																		
CASWELL COUNTY EMERGENCY SERVICES	EOC/Response	X	X	X	X	X	X				X				X	X		
Anderson Township Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Anderson Township Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Casville Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Cherry Grove Volunteer Fire and Rescue Department	Fire/EMS	X	X	X	X	X	X				X							
Leasburg Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Leasburg Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Milton Voluntary Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Milton Voluntary Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Pelham Volunteer Fire Department of Caswell County, N. C.	Fire/EMS	X	X	X	X	X	X				X	X			X	X	X	X
Prospect Hill Voluntary Fire Department	Fire/EMS	X	X	X	X	X	X				X				X	X		
Providence Fire and Rescue, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Semora Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Yanceyville Fire & Rescue Corporation	Fire/EMS	X	X	X	X	X	X				X				X	X		
Yanceyville Fire & Rescue Corporation 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
NORTH CAROLINA STATE HIGHWAY PATROL TROOP D - DISTRICT IV - SUBSTATION	Police	X	X	X	X	X	X				X		X	X		X		
CASWELL COUNTY SHERIFFS DEPARTMENT / CASWELL COUNTY JAIL	Police	X	X	X	X	X	X				X				X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
YANCEYVILLE POLICE DEPARTMENT - HEADQUARTERS	Police	X	X	X	X	X	X				X				X	X		
Oakwood Elementary	School	X	X	X	X	X	X				X		X	X		X		
N L Dillard Middle	School	X	X	X	X	X	X				X				X	X		
Bartlett Yancey High	School	X	X	X	X	X	X				X				X	X		
South Elementary	School	X	X	X	X	X	X				X				X	X		
North Elementary	School	X	X	X	X	X	X				X				X	X		
Stoney Creek Elementary	School	X	X	X	X	X	X				X	X						
Beverly Rucker Family Care Home #6	Medical	X	X	X	X	X	X				X				X	X		
Beverly Rucker Family Care Home #7	Medical	X	X	X	X	X	X				X				X	X		
Beverly Rucker Family Care Home #8	Medical	X	X	X	X	X	X				X				X	X		
Beverly Rucker Family Care Home #9	Medical	X	X	X	X	X	X				X				X	X		
Carrie's Family Care Home	Medical	X	X	X	X	X	X				X							
Corbett's Family Care Home	Medical	X	X	X	X	X	X				X				X	X		
Corbett's Family Care Home #2	Medical	X	X	X	X	X	X				X				X	X		
D & H Family Care Home	Medical	X	X	X	X	X	X				X					X		
D & H Family Care Home #2	Medical	X	X	X	X	X	X				X					X		
Dogwood Forest Family Care Home #1	Medical	X	X	X	X	X	X				X				X	X		
Dogwood Forest Family Care Home #2	Medical	X	X	X	X	X	X				X							
Double 'S' And 'H' Family Care Home	Medical	X	X	X	X	X	X				X				X	X		
Graves Family Care Home	Medical	X	X	X	X	X	X				X							
Jefferson Family Care Home #4	Medical	X	X	X	X	X	X				X							
Jones Family Home #4	Medical	X	X	X	X	X	X				X				X	X		
L & L Family Care	Medical	X	X	X	X	X	X				X	X				X		X
Mitchell Family Care Home	Medical	X	X	X	X	X	X				X							
New Beginnings	Medical	X	X	X	X	X	X				X							

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Parker's Family Care Home	Medical	X	X	X	X	X	X				X							
Rudd Ridge Family Care	Medical	X	X	X	X	X	X				X				X	X		
Taylor Family Care Home #1	Medical	X	X	X	X	X	X				X							
Taylor Family Care Home #2	Medical	X	X	X	X	X	X				X							
Terry Care Home	Medical	X	X	X	X	X	X				X							
CareFocus	Medical	X	X	X	X	X	X				X				X	X		
Caswell County Home Health Agency	Medical	X	X	X	X	X	X				X				X	X		
Blackwell's Rest Home	Medical	X	X	X	X	X	X				X							
Dogwood Forest #2	Medical	X	X	X	X	X	X				X							
Jefferson Care Home	Medical	X	X	X	X	X	X				X							
Poole's Rest Home	Medical	X	X	X	X	X	X				X	X			X	X		
The Ronald David Home	Medical	X	X	X	X	X	X				X							
Currie House	Medical	X	X	X	X	X	X				X				X	X		
Hamer Group Home	Medical	X	X	X	X	X	X				X				X	X		
Hearthstone Youth and Family Services, Inc.	Medical	X	X	X	X	X	X				X							
Life Changes Counseling	Medical	X	X	X	X	X	X				X				X	X		
Seventh Avenue Group Home	Medical	X	X	X	X	X	X				X			X	X	X		
Brian Center Health & Rehabilitation/Yanceyville	Medical	X	X	X	X	X	X				X				X	X		
Davie County																		
DAVIE COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X				X			X	X	X		X
Advance Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Advance Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Center Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Cooleemee Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Cornatzer-Dulin Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X						X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
County Line Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Jerusalem Township Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Mocksville Fire Department	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Sheffield-Calahaln Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X		X	X				
Smith Grove Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
The Farmington Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
The Fork Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
William R. Davie Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
DAVIE COUNTY EMERGENCY MEDICAL SERVICES STATION 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
DAVIE COUNTY EMERGENCY MEDICAL SERVICES STATION 3	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
DAVIE COUNTY EMERGENCY MEDICAL SERVICES STATION 1	Fire/EMS	X	X	X	X	X	X				X			X	X	X		X
DAVIE COUNTY RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X				X							
TOWN OF COOLEEMEE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X				X	X		
NORTH CAROLINA STATE HIGHWAY PATROL TROOP E DISTRICT III - SUBSTATION	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
DAVIE COUNTY SHERIFFS DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
MOCKSVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
William R Davie Elementary	School	X	X	X	X	X	X				X				X	X		
Cooleemee Elementary	School	X	X	X	X	X	X				X				X	X		
South Davie Middle	School	X	X	X	X	X	X				X	X	X	X	X	X		
Davie County High	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Mocksville Elementary	School	X	X	X	X	X	X				X			X	X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
North Davie Middle	School	X	X	X	X	X	X				X				X	X		
Pinebrook Elementary	School	X	X	X	X	X	X				X				X	X		
Shady Grove Elementary	School	X	X	X	X	X	X				X				X	X	X	X
Cornatzer Elementary	School	X	X	X	X	X	X				X	X						
Central Davie Academy	School	X	X	X	X	X	X				X			X	X	X	X	X
William Ellis Middle	School	X	X	X	X	X	X				X	X			X	X		
Davie County Early College High	School	X	X	X	X	X	X				X			X	X	X	X	X
Trinity Baptist Academy	School	X	X	X	X	X	X				X			X	X	X		
Magnolia Place	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Davie County Home Health Agency	Medical	X	X	X	X	X	X				X			X	X	X		X
Davie County Hospital/CAP	Medical	X	X	X	X	X	X				X			X	X	X		X
Davie Medical Equipment, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Cedar Rock Assisted Living	Medical	X	X	X	X	X	X				X			X	X	X		X
Davie Place Residential Care	Medical	X	X	X	X	X	X				X			X	X	X		X
Somerset Court of Mocksville	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Davie County Hospital	Medical	X	X	X	X	X	X				X			X	X	X		X
Boxwood Acres	Medical	X	X	X	X	X	X				X		X	X	X	X		
Davie County Group Home, Inc	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Milling Manor, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Mocksville Outpatient Center	Medical	X	X	X	X	X	X				X			X	X	X		X
New Beginning Family Services-Apt. 102	Medical	X	X	X	X	X	X				X			X	X	X		X
New Beginnings Family Services - Apt. 101	Medical	X	X	X	X	X	X				X			X	X	X		X
New Beginnings Family Services - Apt. 101-A	Medical	X	X	X	X	X	X				X			X	X	X		X
New Beginnings Family Services - Apt. 201-B	Medical	X	X	X	X	X	X				X			X	X	X		X
New Beginnings Family Services - Apt. 202	Medical	X	X	X	X	X	X				X			X	X	X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
New Beginnings Family Services - Apt. 202-C	Medical	X	X	X	X	X	X				X			X	X	X		X
New Beginnings Family Services-Apt. 201	Medical	X	X	X	X	X	X				X			X	X	X		X
New Horizon Enterprises	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Pleasant Acres	Medical	X	X	X	X	X	X				X		X	X	X	X		
Twinbrooks	Medical	X	X	X	X	X	X				X	X		X	X	X		X
