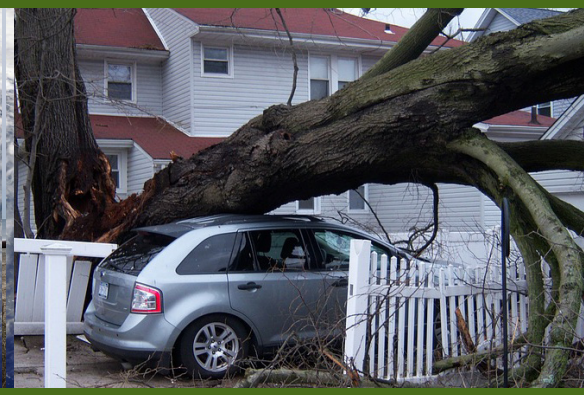
ENO-HAW
Regional Hazard Mitigation Plan



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1 INTRODUCTION

Section 1 provides a general introduction to hazard mitigation and an introduction to the Eno-Haw Regional Hazard Mitigation Plan. This section contains the following subsections:

1.1 Background
1.2 Purpose and Authority
1.3 Scope
1.4 References
1.5 Plan Organization

1.1 BACKGROUND

This document comprises a Hazard Mitigation Plan for the Eno-Haw region of North Carolina.

Each year in the United States, natural and human-caused hazards take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses incurred by insurance companies and non-governmental organizations are not reimbursed by tax dollars. Many natural hazards are predictable, and much of the damage caused by hazard events can be reduced or even eliminated.

Hazards are a natural part of the environment that will inevitably continue to occur, but there is much we can do to minimize their impacts on our communities and prevent them from resulting in disasters. Every community faces different hazards, has different resources to draw upon in combating problems, and has different interests that influence the solutions to those problems. Because there are many ways to deal with hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of hazards while accounting for the unique character of a community.

A well-prepared hazard mitigation plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity. This plan provides a framework for all interested parties to work together toward mitigation. It establishes the vision and guiding principles for reducing hazard risk and proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

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) to invoke new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for state and local 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 government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP), the Building Resilient Infrastructure and Communities (BRIC), and the Flood Mitigation Assistance (FMA) Program, all of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

This plan was prepared in coordination with FEMA Region 4 and the North Carolina Division of Emergency Management (NCEM) to ensure that it meets all applicable federal and state planning requirements. A Local Mitigation Plan Review Tool, found in Appendix A, provides a summary of FEMA's current minimum standards of acceptability and notes the location within this plan where each planning requirement is met.

1.2 PURPOSE AND AUTHORITY

This plan was developed in a joint and cooperative manner by members of a Hazard Mitigation Planning Committee (HMPC) which included representatives of County, City, and Town departments, federal and state agencies, citizens, and other stakeholders. This plan will ensure all jurisdictions in the Eno-Haw region remain eligible for federal disaster assistance including the FEMA HMGP, BRIC, and FMA programs.

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

This plan will be adopted by each participating jurisdiction in accordance with standard local procedures. Copies of adoption resolutions are provided in Section 9 Plan Adoption.

1.3 SCOPE

This document comprises a Regional Hazard Mitigation Plan for the Eno-Haw region. The planning area includes all incorporated municipalities and unincorporated areas in the region. All participating jurisdictions are listed in Table 1.1.

Table 1.1 – Participating Jurisdictions in the Eno-Haw Regional Hazard Mitigation Plan

Alamance County	
City of Burlington	City of Graham
City of Mebane	Town of Elon
Town of Green Level	Town of Haw River
Town of Ossipee	Town of Swepsonville
Village of Alamance	
Durham County	
City of Durham	
Orange County	
Town of Carrboro	Town of Chapel Hill
Town of Hillsborough	
Person County	
City of Roxboro	

The Eno-Haw region followed the planning process prescribed by the FEMA, and this plan was developed under the guidance of an HMPC comprised of representatives of County, City, and Town departments; citizens; and other stakeholders. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to the planning area, assessed the planning area's vulnerability to these hazards, and examined each participating jurisdiction's capabilities in place to mitigate them. The plan evaluates and prioritizes hazards for the planning area using a Priority Risk Index, as determined through

the risk and vulnerability assessments. Hazards are categorized as “low,” “moderate,” or “high” priority, however, mitigation strategies are identified for all profiled hazards. The hazards profiled in this plan are:

- Dam Failure
- Drought
- Earthquake
- Excessive Heat
- Flooding
- Hurricane & Tropical Storm
- Landslide
- Severe Winter Weather
- Tornadoes & Thunderstorms
- Wildfire
- Civil Disturbance
- Critical Infrastructure Failure
- Cyber Threat
- Hazardous Substances
- Infectious Disease
- Radiological Emergency
- Terrorism / Mass Casualty

1.4 REFERENCES

The following FEMA guides and reference documents were used to prepare this document:

- FEMA 386-1: Getting Started: Building Support for Mitigation Planning. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January 2008.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013.
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.
- FEMA Hazard Mitigation Assistance Program and Policy Guide. July 30, 2024.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA. FP 206-21-0002. Local Mitigation Planning Policy Guide. April 19, 2023.
- FEMA. Local Mitigation Planning Handbook. May 2023.

Additional sources used in the development of this plan, including data compiled for the Hazard Identification and Risk Assessment, are listed in Appendix D.

1.5 PLAN ORGANIZATION

The Eno-Haw Regional Hazard Mitigation Plan is organized into the following sections:

- Section 1: Introduction
- Section 2: Planning Process
- Section 3: Planning Area Profile
- Section 4: Hazard Identification & Risk Assessment
- Section 5: Capability Assessment
- Section 6: Mitigation Strategy
- Section 7: Mitigation Action Plans
- Section 8: Plan Maintenance
- Section 9: Plan Adoption
- Appendix A: Local Plan Review Tool
- Appendix B: Planning Process Documentation
- Appendix C: Mitigation Alternatives
- Appendix D: References

2 PLANNING PROCESS

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): The plan shall include the following:

1) 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.

This section provides a review of the planning process followed for the development of the Eno-Haw Regional Hazard Mitigation Plan. It consists of the following subsections:

2.1 Purpose and Vision
2.2 History of Hazard Mitigation Planning
2.3 Preparing the Plan
2.4 Hazard Mitigation Planning Committee
2.5 Meetings and Workshops
2.6 Involving the Public
2.7 Outreach Efforts
2.8 Involving the Stakeholders
2.9 Documentation of Plan Progress

2.1 PURPOSE AND VISION

As defined by FEMA, “hazard mitigation” means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event. Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented.

The purpose of the Eno-Haw Regional Hazard Mitigation Plan is to identify, assess, and mitigate hazard risk to better protect the people and property within Alamance, Durham, Orange, and Person Counties from the effects of natural and human-caused hazards. This plan documents progress on existing hazard mitigation planning efforts, updates the previous plan to reflect current conditions in the Region including relevant hazards and vulnerabilities, increases public education and awareness about the plan and planning process, maintains grant eligibility for participating jurisdictions, maintains compliance with state and federal requirements for local hazard mitigation plans, and identifies and outlines strategies the Counties and participating jurisdictions will use to decrease vulnerability and increase resiliency.

During the development of the 2020 Eno-Haw Regional Hazard Mitigation Plan, the Hazard Mitigation Planning Committee (HMPC) met to discuss their vision for the planning area in terms of what the successful implementation of the plan would achieve, what outcomes the plan would generate, and what the Region would look like in five years. The resulting vision statement and key principles for hazard

mitigation, presented below, remain relevant to define and guide the planning process and the planning area's approach to hazard mitigation.

The Eno Haw Region will continue to build community resiliency through comprehensive, sustainable practices that identify and reduce risk to natural hazards in order to protect the health, safety, quality of life, environment and economy of the Alamance, Durham, Orange, and Person County area.

This vision is underpinned by the following key principles which describe how the Eno-Haw Region HMPC hopes to characterize the future of the community.

Resilience: The Eno-Haw Region will make socially, financially, and environmentally sustainable decisions to incorporate an all-hazards mitigation approach into existing planning frameworks, such as land use planning and capital improvements programming. In both pre-disaster and post-hazard periods, the Region will be adaptable and strategic in planning for reduced risk and greater resilience.

Coordination: Communities in the Eno-Haw Region will work within their own jurisdictions, throughout the region, and with regional neighbors to ensure that mitigation decisions are coordinated, resources are optimized, and planning decisions involve all the key parties.

Responsible: The Eno-Haw Region will take a strategic, all-hazards approach to mitigation in order to make fiscally responsible, practical decisions that maximize benefits. Communities will be good stewards of the Region's many environmental, historic, and cultural resources.

Efficient: The Eno-Haw Region communities and residents will be prepared for hazard events and ready to take timely and strategic action on post-event response and recovery efforts. Throughout preparedness, response, and recovery processes, the Region will recognize the importance of responsiveness to residents' needs and prioritize clear communication with residents.

2.2 WHAT'S CHANGED IN THE PLAN

This plan is an update to the 2020 Eno-Haw Regional Hazard Mitigation Plan, which included participation from Alamance, Durham, Orange, and Person counties and their incorporated jurisdictions. The previous plan was approved by FEMA on March 26, 2021.

This hazard mitigation plan update involved a comprehensive review and update of each section of the existing plans and an assessment of the success of the Counties and participating municipalities in evaluating, monitoring and implementing the mitigation strategy outlined in their existing plans. Only the information and data still valid from the existing plans was carried forward as applicable into this update. The following requirements were addressed during the development of this new regional plan update:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to inventories; and

— Incorporate new action recommendations or changes in action prioritization.

Section 4.2 provides a comparison of the hazards addressed in the 2023 State of North Carolina HMP, the 2020 Eno-Haw plan and provides the final decision made by the HMPC as to which hazards should be included in the updated 2025 Eno-Haw Regional Plan.

In addition to the specific changes in hazard analyses identified in Section 4.2, the following items were also addressed in this 2020 plan update:

— GIS was used, to the extent data allowed, to analyze the priority hazards as part of the vulnerability assessment.
— Assets at risk to identified hazards were identified by property type and values of properties based on current data in North Carolina's Emergency Management's IRISK Database.
— An updated discussion on the effects of climate change and other future conditions was included in each hazard profile in the risk assessment.
— The discussion on growth and development trends was enhanced utilizing 2022 American Community Survey data and current land use plans.
— An effort was made to provide underserved communities and vulnerable populations with opportunities to participate in and contribute to the plan update process. Engagement opportunities were provided through the public survey, the plan website, and stakeholder coordination.
— Enhanced public outreach and agency coordination efforts were conducted throughout the plan update process in order to meet the more rigorous requirements of the 2017 CRS Coordinator's Manual, in addition to DMA requirements.

2.3 PREPARING THE PLAN

The planning process for preparing the Eno-Haw Regional Hazard Mitigation Plan was based on DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1. Planning Process;
2. Risk Assessment;
3. Mitigation Strategy; and
4. Plan Maintenance.

Into this process, the planning consultant integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program; Building Resilient Infrastructure & Communities (BRIC) Program; Community Rating System; Flood Mitigation Assistance (FMA) Program; Severe Repetitive Loss Program; and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 2.1 shows how the 10-step CRS planning process aligns with the four phases of hazard mitigation planning pursuant to the Disaster Mitigation Act of 2000.