Autumn Care of Mocksville	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Bermuda Village Retirement Center	Medical	X	X	X	X	X	X				X				X	X		
Meadowbrook Terrace of Davie	Medical	X	X	X	X	X	X				X				X	X		
Forsyth County																		
FORSYTH COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X				X		X	X	X	X	X	X
Beeson Cross Roads Fire and Rescue, Inc.	Fire/EMS	X	X	X	X	X	X				X					X		
Belews Creek Volunteer Fire and Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
Griffith Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Horneytown Volunteer Fire Department of Forsyth County, Inc.	Fire/EMS	X	X	X	X	X	X				X					X		
Kernersville Fire Department	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Kernersville Fire Department 2	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
Kernersville Fire Department 3	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Kernersville Fire Department 4	Fire/EMS	X	X	X	X	X	X				X					X		
Mineral Springs Volunteer Fire and Rescue, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Old Richmond Volunteer Fire Department and Rescue Squad, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Rural Hall Fire And Rescue	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
The Clemmons Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
The Clemmons Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
The Lewisville Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
The Lewisville Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X					X		
The Piney Grove Volunteer Fire and Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
The Piney Grove Volunteer Fire and Rescue Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
The Salem Chapel Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Union Cross Fire-rescue of Forsyth County, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Vienna Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
Vienna Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
Walkertown Fire Department Incorporated	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Walkertown Fire Department Incorporated 2	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Walkertown Fire Department Incorporated 3	Fire/EMS	X	X	X	X	X	X				X				X	X		
Winston Salem Fire Department	Fire/EMS	X	X	X	X	X	X				X		X	X		X	X	X
Winston Salem Fire Department 2	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Winston Salem Fire Department 3	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Winston Salem Fire Department 4	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Winston Salem Fire Department 5	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Winston Salem Fire Department 6	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Winston Salem Fire Department 7	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Winston Salem Fire Department 8	Fire/EMS	X	X	X	X	X	X				X				X	X		
Winston Salem Fire Department 9	Fire/EMS	X	X	X	X	X	X				X		X	X				
Winston Salem Fire Department 10	Fire/EMS	X	X	X	X	X	X				X				X	X		
Winston Salem Fire Department 11	Fire/EMS	X	X	X	X	X	X				X					X		
Winston Salem Fire Department 12	Fire/EMS	X	X	X	X	X	X				X				X	X		
Winston Salem Fire Department 14	Fire/EMS	X	X	X	X	X	X				X					X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Winston Salem Fire Department 15	Fire/EMS	X	X	X	X	X	X				X					X		
Winston Salem Fire Department 16	Fire/EMS	X	X	X	X	X	X				X					X		
Winston Salem Fire Department 17	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Winston Salem Fire Department 18	Fire/EMS	X	X	X	X	X	X				X				X	X		
Winston Salem Fire Department 19	Fire/EMS	X	X	X	X	X	X				X				X	X		
Winston Salem Fire Department 20	Fire/EMS	X	X	X	X	X	X				X							
NUCARE CAROLINA AMBULANCE INCORPORATED	Fire/EMS	X	X	X	X	X	X				X			X	X	X		
FORSYTH COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
WINSTON SALEM RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
SPECIAL OPERATIONS RESPONSE TEAM	Fire/EMS	X	X	X	X	X	X				X		X	X		X	X	X
KERNERSVILLE VOLUNTEER RESCUE AND EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X				X		X	X		X		X
CAVALRY MEDICAL TRANSPORT	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
UNITED STATES MARSHALS SERVICE - WINSTON SALEM	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
UNITED STATES INTERNAL REVENUE SERVICE CRIMINAL INVESTIGATION DIVISION - WINSTON SALEM	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
NORTH CAROLINA FORESTRY RANGER - FORSYTH COUNTY	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
WINSTON-SALEM STATE UNIVERSITY CAMPUS POLICE	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
WINSTON-SALEM POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X		X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL TROOP E DISTRICT IV	Police	X	X	X	X	X	X				X				X	X		
WAKE FOREST UNIVERSITY CAMPUS POLICE	Police	X	X	X	X	X	X				X			X		X		
KERNERSVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
UNITED STATES IMMIGRATION AND CUSTOMS ENFORCEMENT - WINSTON SALEM OFFICE OF INVESTIGATION	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
NORTH CAROLINA SCHOOL OF THE ARTS POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL - CENTRAL CRIMINAL INTERDICTION HEADQUARTERS	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
ALCOHOLIC BEVERAGE CONTROL LAW ENFORCEMENT	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
FORSYTH TECHNICAL COMMUNITY COLLEGE CAMPUS POLICE	Police	X	X	X	X	X	X				X				X	X		
FORSYTH COUNTY SHERIFFS DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
Wallburg Elementary	School	X	X	X	X	X	X				X					X		
Quality Education Academy	School	X	X	X	X	X	X				X			X			X	X
The STEAM Academy of Winston Salem	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Bolton Elementary	School	X	X	X	X	X	X				X			X	X	X		X
Brunson Elementary	School	X	X	X	X	X	X	X			X				X	X	X	X
Career Center	School	X	X	X	X	X	X				X				X	X		
Cash Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Carter High School	School	X	X	X	X	X	X				X			X	X	X		X
Children's Center	School	X	X	X	X	X	X				X					X		
Clemmons Elementary	School	X	X	X	X	X	X				X				X	X		
The Downtown School	School	X	X	X	X	X	X				X		X	X		X	X	X
East Forsyth High	School	X	X	X	X	X	X				X			X		X	X	X
Easton Elementary	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Forest Park Elementary	School	X	X	X	X	X	X				X		X	X		X	X	X
R B Glenn High	School	X	X	X	X	X	X				X				X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Griffith Elementary	School	X	X	X	X	X	X				X				X	X		
HallWoodward Elementary	School	X	X	X	X	X	X				X					X		
Hanes Middle	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Ibraham Elementary	School	X	X	X	X	X	X				X				X	X	X	X
Jefferson Elementary	School	X	X	X	X	X	X				X					X		
Kernersville Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Kernersville Middle	School	X	X	X	X	X	X				X			X	X	X	X	X
Konnoak Elementary	School	X	X	X	X	X	X				X			X		X		X
DiggsLatham Elementary	School	X	X	X	X	X	X				X			X	X	X		
Lewisville Elementary	School	X	X	X	X	X	X				X					X		
Lowrance Middle	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Meadowlark Elementary	School	X	X	X	X	X	X				X							
Mineral Springs Elementary	School	X	X	X	X	X	X				X		X	X		X		X
Mineral Springs Middle	School	X	X	X	X	X	X				X		X	X		X		X
Moore Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Mount Tabor High	School	X	X	X	X	X	X				X							
North Forsyth High	School	X	X	X	X	X	X				X			X		X	X	X
North Hills Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Northwest Middle	School	X	X	X	X	X	X				X							X
Old Richmond Elementary	School	X	X	X	X	X	X				X				X	X		
Old Town Elementary	School	X	X	X	X	X	X				X				X	X		
Paisley IB Magnet	School	X	X	X	X	X	X				X			X				X
Parkland High	School	X	X	X	X	X	X				X				X	X		
J. F. Kennedy High	School	X	X	X	X	X	X				X			X		X		X
PhiloHill Magnet Acadent	School	X	X	X	X	X	X				X			X		X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Piney Grove Elementary	School	X	X	X	X	X	X				X	X						
Reynolds High	School	X	X	X	X	X	X				X			X		X	X	X
Rural Hall Elementary	School	X	X	X	X	X	X				X				X	X	X	X
Sedge Garden Elementary	School	X	X	X	X	X	X				X							