Table 2.1 – Mitigation Planning and CRS 10-Step Process Reference Table

DMA Process	CRS Process
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

DMA Process	CRS Process
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

In addition to meeting DMA and CRS requirements, this plan also meets the recommended steps for developing a Community Wildfire Protection Plan (CWPP). Table 2.2 below outlines the recommended CWPP process and the CRS step and sections of this plan that meet each step.

Table 2.2 – Community Wildfire Protection Plan Process Reference

CWPP Process	CRS Step	Fulfilling Plan Section
Convene decision makers	Step 1	Section 2 – HMPC
Involve Federal agencies	Step 3	Section 2 – Involving Stakeholders
Engage interested parties (such as community representatives)	Step 1, 2, and 3	Section 2 – HMPC, Involving the Public, Involving Stakeholders
Establish a community base map		Section 4 – Wildfire
Develop a community risk assessment, including fuel hazards, risk of wildfire occurrence, homes, business and essential infrastructure at risk, other community values at risk, local preparedness, and firefighting capability	Step 4 and 5	Section 4 – Wildfire Section 5 – Capability
Establish community hazard reduction priorities and recommendations to reduce structural ignitability	Step 6, 7, and 8	Section 6 – Mitigation Strategy Section 7 – Mitigation Action Plans
Develop an action plan and assessment strategy	Step 8 and 10	Section 7 – Mitigation Action Plans Section 8 – Plan Maintenance
Finalize the CWPP	Step 9	Section 9 – Plan Adoption

The process followed for the preparation of this plan, as outlined in Table 2.1 above, is as follows:

2.3.1 PHASE I – PLANNING PROCESS

Planning Step 1: Organize to Prepare the Plan

With the participating communities' commitment to participate in the DMA planning process, community officials worked to establish the framework and organization for development of the plan. An initial meeting was held with key community representatives to discuss the organizational aspects of the plan development process. The region's effort to reorganize and coordinate for the plan update was led by each County's emergency management director. Consultants from WSP assisted by leading the communities through the planning process and preparing the plan document.

Planning Step 2: Involve the Public

Public involvement in the development of the plan was sought using various methods, as detailed in Section 2.6.

Planning Step 3: Coordinate

The HMPC that was formed for the 2020 Eno-Haw Regional Hazard Mitigation Plan was reconvened for this plan update. Membership was updated where necessary to ensure each community had adequate representation from staff and stakeholders. More details on the HMPC are provided in Section 2.4. Stakeholder coordination was incorporated into the formation of the HMPC and was sought through additional outreach methods. These efforts are detailed in Section 2.8 and documentation of additional stakeholder outreach is provided in Appendix B.

Coordination with Other Community Planning Efforts and Hazard Mitigation Activities

In addition to stakeholder involvement, coordination with other community planning efforts was also seen as paramount to the success of this plan. Mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. The Eno-Haw region's participating jurisdictions use a variety of planning mechanisms, such as comprehensive plans, subdivision regulations, building codes, and ordinances to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. As detailed in Table 2.3, the development of this plan incorporated information from existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

These and other documents were reviewed and considered, as appropriate, during the collection of data to support the planning process and plan development. Data from these sources was incorporated into the hazard identification and risk assessment, vulnerability assessment, and was used in determining the capability of each jurisdiction to implement certain mitigation strategies. The Hazard Identification and Risk Assessment can be found in Section 4 and the Capability Assessment can be found in Section 5.

Table 2.3 – Summary of Existing Studies and Plans Reviewed

Resource Referenced	Use in this Plan
Local Comprehensive Plans (see Section 3 for specific plans referenced)	Local comprehensive plans were referenced in the Planning Area Profile in Section 3. Comprehensive plans were also incorporated into Mitigation Action Plans where applicable in Section 7 and referenced in the Capability Assessment in Section 5.
Local Ordinances (Flood Damage Prevention Ordinances, Subdivision Ordinances, Zoning Ordinances, etc)	Local ordinances were referenced in the Capability Assessment in Section 5 and where applicable for updates or enforcement in Mitigation Action Plans in Section 7.
Alamance County and Incorporated Areas Flood Insurance Study (FIS), Revised 11/17/2017; Durham County and Incorporated Areas FIS, Revised 10/19/2018 & 07/19/2022; Orange County and Incorporated Areas FIS, Revised 10/19/2018 & 07/19/2022; Person County and Incorporated Areas FIS, Revised 12/06/2019;	The FIS reports were referenced in the preparation of flood hazard profile in Section 4.

Resource Referenced	Use in this Plan
Triangle Regional Resilience Partnership Resilience Assessment	The Technical Report was used in the preparation of the HIRA in Section 4 and reviewed for the development of the Mitigation Strategy in Sections 6 and 7.
Eno-Haw Regional Hazard Mitigation Plan, 2020;	The previous plans were referenced in compiling the Planning Area Profile in Section 3, the Hazard Identification and Risk Assessment in Section 4, and in reporting on implementation status and developing the Mitigation Action Plans in Section 2 and Section 7, respectively.
North Carolina State Hazard Mitigation Plan, 2023	The state hazard mitigation plan was primarily referenced in compiling the Hazard Identification and Risk Assessment in Section 4.

2.3.2 PHASE II – RISK ASSESSMENT

Planning Steps 4 and 5: Identify/Assess the Hazard and Assess the Problem

The HMPC completed a comprehensive effort to identify, document, and profile all hazards that have, or could have, an impact on the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A draft of the risk and vulnerability assessment was made available on the plan website for the HMPC, stakeholders, and the public to review and comment.

The HMPC also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Section 4 Risk Assessment.

2.3.3 PHASE III – MITIGATION STRATEGY

Planning Steps 6 and 7: Set Goals and Review Possible Activities

WSP facilitated a discussion with the HMPC to review and revise the planning goals and objectives and a comprehensive range of mitigation alternatives. The HMPC also discussed a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Section 6 Mitigation Strategy.

Planning Step 8: Draft an Action Plan

A complete first draft of the plan was prepared based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7. This draft was shared for HMPC, stakeholder, and public review and comment via the plan website. HMPC, public, and stakeholder comments were integrated into the final draft for NCEM and FEMA Region 4 to review and approve, contingent upon final adoption by the Counties and their participating jurisdictions.

2.3.4 PHASE IV – PLAN MAINTENANCE

Planning Step 9: Adopt the Plan

To secure buy-in and officially implement the plan, the plan will be reviewed and adopted by all participating jurisdictions. Resolutions will be provided in Section 9 Plan Adoption.

Planning Step 10: Implement, Evaluate and Revise the Plan

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. Up to this point in the planning process, the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Section 8 Plan Maintenance provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The Section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

2.4 HAZARD MITIGATION PLANNING COMMITTEE

The HMPC guided the development of this hazard mitigation plan. The Committee's representatives included representatives of County, City, and Town departments, federal and state agencies, citizens, and other stakeholders.

To form the planning committee, the County Emergency Managers coordinated with County, City, and Town officials to designate representatives for each jurisdiction. Each community was asked to designate a primary and secondary contact for the HMPC. Communities were also asked to identify local stakeholder representatives to participate on the HMPC alongside the County, City, and Town officials to improve the integration of stakeholder input into the plan.

Table 2.4 lists the membership of the HMPC, the agencies and jurisdictions that members represented, and members' attendance at meetings. Many of these representatives were involved in the development of the 2020 Hazard Mitigation Plan and have since participated in regular plan reviews and maintenance. For this plan update, an effort was made to involve additional stakeholders who could represent or coordinate with underserved communities and vulnerable populations.

Table 2.4 – Hazard Mitigation Planning Committee

Jurisdiction	Representative	Agency	Position/Title or *Stakeholder	HMPC Meeting Attendance			
				Mtg.1	Mtg.2	Mtg.3	Mtg.4
Alamance County	Chrisopher Saul	Alamance County	Emergency Management Coordinator	✓	✓	✓	✓
Alamance County	Mandy Shields	American Red Cross North Carolina Region	Resident/Stakeholder*				
City of Burlington	Kevin Turner	City of Burlington	Emergency Management Coordinator	✓	✓	✓	✓
Town of Elon	Landon Massey	Town of Elon	Fire Chief	✓	✓		
Town of Elon	Lori Oakley	Town of Elon	Planning Director	✓	✓	✓	✓
Town of Elon	Isabell Cooper	Town Elon	Planner	✓	✓	✓	✓
City of Graham	Tommy Cole	City of Graham	Fire Chief	✓			
City of Graham	Cameron West	City of Graham	Planning Director		✓	✓	
Town of Green Level	Barret Brown	Town of Green Level	Town Administrator			✓	
Town of Green Level	A.J. Simmons	Town of Green Level	Public Works Director		✓	✓	
City of Mebane	John Wellons	City of Mebane	Fire Chief	✓		✓	
City of Mebane	Ashley Ownbey	City of Mebane	Planning Officer	✓	✓		✓
City of Mebane	Kyle Smith	City of Mebane	Public Works Director	✓	✓		
Durham County	Ryan Eaves	Durham County Stormwater & Erosion Control Division	Division Manager	✓	✓	✓	✓
Durham County	McKenzie Bradshaw	Durham County Stormwater & Erosion Control Division	Stormwater Manager	✓	✓		
Durham County	Jessica Goodstein	Durham County Stormwater & Erosion Control Division	Stormwater Technician	✓			✓
Durham County	Elizabeth Schroeder	Durham Emergency Management	Division Chief of Emergency Management	✓			
Durham County	Jinizha Johnson	Durham Emergency Management	All Hazards Planner	✓	✓	✓	✓
Durham County	Nathan Sanders	Durham Emergency Management	Deputy Chief	✓			
Durham County	Thomas Verrault	Durham Emergency Management	HSSA Coordinator	✓	✓	✓	✓
Durham County	Chloe Hallberg	Duke University	Resident/Stakeholder*		✓		
Durham County	Ray Trapp	Duke Energy	Resident/Stakeholder*	✓	✓		
City of Durham	Graham Summerson	Durham Stormwater Division	Principal Engineer	✓	✓	✓	✓

Jurisdiction	Representative	Agency	Position/Title or *Stakeholder	HMPC Meeting Attendance			
				Mtg.1	Mtg.2	Mtg.3	Mtg.4
City of Durham	Kyle Taylor	Durham City-County Planning	Business Services Manager	✓	✓	✓	
City of Durham	Danial Cremeans	Durham Fire Operations	Division Chief of Special Operations	✓		✓	
City of Durham	Benjamin Phillips	Durham Water Resources	SR Emergency Operations Analyst	✓	✓	✓	
City of Durham	Julianne Patterson	Preservation Durham	Resident/Stakeholder*				
City of Durham	Blake Halsey	Durham Public Schools	Resident/Stakeholder*				
City of Durham	Chelsea Helton	Duke University	Resident/Stakeholder*	✓	✓	✓	
City of Durham	Kendra Ferrell	Duke University Health	Resident/Stakeholder*		✓	✓	
City of Durham	Kim Livingston	Eno River Association	Resident/Stakeholder*		✓		
City of Durham	Reema Garabadu	Eno River Association	Resident/Stakeholder*				✓
Orange County	Hannah Tuckman	Orange County Emergency Management	Emergency Management Planner	✓	✓	✓	✓
Orange County	Sarah Pickhardt	Orange County Emergency Management	Division Chief of Emergency Management	✓		✓	
Orange County	Amy Eckberg	Orange County Manager's Office	Sustainability Program Manager	✓	✓	✓	
Orange County	Ian Fowler	Orange County Emergency Management	Deputy EM Coordinator	✓		✓	
Orange County	Crystal Donaldson	University of North Carolina	Resident/Stakeholder*		✓	✓	✓
Orange County	Patrick Mallett	Orange County Planning and Zoning	Deputy Director of Development Services	✓			
Orange County	Chris Sandt	Erosion Control, Stormwater & Engineering	County Engineer	✓	✓	✓	
Orange County	Wendy Calvin	CERT Council	Resident/Stakeholder*				
Orange County	Sweetly Sanders	American Red Cross	Resident/Stakeholder*		✓		
Orange County	Danielle Stone	American Red Cross	Resident/Stakeholder*				
Orange County	Grant Smith	American Red Cross	Resident/Stakeholder*	✓	✓		
Orange County	Crystal Kelley	Family Success Alliance	Resident/Stakeholder*				
Orange County	David Marsee	Central Carolina Healthcare Preparedness Coalition	Resident/Stakeholder*			✓	
Town of Chapel Hill	Tanner Deisch	Chapel Hill Emergency Management	Deputy Coordinator of Emergency Management	✓		✓	✓