Sherwood Forest Elementary	School	X	X	X	X	X	X				X				X	X		
Southeast Middle	School	X	X	X	X	X	X				X				X	X		
South Fork Elementary	School	X	X	X	X	X	X				X					X		
Speas Elementary	School	X	X	X	X	X	X				X				X	X		
Union Cross Elementary	School	X	X	X	X	X	X				X			X	X	X		
Vienna Elementary	School	X	X	X	X	X	X				X							
Walkertown Elementary	School	X	X	X	X	X	X				X				X	X	X	X
West Forsyth High	School	X	X	X	X	X	X				X					X		
Whitaker Elementary	School	X	X	X	X	X	X				X					X		
Wiley Middle	School	X	X	X	X	X	X				X			X	X	X	X	X
Carver High	School	X	X	X	X	X	X				X				X	X		
Southwest Elementary	School	X	X	X	X	X	X				X					X		
Cook Elementary	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Carter G Woodson School	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Forsyth Academy	School	X	X	X	X	X	X				X							X
Ashley Elementary	School	X	X	X	X	X	X				X			X		X		X
Clemmons Middle	School	X	X	X	X	X	X				X				X	X	X	X
Hospital/Homebound Ed Center	School	X	X	X	X	X	X				X			X		X		X
Jefferson Middle	School	X	X	X	X	X	X				X					X		
Meadowlark Middle	School	X	X	X	X	X	X				X							
Petree Elementary	School	X	X	X	X	X	X				X		X	X	X	X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Walkertown Middle	School	X	X	X	X	X	X				X				X	X	X	X
Ward Elementary	School	X	X	X	X	X	X				X				X	X	X	X
Gibson Elementary	School	X	X	X	X	X	X				X							
Kimberley Park Elementary	School	X	X	X	X	X	X				X			X				X
Middle College of Forsyth Cnty	School	X	X	X	X	X	X				X				X	X		
Middle Fork Elementary	School	X	X	X	X	X	X				X				X	X		
WinstonSalem Preparatory Acad	School	X	X	X	X	X	X				X			X	X	X		X
Arts Based Elementary	School	X	X	X	X	X	X				X		X	X	X	X	X	X
East Forsyth Middle	School	X	X	X	X	X	X				X			X	X	X	X	X
Main Street Academy	School	X	X	X	X	X	X				X				X	X		
Reagan High	School	X	X	X	X	X	X				X					X		
The Special Children's School	School	X	X	X	X	X	X				X					X		
Jacket Academy at Carver High	School	X	X	X	X	X	X				X				X	X		
Early College of Forsyth Count	School	X	X	X	X	X	X				X				X	X		
Frank Morgan Elementary	School	X	X	X	X	X	X				X				X	X		
Walkertown High	School	X	X	X	X	X	X				X				X	X	X	X
Atkins Academic & Technology High	School	X	X	X	X	X	X				X	X	X	X	X	X		X
Kingswood School	School	X	X	X	X	X	X				X			X			X	X
Caleb's Creek Elementary	School	X	X	X	X	X	X				X				X	X		
Flat Rock Middle	School	X	X	X	X	X	X				X							
Kimmel Farm Elementary	School	X	X	X	X	X	X				X							
Berean Christian School	School	X	X	X	X	X	X				X			X	X	X		
Bishop McGuinness Catholic H. S.	School	X	X	X	X	X	X				X				X	X		
Calvary Day School	School	X	X	X	X	X	X				X					X		
Cathedral Oak Academy	School	X	X	X	X	X	X				X							

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Challenge Christian Academy	School	X	X	X	X	X	X				X				X	X	X	X
Faith Academy Christian School	School	X	X	X	X	X	X				X				X	X		
Ephesus Junior Academy	School	X	X	X	X	X	X				X			X	X	X	X	X
Clubhouse Academy	School	X	X	X	X	X	X				X			X		X		X
Hampton Education Academy	School	X	X	X	X	X	X				X		X	X			X	X
Forsyth Country Day School	School	X	X	X	X	X	X				X							
Impact Preparatory Christian Academy	School	X	X	X	X	X	X				X					X		
Montessori School of Winston-Salem	School	X	X	X	X	X	X				X					X		
Jefferson Day School	School	X	X	X	X	X	X				X			X	X	X		X
Our Lady of Mercy Catholic Sch	School	X	X	X	X	X	X				X				X	X		
Redeemer School	School	X	X	X	X	X	X				X					X		X
Quest Excellence Achieve. Acad	School	X	X	X	X	X	X				X			X	X	X		
Rise Academy Street School	School	X	X	X	X	X	X				X			X	X	X		X
Salem Academy	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Salem Baptist Christian School	School	X	X	X	X	X	X				X		X	X	X	X		X
Sherman Academy	School	X	X	X	X	X	X	X			X			X	X	X		
St. Leo Catholic School	School	X	X	X	X	X	X				X					X	X	X
Gospel Light Christian School	School	X	X	X	X	X	X				X				X	X		
St. John's Lutheran Day Sch.	School	X	X	X	X	X	X				X				X	X		
Triad Baptist Christian Academy	School	X	X	X	X	X	X				X				X	X		
Winston Salem Christian School	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Westlawn	School	X	X	X	X	X	X				X					X		
Summit School	School	X	X	X	X	X	X				X				X	X		
Winston-Salem Street School	School	X	X	X	X	X	X				X		X	X		X	X	X
Salem Montessori School	School	X	X	X	X	X	X				X		X	X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Woodland Baptist Chr. Sch.	School	X	X	X	X	X	X				X	X			X	X		X
PIEDMONT BAPTIST COLLEGE	School	X	X	X	X	X	X				X		X	X	X	X		X
WAKE FOREST UNIVERSITY	School	X	X	X	X	X	X				X			X		X		X
SALEM COLLEGE	School	X	X	X	X	X	X				X		X	X	X	X	X	X
FORSYTH TECHNICAL COMMUNITY COLLEGE	School	X	X	X	X	X	X				X				X	X		
CAROLINA CHRISTIAN COLLEGE	School	X	X	X	X	X	X				X	X	X	X	X	X		X
WINSTON-SALEM STATE UNIVERSITY	School	X	X	X	X	X	X				X		X	X	X	X	X	X
NORTH CAROLINA SCHOOL OF THE ARTS	School	X	X	X	X	X	X				X		X	X		X		X
Hawthorne Surgical Center	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Piedmont Endoscopy Center, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Plastic Surgery Center Of North Carolina, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Wake Forest Cardiac Rehabilitation Program	Medical	X	X	X	X	X	X				X			X		X		
Baptist House at Bethabara	Medical	X	X	X	X	X	X				X				X	X	X	X
Brannon's Family Care Home	Medical	X	X	X	X	X	X				X		X	X				X
Dogwood Family Care Home	Medical	X	X	X	X	X	X				X			X		X		X
Dushane Family Care Home #2	Medical	X	X	X	X	X	X				X				X	X		X
Hines Family Care Home	Medical	X	X	X	X	X	X				X			X		X		X
Hines Family Care Home #3	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Hines Family Care Home #4	Medical	X	X	X	X	X	X				X				X	X		
Hines Family Care Home #5	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Holly Haven	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Jack and Jeanie Family Care Home	Medical	X	X	X	X	X	X				X				X	X		
Jackson Family Care Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Liggins Family Care Home of Kernersville	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Moore's Retirement Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Parkview Family Care Home	Medical	X	X	X	X	X	X				X							X
Quality Professional MultiServices, LLC	Medical	X	X	X	X	X	X				X		X	X				X
Tender Love Family Care Home	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Village Trail	Medical	X	X	X	X	X	X				X					X		X
William's Family Care Home #3	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Williams Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Wolfe's Family Care Home	Medical	X	X	X	X	X	X				X			X	X	X		X
Advanced Home Care	Medical	X	X	X	X	X	X				X				X	X	X	X
Alpha Omega Health, Inc.	Medical	X	X	X	X	X	X				X				X	X		
American HomePatient	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Baptist Hospital Home Care	Medical	X	X	X	X	X	X				X				X	X		
Baptist Hospital Home Care	Medical	X	X	X	X	X	X				X				X	X		
Bayada Nurses Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Bayada Nurses, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
Carolina Care, LLC	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Coram Alternate Site Services, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
Crawford's Pointe Health Care Agency	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Easter Seals North Carolina - Winston-Salem	Medical	X	X	X	X	X	X				X		X	X			X	X
Eldercare of Winston-Salem	Medical	X	X	X	X	X	X				X				X	X		
Elite Health Care, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
FairWay Home Care	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Forsyth County DSS	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Forsyth Home Care	Medical	X	X	X	X	X	X				X		X	X			X	X
Gentiva Health Services	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Gentiva Health Services	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Griswold Special Care	Medical	X	X	X	X	X	X				X		X	X		X		X
Home Health Professionals	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Hospice & Palliative Care Center	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
In Home Care, Inc.	Medical	X	X	X	X	X	X				X		X	X				
Interim HealthCare of the Triad, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
J. L. Redford, Inc.	Medical	X	X	X	X	X	X				X					X		
Kelly Home Care Services, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Lincare, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Lowery's Family Care	Medical	X	X	X	X	X	X				X		X	X		X		X
LRW Home Care	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Maxim Healthcare Services, Inc.	Medical	X	X	X	X	X	X				X				X	X		X
Meriweather Home Nursing, Inc.	Medical	X	X	X	X	X	X				X				X	X		
Nursing Providers Incorporation	Medical	X	X	X	X	X	X				X					X		
Pediatric Services of America, Inc.	Medical	X	X	X	X	X	X				X		X	X			X	X
Personal Care Services, Ltd.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Piedmont HomeHealth Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
Quality Personal Care, Inc.	Medical	X	X	X	X	X	X				X			X			X	X
Retirement Home Care, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
RHA Health Services, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Senior Services, Inc.	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Shipman Family Care, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Springboard Care Services, Inc.	Medical	X	X	X	X	X	X				X				X	X		
Tar Heel Home Health	Medical	X	X	X	X	X	X				X				X	X	X	X
TEAMCARE, INC.	Medical	X	X	X	X	X	X				X				X	X	X	X
Tender Care, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Total Care, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Touch by Angels Home Healthcare, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
Trinity Healthcare of Winston Salem	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Visiting Angels of Winston Salem	Medical	X	X	X	X	X	X				X					X		
Alterra Clare Bridge of Winston-Salem	Medical	X	X	X	X	X	X				X				X	X		
Bradford Village East, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Bradford Village West, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Brighton Gardens of Winston-Salem	Medical	X	X	X	X	X	X				X				X	X		
Brookstone Terrace	Medical	X	X	X	X	X	X				X			X		X		X
C.R.T. - Golden Lamb Rest Home	Medical	X	X	X	X	X	X				X			X		X		X
Cambridge Hills of Clemmons	Medical	X	X	X	X	X	X				X				X	X		
Christian Care of Winston-Salem	Medical	X	X	X	X	X	X				X					X		
Clemmons Village	Medical	X	X	X	X	X	X				X				X	X		
Clemmons Village II	Medical	X	X	X	X	X	X				X				X	X		
Creekside Manor	Medical	X	X	X	X	X	X				X				X	X		
Elms at Tanglewood	Medical	X	X	X	X	X	X				X				X	X		
Forsyth Village	Medical	X	X	X	X	X	X				X					X	X	X
Heritage Woods	Medical	X	X	X	X	X	X				X				X	X	X	X
Homestead Hills Assisted Living	Medical	X	X	X	X	X	X				X			X		X		X
Kerner Ridge Assisted Living	Medical	X	X	X	X	X	X				X				X	X		
Meadowbrook Terrace/Winston-Salem	Medical	X	X	X	X	X	X				X					X		
New Beginnings Assisted Living Center	Medical	X	X	X	X	X	X				X			X	X	X		
Polo Ridge Assisted Living	Medical	X	X	X	X	X	X				X				X	X		
Reynolda Park	Medical	X	X	X	X	X	X				X				X	X		X
Salem House	Medical	X	X	X	X	X	X				X			X		X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Shuler Health Care Inc./Crane Villa	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Shuler Health Care Inc./Phillips Villa	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Shuler Health Care Inc./Pierce Villa	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Shuler Health Care Inc./Record Villa	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Shuler Health Care Inc./Storey Villa	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Southfork	Medical	X	X	X	X	X	X				X				X	X		
The Homestead	Medical	X	X	X	X	X	X				X					X		X
Vienna Village, Inc.	Medical	X	X	X	X	X	X				X							
Kate B. Reynolds Hospice Home	Medical	X	X	X	X	X	X				X				X	X		X
Amos Cottage Rehabilitation Hospital	Medical	X	X	X	X	X	X				X				X	X		X
Forsyth Memorial Hospital	Medical	X	X	X	X	X	X				X				X	X		X
Medical Park Hospital, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
SemperCare Hospital of Winston-Salem, Inc.	Medical	X	X	X	X	X	X				X				X	X		X
The North Carolina Baptist Hospitals, Incorporated	Medical	X	X	X	X	X	X				X				X	X	X	X
4 C's Program Inc. C-4 Site	Medical	X	X	X	X	X	X				X		X	X	X	X		X
4C's Program Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Addiction Recovery Care Association (ARCA)	Medical	X	X	X	X	X	X				X			X	X	X		
Adult Partial Hospitalization Program	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Aldersgate Cottage	Medical	X	X	X	X	X	X		X		X			X		X	X	X
Ardsley Street Program	Medical	X	X	X	X	X	X				X				X	X		
Babcock Home	Medical	X	X	X	X	X	X				X			X		X	X	X
Bailey Home	Medical	X	X	X	X	X	X				X					X		
Banner House	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Barnes Therapeutic Home	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Brenda Shelton Home	Medical	X	X	X	X	X	X				X					X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Brent Program	Medical	X	X	X	X	X	X				X				X	X		
Bristol Cottage	Medical	X	X	X	X	X	X		X		X			X		X	X	X
Butler Home	Medical	X	X	X	X	X	X				X				X	X		
C&W Alternative Family Living Facility	Medical	X	X	X	X	X	X				X				X	X		
C.R.E.S.T. Treatment Program	Medical	X	X	X	X	X	X	X			X		X	X		X		X
Carter Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
CDM Counseling and Consulting	Medical	X	X	X	X	X	X				X			X	X	X	X	X
CenterPoint Human Services	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Christian Home	Medical	X	X	X	X	X	X				X					X		
Cole Home	Medical	X	X	X	X	X	X				X					X		
Cooke Therapeutic Home	Medical	X	X	X	X	X	X				X					X		
Crepe Myrtle Home	Medical	X	X	X	X	X	X				X				X	X		
Davis Home	Medical	X	X	X	X	X	X				X				X	X	X	X
Epworth Cottage	Medical	X	X	X	X	X	X		X		X			X		X	X	X
First Step Develomental Independent Care Services,	Medical	X	X	X	X	X	X				X			X	X	X		X
Forsyth County Day Reporting Center	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Forsyth County ICF/MR Group Home	Medical	X	X	X	X	X	X				X		X	X				
Forsyth Group Home #1	Medical	X	X	X	X	X	X				X					X		X
Forsyth Group Home #2	Medical	X	X	X	X	X	X				X				X	X		
Friendship House	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Gales Program	Medical	X	X	X	X	X	X				X				X	X		
Glenn's Assessment and Counseling Service	Medical	X	X	X	X	X	X				X		X	X			X	X
Group Homes of Forsyth, Inc.- Ebert Street Home	Medical	X	X	X	X	X	X				X							
Group Homes of Forsyth, Inc.-Brandywine Road	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Group Homes of Forsyth, Inc.-Independence Road	Medical	X	X	X	X	X	X				X						X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Group Homes of Forsyth, Inc.-Pressman Drive Home	Medical	X	X	X	X	X	X				X					X		X
Group Homes of Forsyth, Inc.-Stockton Street Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Hason Home	Medical	X	X	X	X	X	X				X							
Hines Mental Health Home #1	Medical	X	X	X	X	X	X				X				X	X		
Hines Mental Health Home #2	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Hinkle House at Bethabara	Medical	X	X	X	X	X	X	X			X					X	X	X
Independence Place	Medical	X	X	X	X	X	X				X				X	X		
James and Linda Wright Home	Medical	X	X	X	X	X	X				X				X	X		
Jeffrey & Cheryl Morgan	Medical	X	X	X	X	X	X				X				X	X		
Judy's Group Home	Medical	X	X	X	X	X	X				X				X	X		
Juvenile Day Reporting Center	Medical	X	X	X	X	X	X				X				X	X		X
Kernersville Vocational Center	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Konnoak Group Home	Medical	X	X	X	X	X	X				X			X	X	X		X
Lawson Home	Medical	X	X	X	X	X	X				X					X		
Lifeskills	Medical	X	X	X	X	X	X				X		X	X		X		X
Mathews Home	Medical	X	X	X	X	X	X				X							
Michelle Wardlow Home	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Murray Home	Medical	X	X	X	X	X	X				X						X	X
Norma Jean Lewis Home	Medical	X	X	X	X	X	X				X			X		X		X
Oxford Cottage	Medical	X	X	X	X	X	X		X		X			X		X	X	X
Page Home	Medical	X	X	X	X	X	X				X			X	X	X		X
Parkfield	Medical	X	X	X	X	X	X				X				X	X		
Patterson Home	Medical	X	X	X	X	X	X				X							
Peacehaven Home	Medical	X	X	X	X	X	X				X							

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Raven Ridge Group Home	Medical	X	X	X	X	X	X		X		X		X	X	X	X		X
Rebecca Howell Home	Medical	X	X	X	X	X	X				X					X		
Renigar Place	Medical	X	X	X	X	X	X				X			X			X	X
Shelbia Wiley Home	Medical	X	X	X	X	X	X				X				X	X		
Step One	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Stepping Stones	Medical	X	X	X	X	X	X				X				X	X	X	X