Jurisdiction	Representative	Agency	Position/Title or *Stakeholder	HMPC Meeting Attendance			
				Mtg.1	Mtg.2	Mtg.3	Mtg.4
Town of Chapel Hill	Chris Roberts	Chapel Hill Public Works	Manager of Engineering & Infrastructure	✓	✓		
Town of Chapel Hill	Sue Burke	Chapel Hill Public Works	Stormwater Manager	✓		✓	✓
Town of Chapel Hill	John Richardson	Chapel Hill Sustainability and Resilience Office	Community Resilience Officer	✓	✓	✓	✓
Town of Chapel Hill	Pamela Schultz	Citizens Stormwater Advisory Board Member	Resident/Stakeholder*				
Town of Carrboro	Will Potter	Carrboro Fire Rescue Department	Fire Chief	✓	✓	✓	
Town of Carrboro	Martin Roupe	Carrboro Zoning & Inspections	Development Review Administrator	✓			✓
Town of Carrboro	Patricia McGuire[1]	Carrboro Planning	Planning Director	✓	✓		
Town of Carrboro	Christina Moon[1]	Carrboro Planning	Interim Planning Director			✓	
Town of Carrboro	Laura Janway	Carrboro Planning	Environmental Sustainability Coordinator	✓		✓	
Town of Hillsborough	Andy Simmons	Hillsborough Police Department	Police Major			✓	
Town of Hillsborough	Joseph Hoffheimer	Planning and Economic Development	Planner	✓	✓	✓	✓
Person County	Thomas Schwalenberg	Emergency Management Services	Director	✓			
Person County	Dorothy Stewart Yates	Sappony Tribe Council Chair	Resident/Stakeholder*				
Person County	Ronnie Jeffreys	Person County Veterans Council	Resident/Stakeholder*				
City of Roxboro	Lauren Johnson	Planning and Development	Planning Director	✓		✓	✓
Sappony Indian Tribe	Charlene Martin	Fiscal Officer	Resident/Stakeholder*				
Sappony Indian Tribe	Dorothy Stewart Yates	Chairperson	Resident/Stakeholder*				
Occaneechi Band of the Saponi Nation	Vickie Jeffries	Tribal Administrator	Resident/Stakeholder*				
Occaneechi Band of the Saponi Nation	W.A. Tony Hayes	Chairman	Resident/Stakeholder*				

*Asterisk indicates that the representative is a resident or outside stakeholder not affiliated with the local government

[1]Patricia McGuire vacated her position during the planning process and was replaced on the HMPC by Christina Moon.

Several of the jurisdictions elected to designate their respective county official to represent their jurisdiction on the HMPC, generally because they did not have the time or staff to be able to attend on their own. Although these members designated county officials to represent them at in-person meetings, each was still contacted throughout the planning process and participated by providing suggestions and comments on the plan and updates to mitigation actions and local capabilities via emails and phone conversations. These members are listed in Table 2.5 by jurisdiction.

Table 2.5 – Jurisdictions Designating County Representation on the HMPC

Jurisdiction	Representative	Agency	Position
Village of Alamance	Nick Farmerie	Village of Alamance	Town Manager
Town of Haw River	Sean Tencer	Town of Haw River	Town Manager
Town of Ossipee	Edward Lipscomb	Altamahaw-Ossipee Fire	Fire Chief
Town of Swepsonville	Steve Couturier	Swepsonville Fire	Fire Chief

The HMPC led the planning and decision-making efforts throughout the planning process; however, other staff from the participating communities were involved in an advisory role to provide input and local data, review plan drafts, update the status of their respective mitigation actions, and otherwise support the HMPC in this plan update. These were not members of the HMPC. Additional local staff that supported the HMPC are recognized in Table 2.6 below.

Table 2.6 – Additional Staff Supporting the Planning Process

Jurisdiction	Representative	Agency	Position/Title
Alamance County	Tony Logiduice	Alamance County Health Department	Health Director
Alamance County	Jonathan Hodges	Alamance County	Health Care Preparedness Coordinator/EM Planner
City of Burlington	Jamie Lawson	City of Burlington	Planning
City of Durham	Sara Young	Durham City-County Planning	Director
City of Durham	Mitra Goswami	Durham City-County Planning	Senior Engineer
Orange County	Cy Stober	Orange County Planning and Zoning	Planning and Inspections Director
Orange County	Taylor Perschau	Orange County Planning and Zoning	Planning and Zoning Manager
Orange County	Perdita Holtz	Orange County Planning and Zoning	Planning Systems Coordinator
Orange County	Ashley Moncado	Orange County Planning and Zoning	Planner III
Orange County	Alan Dorman	Orange County Asset Management Services	AMS Assistant Director
Orange County	Quintana Stewart	Orange County Health Department	Health Director
Orange County	Michael Rettie	Orange County Building Inspections	Chief Building Official
Orange County	Victoria Hudson	Orange County Health Department	Environmental Health Director
Town of Chapel Hill	Kelly Drayton	Chapel Hill Emergency Management	Emergency Management Coordinator
Town of Carrboro	Sam Blank	Carrboro Planning	Administrative Assistant
Town of Carrboro	Amy Armbruster	Town Manager's Office	Chief Sustainability Officer

Jurisdiction	Representative	Agency	Position/Title
Town of Hillsborough	Shannan Campbell	Planning and Economic Development	Planning and Economic Development Manager
Person County	Shawn Bradsher	Community Risk Reduction	Division Chief
Person County	Hannah Wilson	Emergency Management Services	Emergency Management

The formal HMPC meetings followed the 10 CRS Planning Steps. Agendas, minutes, and sign-in sheets for the HMPC meetings are included in Appendix B. The meeting dates and topics discussed are summarized in Section 2.5 Meetings and Workshops. All HMPC meetings were open to the public.

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC;
- Detail where within the planning area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For the Eno-Haw Regional HMPC, "participation" meant the following:

- Providing facilities for meetings;
- Attending and participating in the HMPC meetings;
- Collecting and providing requested data (as available);
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by local governing bodies.

Detailed summaries of HMPC meetings are provided under Section 2.5 Meetings and Workshops, including meeting dates, locations, and topics discussed. During the planning process, the HMPC members communicated through face-to-face meetings, email, and telephone conversations. This continued communication ensured that coordination was ongoing throughout the entire planning process despite the fact that not all HMPC members could be present at every meeting. Additionally, draft documents were distributed via the plan website so that the HMPC members could easily access and review them and provide comments.

2.5 MEETINGS AND WORKSHOPS

The preparation of this plan required a series of meetings and workshops for facilitating discussion, gaining consensus, and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the plan.

Table 2.7 summarizes the 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, completing the Local Capability Self-Assessment or 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 meetings are summarized in subsection 2.6.

Table 2.7 – Summary of HMPC Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
HMPC Mtg. #1 – Project Kickoff	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	September 19, 2024 3 p.m.	Whitted Building 300 West Tryon Street, Hillsborough
HMPC Mtg. #2	1) Review Draft Hazard Identification & Risk Assessment (HIRA)	December 9, 2024 10 a.m.	Microsoft Teams
HMPC Mtg. #3	1) Discuss changes in capability 2) Review and update plan goals and objectives 3) Report on status of actions from the 2020 plan 4) Discuss new mitigation action alternatives	February 11, 2025 10 a.m.	Microsoft Teams
HMPC Mtg. #4	1) Review the Draft Hazard Mitigation Plan 2) Solicit comments and feedback	April 3, 2025 10 a.m.	Microsoft Teams

2.6 INVOLVING THE PUBLIC

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

Public involvement in the development of the plan was sought using various methods including open public meetings, an interactive plan website, a public participation survey, and by making copies of draft plan documents available for public review online and at government offices. Additionally, all HMPC meetings were made open to the public.

All public meetings were advertised on the plan website and on local community websites, where possible. Copies of meeting announcements are provided in Appendix B. The public meetings held during the planning process are summarized in Table 2.8.

Table 2.8 – Summary of Public Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Explanation of mitigation 3) Review of the project schedule 4) Review of hazard identification	September 19, 2024 5 p.m.	Whitted Human Services Building, 300 West Tryon Street, Hillsborough
Public Meeting #2	1) Review "Draft" Hazard Mitigation Plan 2) Solicit comments and feedback	April 9, 2025 5 p.m.	Microsoft Teams

2.7 OUTREACH EFFORTS

The HMPC agreed to employ a variety of public outreach methods including established public information mechanisms and resources within the community. The table below details public outreach efforts employed during the preparation of this plan.

Table 2.9 – Public Outreach Efforts

Location	Date	Event/Message
Plan website	Ongoing	Meeting announcements, meeting materials, and description of hazards; contact information provided to request additional information and/or provide comments
Local community websites	September 2024	Public Meeting #1 announcements posted with summary of the plan purpose and process
Local community websites	September 2024, December 2024	Link to the plan website and public survey shared to expand reach
Public survey	September – December 2024	Survey hosted online and made available via shareable link
Plan website - HIRA draft	December 2024	Draft HIRA made available for review and comment online
Plan website - Draft Plan	April 2025	Full draft plan made available for review and comment online
Local community websites	April 2025	Public Meeting #2 announcements posted with request for comments on the draft plan

As detailed above, public involvement activities for this plan update included press releases, creation of a website for the plan, a public survey, and the collection of public and stakeholder comments on the draft plan. Documentation of these activities is provided in Appendix B.

A public outreach survey was made available in September 2024 and remained open for response until December 2024. The public survey requested public input into the Hazard Mitigation Plan planning process and the identification of mitigation activities to lessen the risk and impact of future hazard events. The survey is shown in Appendix B. The survey was available online on the plan website. In total, 144 responses were received via the online survey.

The following is a list of high-level summary results derived from survey responses:

— Responses were received from residents of all participating communities as well as individuals who live outside of the region but live or recreate in the region.

- 39% of people said they have experienced a hazard or disaster in the Eno-Haw region. However, 55% of respondents, moderately to highly concerned about future hazard events. Regardless of past experience, concern about hazard impacts are moderate; 45% of all respondents rated their concern at 4 or 5 out of 5.
- People were asked to rate the risk of each hazard identified in the region. Severe weather, extreme heat, and flood were rated the highest risk hazards. Earthquake, dam failure, and landslide were rated the lowest risk hazards.
- Regarding flood risk, 72% of people say their home is not located in a floodplain, and another 8% of people say their home is outside of the floodplain but they still experience flooding. Only 5% of respondents reported that their home was in a floodplain.
- 9% of respondents have flood insurance. Of those who do not have flood insurance (84%), 63% say that is because their home is elevated or otherwise protected.
- 47% of respondents have taken actions to protect their home or neighborhood from hazards. Reported actions include trimming trees, cleaning debris around property, cleaning gutters and drains, installing French drains, having a generator, and knowing evacuation routes.
- Almost 70% of respondents do not know which government office to contact for more information on hazard risks and how to reduce vulnerability.
- All mitigation categories were rated as important, with most ranked as 1 or 2 out of 6 on a scale where 1 is most important and 6 is least important. The most preferred categories were prevention, natural resource protection, and emergency services. 97 people responded with steps the local government could take to reduce hazard risk. These responses were shared with the HMPC to assist in identifying new mitigation actions.