Sturmer House	Medical	X	X	X	X	X	X				X			X		X		X
Summit House	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Tabitha Carter Therapeutic Home	Medical	X	X	X	X	X	X				X				X	X	X	X
The Arches-Horizons Residential Care Center	Medical	X	X	X	X	X	X				X				X	X		X
The Ashley House	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
The Atrium/The Respite Center	Medical	X	X	X	X	X	X				X				X	X		
The Children's Home/Day Treatment Program	Medical	X	X	X	X	X	X		X		X			X		X	X	X
The Enrichment Center	Medical	X	X	X	X	X	X				X		X	X				
The Fellowship Home	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Therapeutic Classroom	Medical	X	X	X	X	X	X				X		X	X			X	X
Tise Cottage	Medical	X	X	X	X	X	X		X		X			X		X	X	X
Twin City Counseling Center	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Twin City Counseling Center-Winston-Salem	Medical	X	X	X	X	X	X				X			X		X	X	X
UMAR-Clingman Home	Medical	X	X	X	X	X	X				X				X	X		
UMAR-Rider Group Home	Medical	X	X	X	X	X	X				X							X
UMAR-Waddell Group Home	Medical	X	X	X	X	X	X				X							X
Vaughn Home	Medical	X	X	X	X	X	X				X							
Westwind	Medical	X	X	X	X	X	X				X				X	X		
Wilson Smith Cottage	Medical	X	X	X	X	X	X				X					X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Winfrey Home	Medical	X	X	X	X	X	X				X					X		
YWCA-Hawley House	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Wake Forest University Baptist Behavioral Health, I	Medical	X	X	X	X	X	X				X				X	X		X
Arbor Acres United Methodist Retirement Community,	Medical	X	X	X	X	X	X				X			X				
Baptist Retirement Homes of North Carolina, Inc.	Medical	X	X	X	X	X	X				X			X		X	X	X
Blumenthal Jewish Home	Medical	X	X	X	X	X	X				X				X	X		
Brian Center Health & Retirement/Winston Salem	Medical	X	X	X	X	X	X				X						X	X
Britthaven Forsyth	Medical	X	X	X	X	X	X				X			X	X	X		
Britthaven of Kernersville	Medical	X	X	X	X	X	X				X			X		X		X
High Point Care Center	Medical	X	X	X	X	X	X				X	X			X	X		
Lutheran Home - Winston-Salem	Medical	X	X	X	X	X	X				X				X	X	X	X
Meadowbrook Manor of Clemmons	Medical	X	X	X	X	X	X				X			X	X	X		
Salemtowne	Medical	X	X	X	X	X	X				X						X	X
Silas Creek Manor	Medical	X	X	X	X	X	X				X				X	X		X
Springwood Care Center of Forsyth	Medical	X	X	X	X	X	X				X			X		X		X
The Nursing Center At Oak Summit	Medical	X	X	X	X	X	X				X			X	X	X		
The Oaks at Forsyth	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Winston-Salem Rehabilitation and Healthcare Center	Medical	X	X	X	X	X	X				X				X	X	X	X
Crossroads Healthcare Services	Medical	X	X	X	X	X	X				X				X	X		X
Gentiva Health Services	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Maxim Healthcare Services, Inc.	Medical	X	X	X	X	X	X				X				X	X		X
Nursefinders MedicalStaffing of Winston-Salem	Medical	X	X	X	X	X	X				X			X	X	X	X	X
RN's and Allied Health Associates + Allied Nurses.	Medical	X	X	X	X	X	X				X			X	X	X		X
Trinity HealthCare Staffing Group, Inc.	Medical	X	X	X	X	X	X				X			X		X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
U.S. Nursing Network	Medical	X	X	X	X	X	X				X				X	X		X
Rockingham County																		
ROCKINGHAM COUNTY EMERGENCY SERVICES-EMERGENCY OPERATIONS CENTER	EOC/Response	X	X	X	X	X	X				X				X	X		
ROCKINGHAM COUNTY 911 CENTER-ALTERNATE	EOC/Response	X	X	X	X	X	X				X				X	X		
Draper Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Draper Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X		X	X		X	X	X
Eden Fire Department	Fire/EMS	X	X	X	X	X	X				X		X	X				
Eden Fire Department 2	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Eden Fire Department 3	Fire/EMS	X	X	X	X	X	X				X		X	X		X	X	X
Eden Fire Department 4	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		X
Huntsville Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
Jacobs Creek Fire Tax District, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Leaksville Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Madison Fire Department	Fire/EMS	X	X	X	X	X	X				X			X	X	X		X
Mayodan Fire Department	Fire/EMS	X	X	X	X	X	X				X			X		X		X
Monroeton Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Monroeton Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
North Stoneyview Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X								
Northwest Rockingham County Fire Protection Association, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Oregon Hill Volunteer Fire District, Inc.	Fire/EMS	X	X	X	X	X	X				X							
Reidsville Fire Department	Fire/EMS	X	X	X	X	X	X				X			X			X	X
Reidsville Fire Department 2	Fire/EMS	X	X	X	X	X	X				X		X	X		X	X	X
Reidsville Fire Department 3	Fire/EMS	X	X	X	X	X	X				X			X	X	X		
Ruffin Volunteer Fire Department, Inc	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Shiloh Community Fire Protection Association, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Stoneville Fire Department	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
Volunteer Fire Department Of Bethany, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Volunteer Fire Department Of Bethany, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Wentworth Voluntary Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Williamsburg Fire Department and Rescue, Incorporated	Fire/EMS	X	X	X	X	X	X				X				X	X		
Yanceyville Road Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
MADISON-ROCKINGHAM RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
EDEN RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
ROCKINGHAM COUNTY EMERGENCY SERVICES	Fire/EMS	X	X	X	X	X	X				X				X	X		
REIDSVILLE RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X				X			X			X	X
ROCKINGHAM COUNTY SHERIFFS DEPARTMENT / ROCKINGHAM COUNTY JAIL	Police	X	X	X	X	X	X				X				X	X		
EDEN POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X		X
MAYODAN POLICE DEPARTMENT	Police	X	X	X	X	X	X				X			X	X	X	X	X
MADISON POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL TROOP D DISTRICT III	Police	X	X	X	X	X	X				X		X	X	X	X		
CITY OF REIDSVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X		X	X	X
STONEVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X			X	X	X	X	X
NORTH CAROLINA DIVISION OF PARKS - MAYO RIVER STATE PARK	Police	X	X	X	X	X	X				X			X	X	X	X	X
Bethany Elementary	School	X	X	X	X	X	X				X	X			X	X		
Dalton McMichael High	School	X	X	X	X	X	X				X				X	X		X
Western Rockingham Middle	School	X	X	X	X	X	X				X		X	X	X	X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Stoneville Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Rockingham County High	School	X	X	X	X	X	X				X				X	X		
Wentworth Elementary	School	X	X	X	X	X	X				X				X	X		
Williamsburg Elementary	School	X	X	X	X	X	X				X				X	X		
Central Elementary	School	X	X	X	X	X	X				X		X	X	X	X		X
Douglass Elementary	School	X	X	X	X	X	X				X			X				
Draper Elementary	School	X	X	X	X	X	X				X				X	X	X	X
J E Holmes Middle	School	X	X	X	X	X	X				X		X	X	X	X		X
John W Dillard Elementary	School	X	X	X	X	X	X				X		X	X	X	X		X
Lawsonville Ave Elem	School	X	X	X	X	X	X				X			X			X	X
LeaksvilleSpray Elementary	School	X	X	X	X	X	X				X		X	X		X		X
Monroeton Elementary	School	X	X	X	X	X	X				X				X	X		
John M Morehead High	School	X	X	X	X	X	X				X		X	X	X	X		X
Moss Street Elementary	School	X	X	X	X	X	X				X		X	X	X	X		X
New Vision Sch.of Math/Sci/Tec	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Reidsville High	School	X	X	X	X	X	X				X					X		
Reidsville Middle	School	X	X	X	X	X	X				X				X	X		
South End Elementary	School	X	X	X	X	X	X				X							X
Bethany Community Middle	School	X	X	X	X	X	X				X				X	X		
The SCORE Center	School	X	X	X	X	X	X				X				X	X		
Lincoln Elementary	School	X	X	X	X	X	X				X	X						
Rockingham County Middle	School	X	X	X	X	X	X				X	X			X	X		
Huntsville Elementary	School	X	X	X	X	X	X				X	X			X	X		
Rockingham Co Early College High	School	X	X	X	X	X	X				X				X	X		
Benaja Christian Academy	School	X	X	X	X	X	X				X				X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Community Baptist School	School	X	X	X	X	X	X				X				X	X		
Carolina Baptist Academy	School	X	X	X	X	X	X				X		X	X		X	X	X
Increase Learning Center	School	X	X	X	X	X	X				X			X			X	X
Shiloh Community School LLC	School	X	X	X	X	X	X				X			X	X	X	X	X