Detailed survey results are provided in Appendix B.

2.8 INVOLVING THE STAKEHOLDERS

In addition to representatives of each participating jurisdiction, the Hazard Mitigation Planning Committee included a variety of stakeholders. Some residents and stakeholders were able to represent underserved communities and vulnerable populations. Stakeholders on the HMPC included representatives from the Duke University, Preservation Durham, University of North Carolina, American Red Cross, and local CERT and Stormwater Advisory Boards. Input from additional stakeholders, including neighboring communities, was solicited through invitations to the open public meetings, distribution of the public survey, and review of the draft plan. Documentation and details of this effort are provided in Appendix B. Additional stakeholders could also participate through the public survey, however, that information is unknown due to the anonymous nature of the survey.

2.9 DOCUMENTATION OF PLAN PROGRESS

Progress on the mitigation strategy developed in the previous plan is documented in this plan update. Table 2.10 below details the status of mitigation actions from the previous plan. More detail on these actions is provided in Section 6: Mitigation Strategy.

Table 2.10 – Status of Previous Mitigation Actions

Jurisdiction	Completed	Deleted	Carried Forward
Alamance County	6	1	17
City of Burlington	0	1	18

Jurisdiction	Completed	Deleted	Carried Forward
City of Graham	0	1	16
City of Mebane	2	1	13
Town of Elon	1	0	19
Town of Green Level	0	0	10
Town of Haw River	1	0	14
Town of Ossipee	0	0	9
Town of Swepsonville	0	0	12
Village of Alamance	0	1	10
Durham County	1	0	3
City of Durham	1	0	3
Orange County	0	3	17
Town of Carrboro	0	1	12
Town of Chapel Hill	0	1	27
Town of Hillsborough	0	4	2
Person County	2	2	23
City of Roxboro	1	22	9
Total	**15**	**38**	**234**

Table 2.11 on the following pages details all completed and deleted actions from the 2020 plan and thus have been marked as completed or deleted and thus removed from the updated mitigation action plan.

Community capability continues to improve with the implementation of new plans, policies, and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 5 Capability Assessment. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and have proven this by reconvening the HMPC to update this multi-jurisdictional plan and by continuing to involve the public in the hazard mitigation planning process.

Moving forward, information in this plan will be used to help guide and coordinate mitigation activities and decisions for local plans and policies in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage.

Table 2.11 – Completed and Deleted Actions from the 2020 Eno-Haw Regional Hazard Mitigation Plan

2020 Action #	Description	2025 Status	Status Comments/Explanation
Alamance County			
P-1	Direct each County office of agency to assess how it can better incorporate hazard mitigation goals into its planning and implementation of its duties.	Completed	Countywide Continuity of Operations Plan was completed.
P-2	Maintain shelter agreements with the American Red Cross	Completed	Alamance County has taken on the responsibilities of opening and maintaining shelters on their own. ARC will be used as a backup if need.
P-5	Propose a policy to the Board of Commissioners prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist. Presently, most critical facilities located in the floodplain are waste pump stations because they must be located at low elevations because the handle gravity flowing sewage.	Deleted	Planning is still working on this. No progress has been made due to limited staff resources.
P-6	Develop specific regulations that prohibit dumping in the county's watersheds.	Completed	Completed in 2021.
P-7	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	Completed	
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	Completed	
ES-1	Coordinate with the North Carolina Department of Transportation (NCDOT) to maintain adequate and effective snow and ice removal plans by the towns/cities and NCDOT. "Adequate" means that all major thoroughfares are cleared and remain clear within 12 hours of last snowfall.	Completed	
City of Burlington			
P-5	Request that each City department/office assess how it can better incorporate hazard mitigation goals into its separate planning processes and/or implementation of its duties.	Delete	Informal assessments were completed. No formal documentation developed due to limited administrative resources.

2020 Action #	Description	2025 Status	Status Comments/Explanation
City of Graham			
P-1	Review methods of school construction to ensure that all new schools are constructed to the maximum cost feasible standards of wind resistance, flood resistance, and access so that they can be used as shelters for evacuees during and after natural hazard events.	Delete	Planning Department and Alamance EM will coordinate on identifying and meeting local sheltering needs.
City of Mebane			
P-2	Expand the County's GIS Capabilities to Include Maintaining Elevation Certificates	Delete	This is a County action..
P-6	When County Land Use Plan is Complete, Create a Land Use Map with an Overlay for Flood Hazards and any Other Natural Hazards	Completed	Land use plan completed locally. County has flood hazard on the County GIS. The City incorporates the Flood Hazard Overlay District as part of its zoning map.
ES-2	Coordinate with the NCDOT to Maintain Adequate and Effective Snow Removal Plans by Cities and NCDOT	Completed	Municipal agreement is in place.
Town of Elon			
P-1	Review methods of school construction to ensure that all new schools are constructed to the maximum cost feasible standards of wind resistance, flood resistance, and access so that they can be used as shelters for evacuees during and after natural hazard events.	Completed	Completed. Elon University donated and built a new Elementary school for the residents of Elon and surrounding community. Built in 2019. Estimated cost $19m. This project has been completed.
Town of Green Level			
N/A	*No completed or deleted actions from the 2020 plan.*	*N/A*	*N/A*
Town of Haw River			
P-3	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	Completed	The Town completed its Comprehensive Land Use and Master Plan in 2020 and incorporated flood hazard areas on the future land use map.
Town of Ossipee			
N/A	*No completed or deleted actions from the 2020 plan.*	*N/A*	*N/A*
Town of Swepsonville			
N/A	*No completed or deleted actions from the 2020 plan.*	*N/A*	*N/A*

2020 Action #	Description	2025 Status	Status Comments/Explanation
Village of Alamance			
P-4	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	Delete	The Village has its own Land Use Plan which includes mapping of flood hazard areas.
Durham County & City of Durham			
P-1	Implement a Stormwater Utility Fee for all properties within the unincorporated areas of Durham County.	Completed	The County implemented a stormwater utility fee in August 2020 to collect funds to ensure the County has resources to complete projects throughout the unincorporated areas of the County to meet the future Falls Lake and Jordan Lake rules. The utility fee rates are based on square feet of impervious surfaces on properties located outside of City limits. The stormwater utility fee is included on Durham County's tax bill each year.
Orange County			
P-5	Engage in assessments of local supply chain resiliency for critical commodities	Deleted	This action is no longer a priority.
ES-1	Identify and implement strategies to increase swift water rescue capacity.	Deleted	This action is no longer a priority.
PEA-3	Strive to improve communication and outreach in multiple languages to Orange County residents before, during, and after hazard weather event with the county's website, press releases, social media accounts, and the OC Alerts system in order to keep residents informed and improve public safety in and around the county.	Deleted	In 2024, the Ready Orange Website has been updated to include hazard-specific preparedness information that is translatable into several language. Multi-language preparedness graphics have also been created that can be used for targeted outreach or for social media channels. Ongoing effort to use plain language in any communications, especially through OC Alert notifications.
Town of Carrboro			
SP-2	Look for opportunities to mitigate repetitive loss structures	Deleted	This action is a property protection measure covered by new action PP-3.

2020 Action #	Description	2025 Status	Status Comments/Explanation
Town of Chapel Hill			
PEA-4	To achieve Comprehensive Plan objectives: The Town is undertaking an evaluation of its future land use map (FLUM) and planning to rewrite the Town's UDO through an initiative called "Charting Our Future" (http://chartingourfuture.info/). The FLUM includes Resiliency Maps that depict areas of Town subject to flooding. It is anticipated that the new UDO will utilize these maps to attempt to mitigate flooding through updated regulations.	Deleted	This action is a repeat of other carried forward actions. Deleted to remove redundancy.
Town of Hillsborough			
P-1	Work with the Tree Board, Public Works Department, and utility companies to ensure that dangerous situations are addressed in a timely manner	Deleted	This is something the Town already does and does not require an action.
SP-1	Construct new recreational facilities out of flood-resistant and resilient building materials due to their locations in flood-prone areas	Deleted	This should be covered by the Town's Flood Damage Prevention Ordinance as well as actions added from the Town's Comprehensive Sustainability Plan.
ES-1	Conduct Emergency Operations Center (EOC) exercises and staff drills to address the increasing threat of terrorism and to increase staff coordination and response time for hazards	Deleted	The Town regularly conducts similar trainings for staff (including cyber threat), and those do not need their own actions.
PEA-1	Construct an extension of a fiber optic loop to serve underprivileged and rural residents with high speed internet service for better access to emergency information.	Deleted	This is almost complete and can be replaced by similar actions added from the Town's Comprehensive Sustainability Plan.
Person County			
P-1	At next land Use Plan Update, incorporate a stand-alone element for hazard mitigation and involve citizens in comprehensive planning activities that identify and mitigate hazards.	Deleted	This action remains incomplete and there is a lack of public and political interest in this item.
P-3	Update the Person County Floodplain Ordinance to comply with state and national standards.	Completed	Floodplain Ordinance update was adopted in 2020.
P-5	Use GIS to map 50' riparian buffers as required by the State within watersheds.	Completed	
PP-3	Enforce Stormwater Ordinance for new and redevelopment on residential and commercial properties.	Delete	This is an established capability.

2020 Action #	Description	2025 Status	Status Comments/Explanation
SP-4	Any and all portions of the buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to live, health or property	Delete	This is performed by Building Inspections on a case-by-case basis, as needed.
City of Roxboro			
P-1	At next land Use Plan Update, incorporate a stand-alone element for hazard mitigation and involve citizens in comprehensive planning activities that identify and mitigate hazards.	Deleted	This action remains incomplete and there is a lack of public and political interest in this item.
P-5	Use GIS to map 50' riparian buffers as required by the State within watersheds.	Completed	
P-6	Identify at risk-populations that may be exceptionally vulnerable in the event of long-term power outages.	Deleted	Contacted relevant departments regarding this action item, but no progress toward implementation was reported.
P-7	Organize outreach to vulnerable populations during long-term power outage events	Deleted	Contacted relevant departments regarding this action item, but no progress toward implementation was reported.
P-8	Public Services receive training on erosion and sedimentation control and assists property owners and developers with issues.	Deleted	This action is ongoing, but it is a requirement for the job duties of various staff.
P-10	Enforce impervious surface calculation/ limitation for residential and non-residential development.	Deleted	This action is ongoing, but it is a requirement for the job duties of various staff.
PP-1	Enforce minimum housing standards ordinance	Deleted	This action is ongoing, but it is a requirement for the job duties of various staff.
PP-3	Enforce Stormwater Ordinance for new and redevelopment on residential and commercial properties.	Deleted	This action is ongoing, but it is a requirement for the job duties of various staff.
NRP-1	Establish Enhanced Voluntary Ag District (EVAD) Ordinance	Deleted	This does not need to be a City of Roxboro task as we have no Voluntary Ag Districts or appropriate land areas to pursue such. Remains a County action.
NRP-2	Develop a conservation easement program	Deleted	This is not something the City plans to pursue. Remains a County action.
NRP-3	Encourage participation in State & Federal Cost Share programs	Deleted	This is not something the City plans to pursue. Remains a County action.
NRP-4	Conduct landowner/farmer workshops on conservation practices	Deleted	This is not something the City plans to pursue. Remains a County action.