Oak Level Baptist Academy	School	X	X	X	X	X	X				X							
Tribe of Judah of NC INC	School	X	X	X	X	X	X				X				X	X	X	X
Victory Christian Academy	School	X	X	X	X	X	X				X	X						
Freedom Academy	School	X	X	X	X	X	X				X				X	X		
True Gospel Christian School	School	X	X	X	X	X	X				X		X	X	X	X	X	X
ROCKINGHAM COMMUNITY COLLEGE	School	X	X	X	X	X	X				X				X	X		
Addie's Adult Care Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Beverly Rucker Family Care Home #5	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Beverly Rucker's Family Care Home	Medical	X	X	X	X	X	X				X							
Beverly Rucker's Family Care Home #2	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Beverly Rucker's Family Care Home #3	Medical	X	X	X	X	X	X				X			X	X	X		X
Beverly Rucker's Family Care Home #4	Medical	X	X	X	X	X	X				X	X						
Cornerstone Assisted Living	Medical	X	X	X	X	X	X				X			X				X
Daphne's Adult Care #5	Medical	X	X	X	X	X	X				X			X		X		X
Daphne's Adult Care Home Inc. #3	Medical	X	X	X	X	X	X				X				X	X		
Daphne's Adult Care Home Inc. #4	Medical	X	X	X	X	X	X				X				X	X		
Daphne's Adult Care Home, Inc. #1	Medical	X	X	X	X	X	X				X							
Daphne's Adult Care Home, Inc. #2	Medical	X	X	X	X	X	X				X				X	X		
Ellison's Family Care Home	Medical	X	X	X	X	X	X				X					X		
Ellison's Family Care Home #2	Medical	X	X	X	X	X	X				X				X	X		
Holt Family Care	Medical	X	X	X	X	X	X				X			X				X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Kellam's Home	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Lawson Family Care Home #2	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Leaksville Rest Home	Medical	X	X	X	X	X	X				X			X				
Leaksville Rest Home #2	Medical	X	X	X	X	X	X				X			X				
Mark's Family Care Home #1	Medical	X	X	X	X	X	X				X				X	X		
Mark's Family Care Home #2	Medical	X	X	X	X	X	X				X				X	X		
Nancy O. Turner Family Care Home I	Medical	X	X	X	X	X	X				X				X	X	X	X
Nancy O. Turner Family Care Home II	Medical	X	X	X	X	X	X				X				X	X	X	X
Oakwood Family Care Home	Medical	X	X	X	X	X	X				X				X	X		
Oakwood Family Care Home #2	Medical	X	X	X	X	X	X				X				X	X		
Pierce's Family Care Home	Medical	X	X	X	X	X	X	X			X		X	X	X	X	X	X
Pritchett's Family Care	Medical	X	X	X	X	X	X				X		X	X		X	X	X
The East Adult Care Home #1	Medical	X	X	X	X	X	X				X					X		
The East Adult Care Home #2	Medical	X	X	X	X	X	X				X					X		
Turner's Family Care Home	Medical	X	X	X	X	X	X				X				X	X		X
CareFocus	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Continuum Home Care of Madison	Medical	X	X	X	X	X	X				X	X						
Rockingham County Council On Aging, Inc.	Medical	X	X	X	X	X	X				X			X			X	X
Shipman Family Care, Inc.	Medical	X	X	X	X	X	X				X			X		X		
Unified Home Care, LLC	Medical	X	X	X	X	X	X				X	X			X	X		
Branchwood Home	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Carolina House of Reidsville	Medical	X	X	X	X	X	X				X		X	X	X	X		
Eden Estates	Medical	X	X	X	X	X	X				X			X	X	X		
Highgrove Long Term Care Center,Inc	Medical	X	X	X	X	X	X				X			X		X	X	X
Moyer's Rest Home	Medical	X	X	X	X	X	X				X				X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Pine Forrest Home for the Aged	Medical	X	X	X	X	X	X				X			X		X	X	X
Hospice of Rockingham County, Inc.	Medical	X	X	X	X	X	X				X				X	X		
Annie Penn Hospital	Medical	X	X	X	X	X	X				X			X			X	X
Morehead Memorial Hospital	Medical	X	X	X	X	X	X				X			X	X	X		
ARC #3	Medical	X	X	X	X	X	X				X					X		X
ARC #4	Medical	X	X	X	X	X	X				X			X	X	X		
Bibee Home	Medical	X	X	X	X	X	X				X			X	X	X		
Carolyn Carter and Associates, Inc.	Medical	X	X	X	X	X	X				X			X			X	X
Cedar Place	Medical	X	X	X	X	X	X				X			X				
Challenges #2	Medical	X	X	X	X	X	X				X					X		
Challenges Group Home	Medical	X	X	X	X	X	X				X				X	X		
Daystar Group Home # 1	Medical	X	X	X	X	X	X				X					X		
Daystar Group Home #5	Medical	X	X	X	X	X	X				X			X				
Daystar Group Home 2	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Daystar Group Home 3	Medical	X	X	X	X	X	X				X			X				
Daystar Group Home 4	Medical	X	X	X	X	X	X				X					X		
Ellis Broadus	Medical	X	X	X	X	X	X				X					X		
Greycliff House	Medical	X	X	X	X	X	X				X				X	X	X	X
Hodgkins Substance Abuse Services	Medical	X	X	X	X	X	X				X			X	X	X		
Jerry's Place	Medical	X	X	X	X	X	X				X			X				
Life Changes Counseling	Medical	X	X	X	X	X	X				X				X	X		
Life Changes Counseling	Medical	X	X	X	X	X	X				X				X	X		
Life Turn	Medical	X	X	X	X	X	X				X				X	X		
Manley Street Home	Medical	X	X	X	X	X	X				X		X	X				X
New Life Clubhouse	Medical	X	X	X	X	X	X				X				X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Norman Street	Medical	X	X	X	X	X	X				X			X	X	X		X
Red Clay Road Supervised Living	Medical	X	X	X	X	X	X				X				X	X		
Remmsco Men's Halfway House	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Remmsco Women's House	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Rockingham ARC # 6	Medical	X	X	X	X	X	X				X			X	X	X		
Rockingham ARC #1	Medical	X	X	X	X	X	X				X			X				X
Rockingham ARC #2	Medical	X	X	X	X	X	X				X				X	X		
Rockingham ARC #5	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Rockingham County Area MH/DD/SAS	Medical	X	X	X	X	X	X				X				X	X		
Rockingham Family Health Psychological & Counseling	Medical	X	X	X	X	X	X				X						X	X
Rockingham Opportunities Corporation	Medical	X	X	X	X	X	X				X				X	X		
Rouse's Group Home #6	Medical	X	X	X	X	X	X				X				X	X		
Rouse's Group Homes	Medical	X	X	X	X	X	X				X				X	X		
Second Street	Medical	X	X	X	X	X	X				X			X				
Thomas Therapeutic Home	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Visions Adolescence Care Facility	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Webb Home	Medical	X	X	X	X	X	X				X			X	X	X		
Westerly Park Home	Medical	X	X	X	X	X	X				X			X				
Youth Haven Services, Inc	Medical	X	X	X	X	X	X				X				X	X		
Avante at Reidsville	Medical	X	X	X	X	X	X				X			X			X	X
Brian Center Health and Rehabilitation/Eden	Medical	X	X	X	X	X	X				X	X						
Britthaven of Madison	Medical	X	X	X	X	X	X				X	X						
Stokes County																		
STOKES COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X				X				X	X		
City Of King Fire Department	Fire/EMS	X	X	X	X	X	X				X		X	X			X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Danbury Volunteer Fire Department and Rescue Squad, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Double Creek Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Francisco Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Lawsonville Volunteer Fire & Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Northeast Stokes Volunteer Fire Department and Rescue Squad, Incorporated	Fire/EMS	X	X	X	X	X	X			X					X	X		
South Stokes Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X				X				X	X		
South Stokes Volunteer Fire Department 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Stokes-Rockingham Volunteer Fire Department and Rescue Squad, Inc.	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Stokes-Rockingham Volunteer Fire Department and Rescue Squad, Inc. 2	Fire/EMS	X	X	X	X	X	X				X	X			X	X		
The Pinnacle Volunteer Fire and Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X				X					X	X	X
The Sauratown Volunteer Fire Department, Incorporated	Fire/EMS	X	X	X	X	X	X				X	X			X	X		
Traphill Volunteer Fire Department, Inc. 3	Fire/EMS	X	X	X	X	X	X				X					X		
Walnut Cove Volunteer Fire Department and Rescue Squad, Incorporated	Fire/EMS	X	X	X	X	X	X				X				X	X		X
STOKES COUNTY EMERGENCY MEDICAL SERVICES - UNIT 3 AND 4	Fire/EMS	X	X	X	X	X	X				X					X	X	X
STOKES COUNTY EMERGENCY MEDICAL SERVICES - UNIT 1	Fire/EMS	X	X	X	X	X	X				X				X	X		X
STOKES COUNTY EMERGENCY MEDICAL SERVICES - UNIT 5	Fire/EMS	X	X	X	X	X	X				X				X	X		
STOKES COUNTY SHERIFFS DEPARTMENT	Police	X	X	X	X	X	X				X	X			X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
NORTH CAROLINA STATE HIGHWAY PATROL TROOP E DISTRICT IV - SUBSTATION	Police	X	X	X	X	X	X				X	X					X	X
HANGING ROCK STATE PARK - RANGER STATION	Police	X	X	X	X	X	X				X							
WALNUT COVE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X				X	X	X	X
KING POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X			X	X
Chestnut Grove Middle	School	X	X	X	X	X	X				X							
Mount Olive Elementary	School	X	X	X	X	X	X				X							
King Elementary	School	X	X	X	X	X	X				X			X			X	X