2020 Action #	Description	2025 Status	Status Comments/Explanation
SP-4	Any and all portions of the buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to live, health or property	Deleted	This action is a requirement for the job duties of various staff.
ES-1	Ensure adequate evacuation warning in case of major hazard event.	Deleted	This is a regular duty of Person County Emergency Services.
ES-3	Review program to maintain continuity of government operations.	Deleted	Continuity of operations planning in done by Person County Emergency Services
ES-4	Identify alternate/new Emergency Operations Center locations.	Deleted	The EOC is a County agency. This action will continue to be addressed by Person County.
ES-5	Update and maintain Emergency Plan. Review and update EOP every four years.	Deleted	This action will continue to be addressed by Person County. OEM reviews the EOP annually and updates as needed. The EOP is re-adopted every four years.
ES-6	Track drainage, erosion, and flooding problems within the City planning jurisdiction.	Deleted	This action is already addressed by another carried forward action.
ES-7	Continue to maintain a debris removal program for problem sites.	Deleted	This action is a regular job function of various staff.
PEA-1	The Emergency Services Department will periodically make various hazard education items available through various media outlets including websites, newspaper, radio	Deleted	This action will continue to be addressed by Person County.
PEA-2	The Emergency Services Department will establish an annual hazard awareness week in coordination with the media to promote hazard awareness.	Deleted	This action will continue to be addressed by Person County.
PEA-4	Post warning signage at local parks and outdoor venues with information about severe weather.	Deleted	This action is incomplete and there is not support to implement it.
PEA-5	Ensure school officials are aware of the best area of refuge in school buildings during orientation.	Deleted	This action will continue to be addressed by Person County.

3 PLANNING AREA PROFILE

This section provides a general overview of the current conditions in the Eno-Haw region and its participating municipalities. It consists of the following subsections:

3.1 Geography and Environment
3.2 Population and Demographics
3.3 Historic Properties
3.4 Housing
3.5 Infrastructure
3.6 Current and Future Land Use
3.7 Employment and Industry

3.1 GEOGRAPHY AND ENVIRONMENT

The Eno-Haw region, which contains Alamance, Durham, Orange, and Person Counties, is located in north central North Carolina in the piedmont. A location map is provided in Figure 3.1.

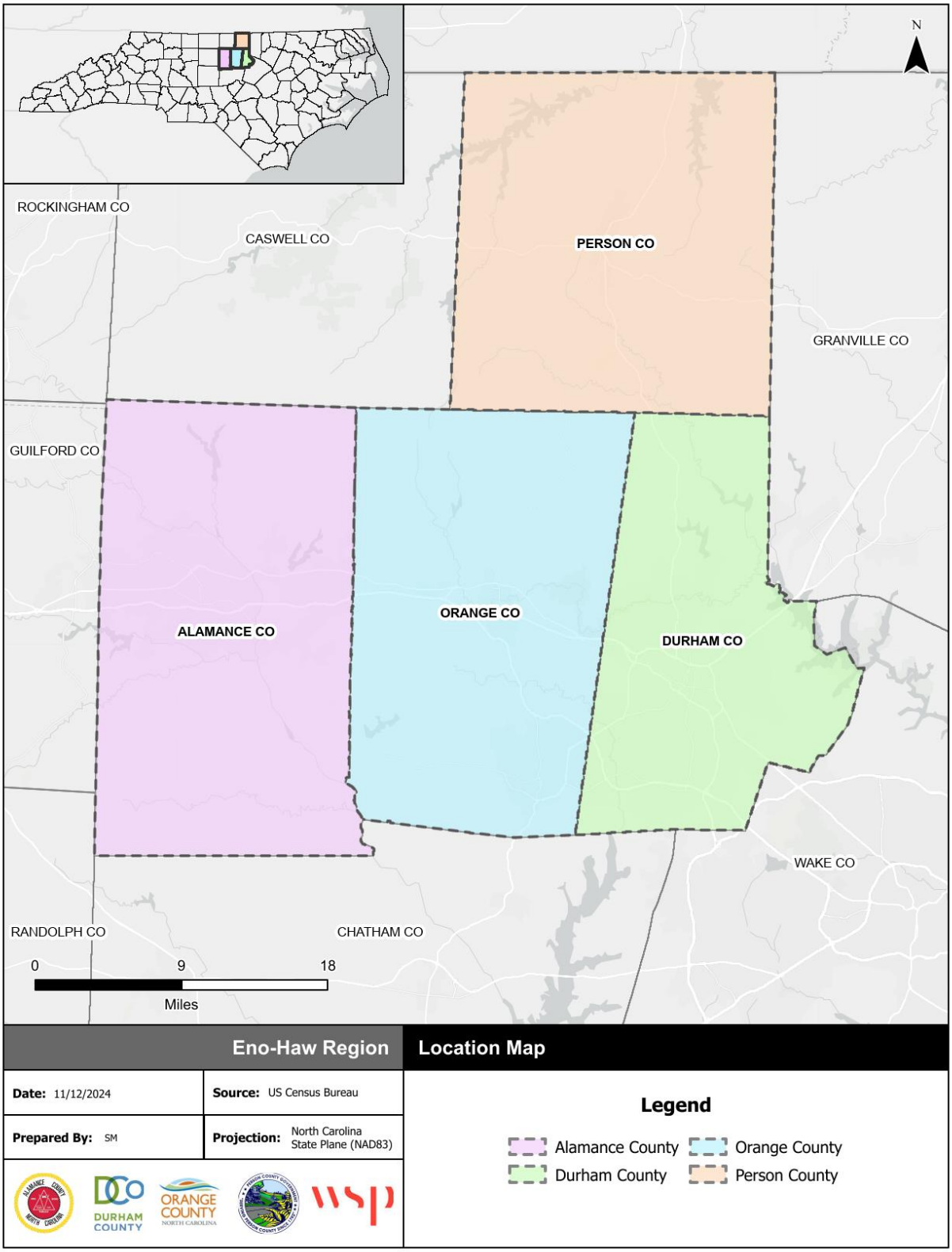
The planning area comprises a total land area of approximately 1,499 square miles, the sum of the total area of each participating county. Note that several jurisdictions extend into neighboring counties that are not participants of this plan. The full extent of these jurisdictions is including in the planning area and scope of this plan. The total land area of each participating jurisdiction is listed in Table 3.1.

Table 3.1 – Total Land Area of Participating Jurisdictions

Jurisdiction	Total Area (sq. mi.)
Alamance County	**423.5**
City of Burlington*	30.1
City of Graham	9.5
City of Mebane*	10.4
Town of Elon	4.1
Town of Green Level	1.4
Town of Haw River	2.9
Town of Ossipee	0.6
Town of Swepsonville	1.5
Village of Alamance	0.8
Durham County	**286.5**
City of Durham*	112.8
Orange County	**397.6**
Town of Carrboro	6.5
Town of Chapel Hill*	21.6
Town of Hillsborough	5.7
Person County	**392.3**
City of Roxboro	7.03
Region Total	**1,499.9**

Source: US Census Bureau, www.data.census.gov
*These jurisdictions extend into neighboring counties

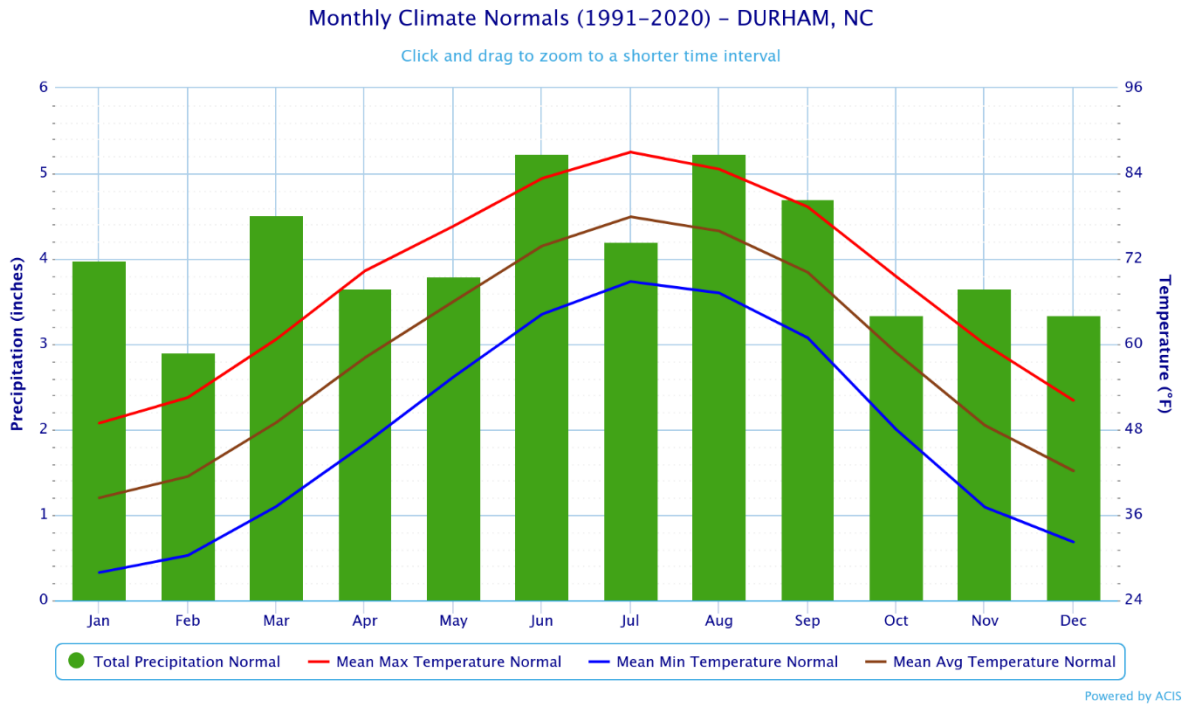
Figure 3.1 – Eno-Haw Region Location Map



Source: U.S. Census Bureau

According to the Köppen climate classification system, the Eno-Haw region has a humid subtropical climate characterized by mild winters and hot humid summers with significant precipitation even during the driest month. The region experiences an average annual high temperature of 68.7°F and an average annual low of 47.9°F. Average annual rainfall is approximately 48.57 inches and average annual snowfall is 1.8 inches. Figure 3.2 shows the average monthly precipitation for the Durham weather station, which approximates temperature and precipitation of the region.

Figure 3.2 – Average Monthly Temperature and Precipitation



Source: Northeast RCC CLIMOD 2.

As shown in the map of HUC-8 watersheds in Figure 3.3, the majority of the Eno Haw region is split between the Haw River Basin, the Upper Neuse River Basin, and the Lower Dan River Basin.

WETLANDS

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 49,478 acres of wetlands in the region. These estimates do not include deepwater areas, ponds, lakes, or riverine areas. Wetland areas are shown in Figure 3.4.

Natural and Beneficial Wetland Functions: The benefits of wetlands are hard to overestimate. They provide critical habitat for many plant and animal species that could not survive in other habitats. They are also critical for water management as they absorb and store vast quantities of storm water, helping reduce floods and recharge aquifers. Not only do wetlands store water like sponges, they also filter and clean water as well, absorbing toxins and other pollutants.

PARKS, PRESERVE, AND CONSERVATION

The Eno Haw region is home to many parks, preserves, and other natural areas including three state parks: Eno River State Park in Durham and Orange Counties, Falls Lake State Recreation Area located partially in Durham County, and Occoneechee Mountain State Park in Orange County. The Mountains-to-Sea State Trail also runs through Alamance, Orange, and Durham Counties.

Several other natural areas can be found within the four-county region and are detailed in Table 3.2 below.

Table 3.2 – Natural Areas, Eno-Haw Region

County	Name
Alamance	Cedarock Park
	Great Bend Park
	Shallowford Natural Area
	Saxapahaw Island Park
	Swepsonville River Park
	Cane Creek Mountains Natural Area
Durham County	Hollow Rock Park*
	New Hope Preserve
	Little River Regional Park*
	Little River County Preserve
	Bottomland Trail
Orange County	Cedar Grove Park
	Efland-Cheeks Park
	Fairview Park
	Seven Mile Creek Natural Area
Person County	Mayo Park and Lake

*Partnership between Durham and Orange Counties

Figure 3.3 – HUC-8 Drainage Basins

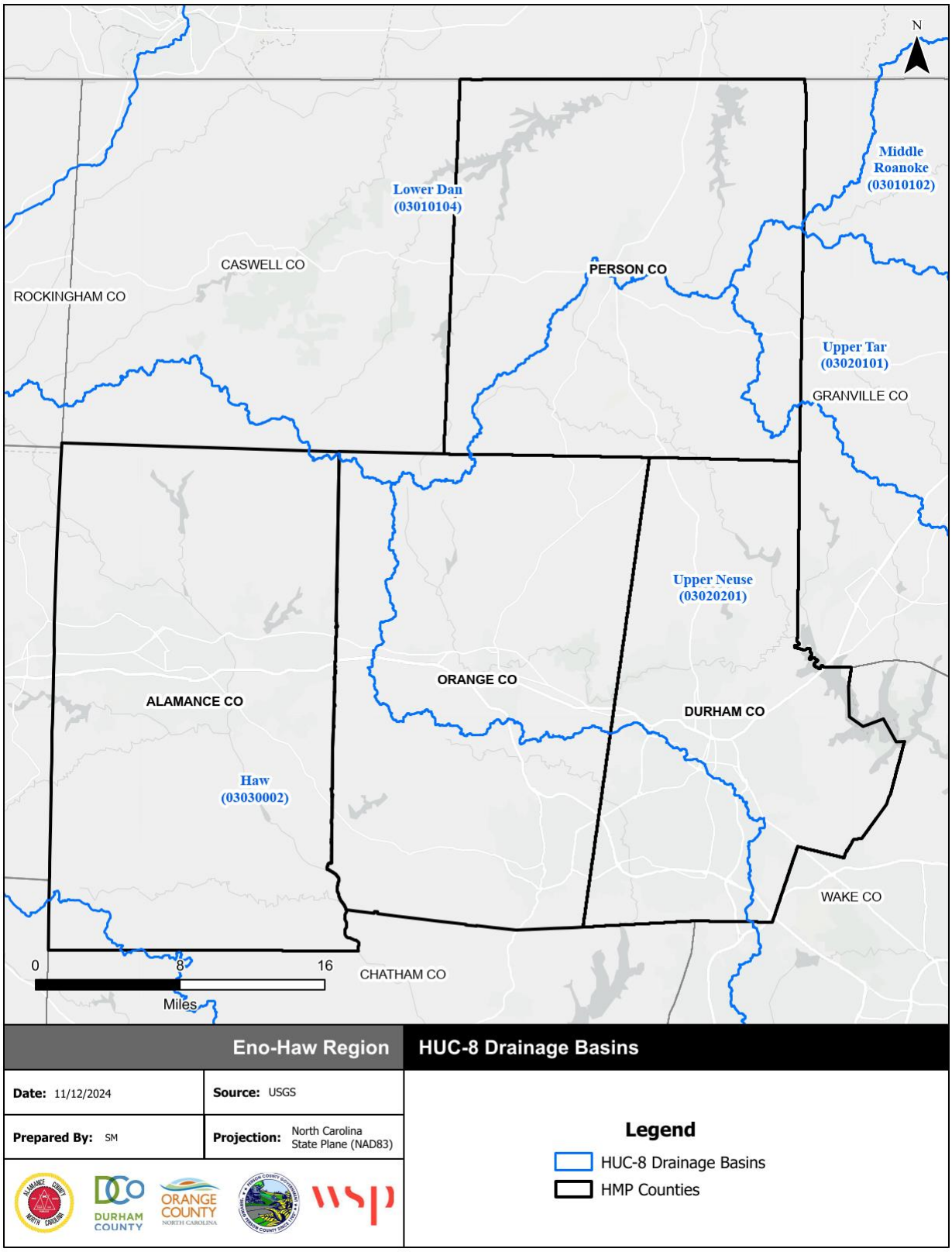
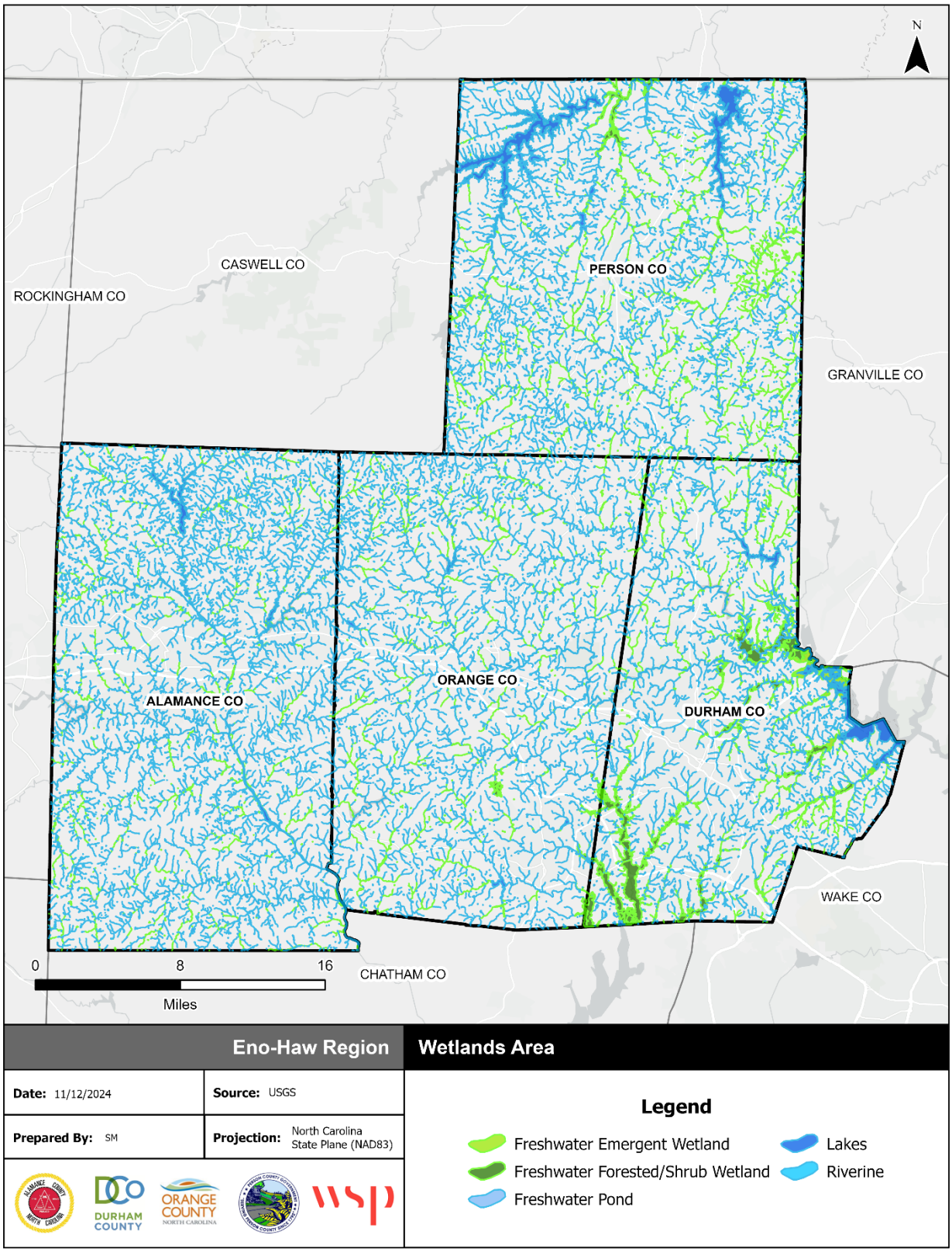


Figure 3.4 – Wetland Areas by Type



THREATENED AND ENDANGERED SPECIES

The U.S. Fish and Wildlife Service maintains a regular listing of threatened species, endangered species, species of concern, and candidate species for counties across the United States. Table 3.3 below lists the species identified as threatened, endangered, or other classification and which county they are found in.

Table 3.3 – Threatened and Endangered Species, Eno-Haw Region

Group	Common Name	Scientific Name	Federal Status	County
Amphibians	Neuse River waterdog	Necturus lewisi	Threatened	D, O, P
Birds	Red-cockaded woodpecker	Dryobates borealis	Threatened	D, O
Clams	Dwarf wedgemussel	Alasmidonta heterodon	Endangered	D, O, P
Clams	Green floater	Lasmigona subviridis	Proposed Threatened	A, D, O, P
Clams	Atlantic pigtoe	Fusconaia masoni	Threatened	A, D, O, P
Clams	Yellow lance	Elliptio lanceolata	Threatened	P
Fishes	Cape Fear shiner	Notropis mekistocholas	Endangered	A, O
Fishes	Carolina madtom	Noturus furiosus	Endangered	D, O, P
Flowering Plants	Harperella	Ptilimnium nodosum	Endangered	D, O, P
Flowering Plants	Smooth coneflower	Echinacea laevigata	Threatened	D, O, P
Flowering Plants	Michaux's sumac	Rhus michauxii	Endangered	D, O
Flowering Plants	Small whorled pogonia	Isotria medeoloides	Threatened	A
Flowering Plants	Schweinitz's sunflower	Helianthus schweinitzii	Endangered	A
Insects	Monarch butterfly	Danaus plexippus	Proposed Threatened	A, D, O, P
Mammals	Little brown bat	Myotis lucifugus	Under Review	A, D, O, P
Mammals	Tricolored bat	Perimyotis subflavus	Proposed Threatened	A, D, O, P
Mammals	Northern Long-Eared Bat	Myotis septentrionalis	Endangered	D, O, P

Source: U.S. Fish & Wildlife Service (https://www.fws.gov/endangered/)

Key: A = Alamance County; D = Durham County; O = Orange County; P = Person County

3.2 POPULATION AND DEMOGRAPHICS

The Eno-Haw region has experienced significant population growth over the last several decades. According to U.S. Census data from the Decennial Census and the American Community Survey (ACS) 5-Year Estimates, from 2000 to 2023, the region's total population increased by nearly 22 percent, which equates to an average annual growth rate of just under 1 percent. Overall population density in the region increased from approximately 378.6 persons per square mile in 2010 to 460.2 persons per square mile in 2023. Table 3.4 provides population counts from 2000, 2010, and 2023 for each of the participating counties. Population statistics for participating jurisdictions are included in each jurisdiction's annex.