Pinnacle Elementary	School	X	X	X	X	X	X				X					X	X	X
Francisco Elementary	School	X	X	X	X	X	X			X					X	X		
Germanton Elementary	School	X	X	X	X	X	X				X				X	X		
South Stokes High	School	X	X	X	X	X	X				X					X		
Lawsonville Elementary	School	X	X	X	X	X	X			X		X			X	X		
North Stokes High	School	X	X	X	X	X	X			X						X		
Nancy Reynolds Elementary	School	X	X	X	X	X	X			X					X	X		
Pine Hall Elementary	School	X	X	X	X	X	X				X			X		X	X	X
Sandy Ridge Elementary	School	X	X	X	X	X	X			X					X	X		
Southeastern Stokes Middle	School	X	X	X	X	X	X				X				X	X		
London Elementary	School	X	X	X	X	X	X				X				X	X		X
Walnut Cove Elementary	School	X	X	X	X	X	X				X				X	X		
West Stokes High	School	X	X	X	X	X	X				X							
Meadowbrook Academy	School	X	X	X	X	X	X				X				X	X		
Piney Grove Middle	School	X	X	X	X	X	X			X					X	X		
Stokes Early College High	School	X	X	X	X	X	X				X				X	X		
Poplar Springs Elementary	School	X	X	X	X	X	X				X				X	X		
King Family Ministries Sch.	School	X	X	X	X	X	X			X								

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Calvary Christian School	School	X	X	X	X	X	X				X				X	X		X
Living Word Christian Academy	School	X	X	X	X	X	X				X			X	X	X		
Overby Rest Home	Medical	X	X	X	X	X	X				X							
Health Services Personnel, Inc.	Medical	X	X	X	X	X	X				X						X	X
Stokes County Department of Social Services	Medical	X	X	X	X	X	X				X				X	X		
Stokes County HHA	Medical	X	X	X	X	X	X				X				X	X		
Tar Heel Home Health	Medical	X	X	X	X	X	X				X				X	X		
Graceland Living Center I	Medical	X	X	X	X	X	X				X					X		
Graceland Living Center II	Medical	X	X	X	X	X	X				X					X		
Mountain Valley Living Center	Medical	X	X	X	X	X	X				X				X	X		
Rose Tara Plantation, Inc.	Medical	X	X	X	X	X	X				X			X	X	X		X
Walnut Ridge Assisted Living	Medical	X	X	X	X	X	X				X				X	X		X
Hospice of Stokes County	Medical	X	X	X	X	X	X				X	X			X	X		
Stokes-Reynolds Memorial Hospital, Inc.	Medical	X	X	X	X	X	X				X	X			X	X		
Group Homes of Forsyth, Inc.-McGee Court Home	Medical	X	X	X	X	X	X				X				X	X		X
King Substance Abuse Counseling	Medical	X	X	X	X	X	X				X			X	X	X		
Pinecrest School	Medical	X	X	X	X	X	X				X				X	X		
Pinnacle Homes #1	Medical	X	X	X	X	X	X				X					X		
Pinnacle Homes II	Medical	X	X	X	X	X	X				X					X		
Serendipity House	Medical	X	X	X	X	X	X				X				X	X	X	X
Stokes County ICF/MR Group Home	Medical	X	X	X	X	X	X				X			X		X	X	X
Stokes Medical Center Park	Medical	X	X	X	X	X	X				X							X
Stokes Opportunity Center	Medical	X	X	X	X	X	X				X				X	X		
Stokes-Reynolds Memorial Hospital	Medical	X	X	X	X	X	X				X	X			X	X		
Universal Health Care/King	Medical	X	X	X	X	X	X				X		X	X		X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Village Care of King	Medical	X	X	X	X	X	X				X			X	X	X		
Walnut Cove Healthcare Center	Medical	X	X	X	X	X	X				X				X	X		X
Surry County																		
SURRY COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X			X				X	X	X	X	X
Ararat Volunteer Fire Department, Incorporated	Fire/EMS	X	X	X	X	X	X			X							X	X
Bannertown Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Bannertown Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
C. C. Camp Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
C. C. Camp Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Central Surry Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Central Surry Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Dobson Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Elkin Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Four-way Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Four-way Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Franklin Community Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Franklin Community Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Jot-Um-Down Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X						X		
Mount Airy Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Mount Airy Fire Department 2	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Mountain Park Volunteer Fire Department, Incorporated	Fire/EMS	X	X	X	X	X	X			X								
Pilot Knob Volunteer Fire Department, Incorporated	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Pine Ridge Volunteer Fire Department, Incorporated	Fire/EMS	X	X	X	X	X	X			X					X	X		
Shoals Volunteer Fire District, Inc.	Fire/EMS	X	X	X	X	X	X				X	X						
Skull Camp Volunteer Fire Department, Incorporated	Fire/EMS	X	X	X	X	X	X			X					X	X		
Skull Camp Volunteer Fire Department, Incorporated 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Skull Camp Volunteer Fire Department, Incorporated 3	Fire/EMS	X	X	X	X	X	X			X								
South Surry Volunteer Fire Dept., Inc.	Fire/EMS	X	X	X	X	X	X			X								
South Surry Volunteer Fire Dept., Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
South Surry Volunteer Fire Dept., Inc. 3	Fire/EMS	X	X	X	X	X	X			X					X	X		
Westfield Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
White Plains Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
SURRY COUNTY EMERGENCY SERVICES STATION 4	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
SURRY COUNTY EMERGENCY SERVICES STATION 5	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
SURRY COUNTY EMERGENCY SERVICES STATION 3	Fire/EMS	X	X	X	X	X	X			X					X	X		
MOUNT AIRY RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
SURRY COUNTY EMERGENCY SERVICES STATION 2	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
ELKIN RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X			X					X	X		
DOBSON RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
PILOT MOUNTAIN RESCUE SQUAD AND EMERGENCY MEDICAL SERVICES INCORPORATED	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
PILOT MOUNTAIN POLICE DEPARTMENT	Police	X	X	X	X	X	X				X			X	X	X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL TROOP E DISTRICT V - SUBSTATION	Police	X	X	X	X	X	X			X		X	X	X	X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
NORTH CAROLINA STATE HIGHWAY PATROL TROOP E DISTRICT V	Police	X	X	X	X	X	X			X					X	X		
SURRY COMMUNITY COLLEGE CAMPUS POLICE	Police	X	X	X	X	X	X			X				X	X	X		
PILOT MOUNTAIN STATE PARK - RANGER STATION	Police	X	X	X	X	X	X				X				X	X		
SURRY COUNTY SHERIFFS DEPARTMENT / SURRY COUNTY JAIL	Police	X	X	X	X	X	X			X				X	X	X		
DOBSON POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X		
MOUNT AIRY POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
ELKIN POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
Central Middle	School	X	X	X	X	X	X			X						X		
Dobson Elementary	School	X	X	X	X	X	X			X				X	X	X		
Pilot Mountain Middle	School	X	X	X	X	X	X				X			X	X	X		X
Shoals Elementary	School	X	X	X	X	X	X				X							
Surry Central High	School	X	X	X	X	X	X			X				X	X	X		
Westfield Elementary	School	X	X	X	X	X	X			X					X	X		
Cedar Ridge Elementary	School	X	X	X	X	X	X			X								
Copeland Elementary	School	X	X	X	X	X	X			X					X	X		
Flat Rock Elementary	School	X	X	X	X	X	X			X					X	X		
Franklin Elementary	School	X	X	X	X	X	X			X						X		X
J Sam Gentry Middle	School	X	X	X	X	X	X			X					X	X		
Mountain Park Elementary	School	X	X	X	X	X	X			X								
North Surry High	School	X	X	X	X	X	X			X					X	X		
White Plains Elementary	School	X	X	X	X	X	X			X					X	X		
Elkin Elementary	School	X	X	X	X	X	X			X				X	X	X	X	X
Elkin High	School	X	X	X	X	X	X			X				X	X	X	X	X
Mount Airy High	School	X	X	X	X	X	X			X			X	X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Mount Airy Middle	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Meadowview Middle	School	X	X	X	X	X	X			X		X						
Bruce H Tharrington Elem	School	X	X	X	X	X	X			X				X	X	X		X
Jones Elementary	School	X	X	X	X	X	X			X				X	X	X		
East Surry High	School	X	X	X	X	X	X			X						X		X
Surry Early College HS Design	School	X	X	X	X	X	X			X				X	X	X		
Elkin Middle	School	X	X	X	X	X	X			X				X	X	X	X	X
Millennium Charter Academy	School	X	X	X	X	X	X			X			X	X	X	X		X
Rockford Elementary	School	X	X	X	X	X	X			X						X		
EMunTalee	School	X	X	X	X	X	X			X								
Pilot Mountain Elementary	School	X	X	X	X	X	X			X				X	X	X		X
Yadkin Valley Community School	School	X	X	X	X	X	X	X		X			X	X	X	X	X	X
Salem Christian Academy	School	X	X	X	X	X	X			X					X	X		