Figure 3.5 on the following page shows 2023 population density by census tract in persons per square mile.

Table 3.4 – Eno-Haw Region Population Counts

Jurisdiction	2000 Census Population	2010 Census Population	2023 ACS Population Estimate	Total Change 2010-2023	% Change 2010-2023
Alamance County	130,800	146,902	174,286	27,384	18.6%
Durham County	223,314	257,466	329,405	71,939	27.9%
Orange County	118,227	124,244	147,292	23,048	18.6%
Person County	35,623	39,022	39,275	253	0.6%
Region Total	**507,964**	**567,634**	**690,258**	**122,624**	**21.6%**

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2023 5-Year Estimates

Figure 3.5 – Population Density, 2023

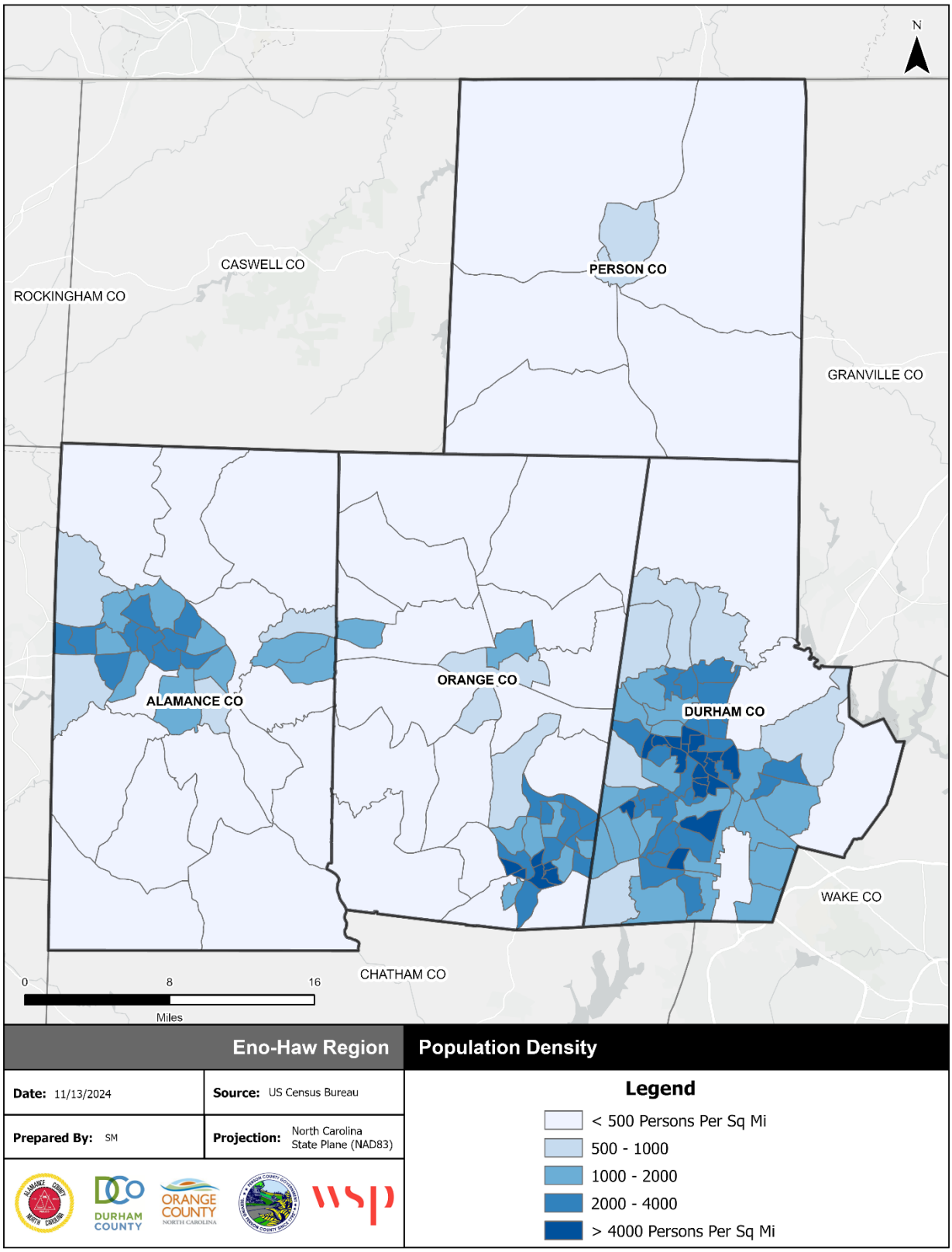


Table 3.5 details demographic and social characteristics of each of the participating counties compared to the State of North Carolina overall according to the 2023 ACS 5-Year Estimates. Per this data, Alamance County and Person Counties have older populations than the state average, and a greater proportion of individuals with disabilities. Alamance, Durham, and Orange Counties have a greater percentage of individuals who speak English less than very well. Educational attainment is higher than the state average in Durham and Orange Counties but lower in Alamance and Person Counties.

Table 3.5 – Eno Haw Region Demographic Summary, 2023

Demographic & Social Characteristics	Alamance County	Durham County	Orange County	Person County	North Carolina
Median Age	38.7	35.8	36.7	43.9	39.1
% of Population Under 5 years old	5.7%	6.0%	4.2%	5.3%	5.7%
% of population Over 65 years old	16.9%	14.0%	15.7%	21.0%	16.8%
% of Population Over 25 with high school diploma or higher	88.5%	90.7%	93.2%	89.1%	89.7%
% of Population Over 25 with bachelor's degree or higher	27.7%	53.5%	61.8%	19.8%	34.7%
% with Disability	12.4%	9.9%	8.6%	18.9%	13.4%
% Speak English less than "very well"	5.8%	7.9%	5.4%	2.1%	4.9%

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

The racial characteristics of the participating counties, compared to the state average, are presented in Table 3.6. Alamance, Orange, and Person Counties are a majority White, while Durham County has no racial majority, with a greater proportion of Hispanic and African American individuals. Compared to the state average, Alamance and Durham Counties have larger Hispanic populations, Durham and Person Counties have larger African American populations, and Durham and Orange Counties have larger Asian populations.

Table 3.6 – Eno-Haw Region Racial Demographics, 2023

Demographics	Alamance County	Durham County	Orange County	Person County	North Carolina
Total Population	*174,286*	*329,405*	*147,292*	*39,275*	*10,584,340*
White, not Hispanic	59.9%	41.9%	66.8%	64.8%	60.6%
Hispanic or Latino	14.8%	15.3%	10.6%	5.9%	10.9%
Black or African American	19.6%	32.8%	10.2%	25.5%	20.3%
Asian	1.7%	5.1%	7.9%	0.4%	3.1%
American Indian and Alaska Native	0.2%	0.2%	0.3%	0.1%	0.8%
Native Hawaiian and Other Pacific Islander	0.0%	0.0%	0.0%	0.0%	0.1%
Some other race	0.6%	0.4%	0.4%	0.1%	0.4%
Two or more races	3.2%	3.5%	3.3%	3.1%	3.1%

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

3.3 HISTORIC PROPERTIES

As of March 21, 2025, the Eno-Haw region had 224 listings on the National Register of Historic Places including 70 in Alamance County, 85 in Durham County, 57 in Orange County, and 12 in Person County, detailed in Table 3.7. Of the 224 total listings in the region, 65 listings are Historic Districts. Listing on

the National Register signifies that these structures and districts have been determined to be worthy of preservation for their historical or cultural values.

Table 3.7 – National Register of Historic Places Listings in the Eno-Haw Region

Ref#	Property Name	Status Date	City	Category
Alamance County				
70000435	Alamance Battleground State Historic Site	2/26/1970	Alamance	Site
79001655	Alamance County Courthouse,	5/10/1979	Graham	Building
84001906	Alamance Hotel	5/31/1984	Burlington	Building
07000821	Alamance Mill Village Historic District	8/16/2007	Alamance	Building
70000436	Allen House	2/26/1970	Burlington	Building
84000301	Altamahaw Mill Office	11/20/1984	Altamahaw	Building
84001909	Atlantic Bank and Trust Company Building	5/31/1984	Burlington	Building
100007592	Aurora Cotton Mills Finishing Plant-Baker-Cammack Hosiery Mills Plant	4/15/2022	Burlington	Building
87001099	Bellemont Mill Village Historic District	7/1/1987	Bellemont	District
09000599	Beverly Hills Historic District	8/5/2009	Burlington	District
93001193	Braxton, Hiram, House	11/22/1993	Snow Camp	Building
01001025	Cates, Charles F. and Howard, Farm	9/24/2001	Mebane	District
86003455	Cedarock Park Historic District	12/4/1986	Graham	District
93001194	Cook, William, House	11/22/1993	Mebane	Building
86003451	Cooper School	12/15/1986	Mebane	Building
84001912	Cross Roads Presbyterian Church and Cemetery and Stainback Store	5/22/1984	Mebane	Building
90001320	Downtown Burlington Historic District	9/6/1990	Burlington	District
10001054	Durham Hosiery Mill No. 15	12/27/2010	Mebane	Building
00000393	East Davis Street Historic District	4/20/2000	Burlington	District
84001914	Efird Building	5/31/1984	Burlington	Building
88000166	Elon College Historic District	3/22/1988	Elon College	District
84001917	First Baptist Church	5/31/1984	Burlington	Building
84001919	First Christian Church of Burlington	5/31/1984	Burlington	Building
93001197	Fogleman, Polly, House	11/22/1993	Burlington	Building
87000456	Friends Spring Meeting House	3/19/1987	Snow Camp	Building
79001654	Glencoe Mill Village Historic District	2/16/1979	Glencoe	District
10001055	Glencoe School	12/27/2010	Glencoe	Building
83001834	Graham Historic District	4/7/1983	Graham	District
100001627	Granite Mill	9/21/2017	Haw River	Building
100005195	Granite-Cora-Holt Mills Historic District	4/24/2020	Haw River	District
83001835	Griffis-Patton House	3/17/1983	Mebane	Building
93001195	Guy, Thomas, House	11/22/1993	Mebane	Building
78001926	Hawfields Presbyterian Church	12/15/1978	Mebane	Building
87000411	Henderson Scott Farm Historic District	9/16/1987	Mebane	District
82003421	Holt, Charles T., House	6/1/1982	Haw River	Building
77000988	Holt, L. Banks, House	4/18/1977	Alamance	Building
84001920	Holt-Frost House	5/31/1984	Burlington	Building
84001921	Horner Houses	5/31/1984	Burlington	Building
94000130	Johnston Hall	3/7/1994	Elon College	Building