White Plains Christian School	School	X	X	X	X	X	X			X					X	X		
SURRY COMMUNITY COLLEGE	School	X	X	X	X	X	X			X				X	X	X		
Heart-To-Heart	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Hugh Chatham Memorial Hospital Cardiac Rehab Progra	Medical	X	X	X	X	X	X			X				X	X	X		X
American Healthcare Services, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Behavioral Services, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Easter Seals North Carolina - Mt. Airy	Medical	X	X	X	X	X	X			X				X	X	X		X
Lincare	Medical	X	X	X	X	X	X			X					X	X		
Lincare, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Northern Home Care	Medical	X	X	X	X	X	X			X				X	X	X	X	X
RidgeCrest Retirement Community	Medical	X	X	X	X	X	X			X								
Senior Quality Care	Medical	X	X	X	X	X	X				X			X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Surry County DSS	Medical	X	X	X	X	X	X			X			X	X	X	X		
Surry County Friends of Seniors	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Surry County Home Health Agency	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Tender Touch Home Care, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Central Care, Inc.	Medical	X	X	X	X	X	X			X						X		
Colonial Care, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
David's House	Medical	X	X	X	X	X	X			X								
Dunmore Plantation	Medical	X	X	X	X	X	X			X				X	X	X		
Heritage Care of Elkin	Medical	X	X	X	X	X	X			X				X	X	X		
Ridge Crest Retirement, LLC	Medical	X	X	X	X	X	X			X								
Twelve Oaks	Medical	X	X	X	X	X	X			X				X		X		
Hospice of Surry County, Inc	Medical	X	X	X	X	X	X			X					X	X		
Hospice of Surry County, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Northern Hospice	Medical	X	X	X	X	X	X			X			X	X	X	X		
Hugh Chatham Memorial Hospital, Inc.	Medical	X	X	X	X	X	X			X				X	X	X		X
Northern Hospital of Surry County	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Crossroads Behavioral Healthcare-Elkin	Medical	X	X	X	X	X	X			X			X	X	X	X		
Crossroads Behavioral Healthcare-Riverside Drive	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Delphi Counseling Services	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Elkin Group Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Galax Trail Group Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Gilmer Street Group Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Hope Valley-Men's Division	Medical	X	X	X	X	X	X			X								
Hope Valley-Women's Division	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Hunter House	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Lebanon House	Medical	X	X	X	X	X	X			X				X	X	X		X
LifeSpan Enrichment	Medical	X	X	X	X	X	X			X						X		
Lifespan Ventures-Dobson	Medical	X	X	X	X	X	X			X		X				X		
Park Drive Group Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Peace Lily #1	Medical	X	X	X	X	X	X			X								
Peace Lily #2	Medical	X	X	X	X	X	X			X								
Professional Assessment & Counseling Center	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Professional Assessment and Counseling Center	Medical	X	X	X	X	X	X			X				X	X	X		
Spring Street Group Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Surry County Pretrial Release/Day Reporting Center	Medical	X	X	X	X	X	X			X				X	X	X		
Sydnor Street Group Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
The Way Station	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Central Continuing Care	Medical	X	X	X	X	X	X			X			X	X		X	X	X
Elkin Healthcare Center	Medical	X	X	X	X	X	X			X				X	X	X		X
Surry Community Nursing Center	Medical	X	X	X	X	X	X			X				X	X	X		X
Yadkin County																		
YADKIN COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X				X			X	X	X		
Arlington Fire and Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Arlington Fire and Rescue, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Austin Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Buck Shoals Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
Courtney Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
East Bend Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
East Bend Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Forbush Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Forbush Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
Jonesville Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
Lone Hickory Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X											
The Boonville Community Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
The Boonville Community Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
The Fall Creek Community Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
The Fall Creek Community Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
West Yadkin Volunteer Fire Dept., Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Yadkinville Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X			X	X	X		
YADKIN COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X				X			X	X	X		
YADKIN COUNTY RESCUE SQUAD AND EMERGENCY MEDICAL SERVICES INCORPORATED	Fire/EMS	X	X	X	X	X	X				X		X	X		X		
BOONVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X				X	X		
EAST BEND POLICE DEPARTMENT	Police	X	X	X	X	X	X				X				X	X		
JONESVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X		X
YADKIN COUNTY SHERIFFS DEPARTMENT	Police	X	X	X	X	X	X				X			X	X	X		
YADKINVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X				X			X	X	X		
Boonville Elementary	School	X	X	X	X	X	X				X				X	X		
East Bend Elementary	School	X	X	X	X	X	X				X				X	X		
West Yadkin Elementary	School	X	X	X	X	X	X				X				X	X		
Yadkinville Elementary	School	X	X	X	X	X	X				X			X	X	X		
Courtney Elementary	School	X	X	X	X	X	X				X							

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Fall Creek Elementary	School	X	X	X	X	X	X				X					X		
Forbush Elementary	School	X	X	X	X	X	X				X							
Forbush High	School	X	X	X	X	X	X				X							
Jonesville Elementary	School	X	X	X	X	X	X			X				X	X	X		X
Starmount High	School	X	X	X	X	X	X			X								
Yadkin Success Academy	School	X	X	X	X	X	X				X			X	X	X		
Yadkin Early College	School	X	X	X	X	X	X				X			X	X	X		
Forbush Middle	School	X	X	X	X	X	X				X							
Starmount Middle	School	X	X	X	X	X	X			X								
The Way Christian School	School	X	X	X	X	X	X		X	X					X	X		
Whispering Pines Chr. Day Sch.	School	X	X	X	X	X	X				X							
Faith Fellowship School	School	X	X	X	X	X	X				X		X	X	X	X		
Advantage Home Care, Inc.	Medical	X	X	X	X	X	X				X		X	X		X		
Care South, Inc.	Medical	X	X	X	X	X	X				X							
Carolina Companions, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Carolina Select Home Care, LLC	Medical	X	X	X	X	X	X			X					X	X		
Health Services Unlimited, Inc.	Medical	X	X	X	X	X	X				X			X	X	X		
Hospice of Yadkin County	Medical	X	X	X	X	X	X				X			X	X	X		
Quality Care Senior Services, Inc.	Medical	X	X	X	X	X	X				X				X	X		
Touched By Angels Home Healthcare, Inc.	Medical	X	X	X	X	X	X				X			X	X	X		
Yadkin County Council on Aging, Inc.	Medical	X	X	X	X	X	X				X			X	X	X		
Yadkin Valley Home Health	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Piedmont Village at Yadkinville	Medical	X	X	X	X	X	X				X				X	X		
Pinebrook Residential Center 1	Medical	X	X	X	X	X	X				X			X	X	X		
Pinebrook Residential Center 2	Medical	X	X	X	X	X	X				X			X	X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Tropical Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
The Magnolias Over Yadkin	Medical	X	X	X	X	X	X				X		X	X		X		
Hoots Memorial Hospital, Inc.	Medical	X	X	X	X	X	X				X		X	X		X		
Boonville Group Home	Medical	X	X	X	X	X	X				X				X	X		
Carolina Counseling and Court Services	Medical	X	X	X	X	X	X				X			X	X	X		
Crossroads Behavioral Healthcare-Boonville	Medical	X	X	X	X	X	X				X					X		
Crossroads Behavioral Healthcare-Yadkinville	Medical	X	X	X	X	X	X				X		X	X	X	X		
Muncus Road Home	Medical	X	X	X	X	X	X			X					X	X		X
Pathways	Medical	X	X	X	X	X	X			X					X	X		
Yadkin County Adult Developmental Vocational Progra	Medical	X	X	X	X	X	X				X					X		
Yadkin I	Medical	X	X	X	X	X	X				X				X	X		
Yadkin II & III	Medical	X	X	X	X	X	X				X				X	X		
Willowbrook Health Care Center	Medical	X	X	X	X	X	X				X		X	X	X	X		
Yadkin Nursing Care Center	Medical	X	X	X	X	X	X				X		X	X		X		