Ref#	Property Name	Status Date	City	Category
87000454	Kernodle-Pickett House	3/23/1987	Bellemont	Building
85003083	Kerr-Patton House	12/5/1985	Thompson	Building
84001922	Lakeside Mills Historic District	5/31/1984	Burlington	District
16000585	May Hosiery Mills Knitting Mill	8/26/2016	Burlington	Building
93001196	McBane, Camilus, House	11/22/1993	Snow Camp	Building
94000022	McCauley-Watson House	2/4/1994	Union Ridge	Building
86003438	McCray School	12/4/1986	Burlington	Building
11000952	Mebane Commercial Historic District	12/22/2011	Mebane	District
82003420	Menagerie Carousel	1/12/2024	Burlington	Structure
84001924	Moore-Holt-White House	5/31/1984	Burlington	Building
06000687	Morrow, William P., House	8/9/2006	Graham	Building
99000698	North Main Street Historic District	6/10/1999	Graham	District
11000953	Old South Mebane Historic District	12/22/2011	Mebane	District
13000933	Old South Mebane Historic District (Boundary Increase)	12/16/2013	Mebane	District
14000291	Oneida Cotton Mills and Scott-Mebane Manufacturing Company Complex	6/9/2014	Graham	District
98000546	Saxapahaw Spinning Mill, Former	5/20/1998	Saxapahaw	Building
87001850	Scott, Kerr, Farm	10/31/1987	Haw River	Building
89000497	Snow Camp Mutual Telephone Exchange Building	6/9/1989	Snow Camp	Building
01001427	South Broad-East Fifth Streets Historic District	12/31/2001	Burlington	District
80002800	Southern Railway Passenger Station	5/23/1980	Burlington	Building
93001192	Spoon, A. L., House	11/22/1993	Snow Camp	Building
79001653	St. Athanasius Episcopal Church and Parish House and the Church of the Holy Comforter	5/29/1979	Burlington	Building
84001926	Stagg House	5/31/1984	Burlington	Building
87000457	Sunny Side	3/23/1987	Burlington	Building
93001198	Thompson, James Monroe, House	11/22/1993	Saxapahaw	Building
88001594	US Post Office	9/23/1988	Burlington	Building
84000359	West Davis Street-Fountain Place Historic District	11/5/1984	Burlington	District
16000219	Western Electric Company-Tarheel Army Missile Plant	5/2/2016	Burlington	Building
82003422	White Furniture Company	7/29/1982	Mebane	Building
84001930	Windsor Cotton Mills Office	5/31/1984	Burlington	Building
91001745	Woodlawn School	11/29/1991	Mebane	Building
Durham County				
00001163	American Tobacco Company Manufacturing Plant	9/29/2000	Durham	District
79003330	Bassett House	11/29/1979	Durham	Building
70000452	Bennett Place State Historic Site	2/26/1970	Durham	Site
12001157	Biddle, Mary Duke, Estate	1/9/2013	Durham	Building
90000350	Blacknall, Richard D., House	3/1/1990	Durham	Building
99001619	Bright Leaf Historic District	12/30/1999	Durham	District
74001346	Bull Durham Tobacco Factory	9/10/1974	Durham	Building
82003448	Bullington Warehouse	8/30/1982	Durham	Building
10000631	Burch Avenue Historic District	9/3/2010	Durham	District

Ref#	Property Name	Status Date	City	Category
11000508	Carr, Johm C. and Binford, House	8/5/2011	Durham	Building
00000394	City Garage Yard and Fire Drill Tower	5/3/2000	Durham	Building
00000991	Clark and Sorrell Garage	8/16/2000	Durham	Building
85002438	Cleveland Street District	9/20/1985	Durham	District
100003295	College Heights Historic District	1/28/2019	Durham	District
79003331	Cranford-Wannamaker House	11/29/1979	Durham	Building
79003332	Crowell House	11/29/1979	Durham	Building
79003333	Dillard-Gamble Houses	1/19/1979	Durham	Building
77000998	Downtown Durham Historic District	11/1/1977	Durham	District
66000590	Duke Homestead and Tobacco Factory	11/13/1966	Durham	Building
85001781	Duke Memorial United Methodist Church	8/11/1985	Durham	Building
85001793	Durham Cotton Mills Village Historic District	8/9/1985	Durham	District
78001944	Durham Hosiery Mill	11/14/1978	Durham	Building
13001115	Durham Hosiery Mills Dye House	1/22/2014	Durham	Building
85003055	Durham Hosiery Mills No. 2-Service Printing Company Building	11/27/1985	Durham	Building
04001393	East Durham Historic District	12/23/2004	Durham	District
85001775	Emmanuel AME Church	8/9/1985	Durham	Building
85001778	Ephphatha Church	8/9/1985	Durham	Building
84002724	Erwin Cotton Mills Company Mill No. 1 Headquarters Building	11/20/1984	Durham	Building
73001337	Fairntosh Plantation	4/3/1973	Durham	Building
05000348	Forbus, Wiley and Elizabeth, House	4/28/2005	Durham	Building
05001476	Forest Hills Historic District	12/28/2005	Durham	District
13000204	Foster and West Geer Streets Historic District	4/23/2013	Durham	District
85001791	Golden Belt Historic District	8/9/1985	Durham	District
96000816	Golden Belt Historic District (Boundary Increase)	7/30/1996	Durham	Building
82003449	Greystone	6/1/1982	Durham	Building
11000955	Hampton-Ellis Farm	12/22/2011	Bahama	Building
72000960	Hardscrabble	1/20/1972	Bahama	Building
78001945	Hill, John Sprunt, House	1/30/1978	Durham	Building
13001026	Hillside Park High School	12/30/2013	Durham	Building
85002437	Holloway Street District	9/20/1985	Durham	District
09000263	Holloway Street Historic District (Boundary Increase)	4/30/2009	Durham	District
08000814	Holloway, Kinchen, House	8/29/2008	Durham	Building
09001105	Hope Valley Historic District	12/11/2009	Durham	District
78001946	Horton Grove Complex	3/17/1978	Durham	Building
03000340	Lakewood Park Historic District	5/1/2003	Durham	District
75001257	Leigh Farm	9/5/1975	Chapel Hill	Building
08000774	Liberty Warehouse Nos. 1 and 2	8/6/2008	Durham	Building
85000118	Little Creek Site (31 DH 351)	1/11/1985	Chapel Hill	Site
100000896	Little River High School	4/28/2017	Bahama	Building
89000446	Mangum, Bartlett, House	5/25/1989	Durham	Building
85001554	Meadowmont	7/11/1985	Chapel Hill	District

Ref#	Property Name	Status Date	City	Category
85001792	Morehead Hill Historic District	7/13/2017	Durham	District
04000567	Morehead Hill Historic District (Boundary Increase)	6/2/2004	Durham	District
86000676	North Carolina Central University	3/28/1986	Durham	District
75001258	North Carolina Mutual Life Insurance Company Building	5/15/1975	Durham	Building
98001573	North Durham County Prison Camp (Former)	12/31/1998	Durham	Building
85001338	North Durham-Duke Park District	6/20/1985	Durham	District
85001777	O'Brien, William Thomas, House	8/9/1985	Durham	Building
100000866	Pauli Murray Family Home	3/2/2017	Durham	-
100000867	Pauli Murray Family Home	3/2/2017	Durham	-
85001782	Pearl Mill Village Historic District	8/9/1985	Durham	District
79003334	Pegram House	11/29/1979	Durham	Building
04001287	Poland, George, House	12/4/2004	Bahama	Building
85001780	Powe House	8/9/1985	Durham	Building
09000601	Russell School	8/5/2009	Durham	Building
85001779	Scarborough House	8/9/1985	Durham	Building
12000345	Scott and Roberts Dry Cleaning Plant, Office, and Store	6/20/2012	Durham	Building
85002429	Smith Warehouse	9/16/1985	Durham	Building
76001319	St. Joseph's African Methodist Episcopal Church	8/11/1976	Durham	Building
73001338	Stagville	5/25/1973	Durham	Building
10001093	Stokesdale Historic District	12/28/2010	Durham	District
99001684	Tilley, Marcus, House	1/14/2000	Bahama	Building
86000672	Trinity Historic District	3/26/1986	Durham	District
07001372	Trinity Historic District (Boundary Increase II)	1/9/2008	Durham	District
04000568	Trinity Historic District (Boundary Increase)	6/4/2004	Durham	District
89001418	Umstead, Adolphus W., House	9/14/1989	Bahama	Building
14000983	Umstead, D.C., Store and House	12/2/2014	Bahama	Building
03000804	Venable Tobacco Company Prizery and Receiving Room	8/21/2003	Durham	Building
85001847	Venable Tobacco Company Warehouse	8/9/1985	Durham	Building
84002259	Watts and Yuille Warehouses	4/5/1984	Durham	Building
80002824	Watts Hospital	4/2/1980	Durham	Building
01000427	Watts-Hillandale Historic District	4/25/2001	Durham	District
86000680	West Durham Historic District	3/26/1986	Durham	District
85001776	West Point on the Eno	8/9/1985	Durham	District
Orange County				
76001332	Alberta Mill Complex	1/19/1976	Carrboro	Building
71000606	Ayr Mount	8/26/1971	Hillsborough	Building
03000858	Bellevue Manufacturing Company	8/28/2003	Hillsborough	Building
05000325	Beta Theta Pi Fraternity House	4/20/2005	Chapel Hill	Building
78001969	Bingham School	1/18/1978	Oaks	Building
70000465	Burwell School	9/15/1970	Hillsborough	Building
99000481	Cabe-Pratt-Harris House	4/22/1999	Hillsborough	Building
99000867	Carolina Inn	8/6/1999	Chapel Hill	Building

Ref#	Property Name	Status Date	City	Category
85001339	Carrboro Commercial Historic District	6/20/1985	Carrboro	District
98000389	Cedar Grove Rural Crossroads Historic District	4/23/1998	Cedar Grove	District
100005201	Cedar Grove School	4/24/2020	Cedar Grove	Building
71000604	Chapel Hill Historic District	12/16/1971	Chapel Hill	District
15000165	Chapel Hill Historic District (Boundary Increase and Additional Documentation)	4/16/2015	Chapel Hill	District
90000364	Chapel Hill Town Hall	3/20/1990	Chapel Hill	Building
72000980	Chapel of the Cross	2/1/1972	Chapel Hill	Building
72000981	Commandant's House	11/9/1972	Hillsborough	Building
71000607	Eagle Lodge	4/16/1971	Hillsborough	Building
11000622	Eno Cotton Mill	9/1/2011	Hillsborough	Building
88001175	Faucett Mill and House	8/4/1988	Hillsborough	District
99001391	Faucette, David, House	11/22/1999	Efland	Building
93000807	Gimghoul Neighborhood Historic District	8/5/1993	Chapel Hill	District
71000608	Hazel-Nash House	3/31/1971	Hillsborough	Building
73001362	Heartsease	4/11/1973	Hillsborough	Building
73001363	Hillsborough Historic District	10/15/1973	Hillsborough	District
96000186	Hogan, Alexander, Plantation	3/4/1996	Chapel Hill	Site
01000016	Hogan, Thomas and Mary, House	1/26/2001	Carrboro	Building
02000436	Holden-Roberts Farm	5/2/2002	Hillsborough	District
94000184	Jackson, Jacob, Farm	3/17/1994	Hillsborough	District
98000995	Jordan, Dr. Arch, House	8/6/1998	Caldwell	Building
86001625	Lloyd, Thomas F., Historic District	8/14/1986	Carrboro	District
01001187	Montrose	10/28/2001	Hillsborough	District
72000982	Moorefields	4/25/1972	Hillsborough	Building
09000637	Murphey School	8/20/2009	Hillsborough	Building
71000609	Nash Law Office	9/28/1971	Hillsborough	Building
100001633	Nash, Arthur C. and Mary S.A., House	10/27/2017	Chapel Hill	Building
71000610	Nash-Hooper House	11/11/1971	Hillsborough	Building
100009948	Navy Reserve Officers Training Corps (NROTC) Naval Armory at UNC-Chapel Hill	2/9/2024	Chapel Hill	Building
100007247	Neville, Jeter and Ethel, House	8/4/2023	Carrboro	Building
100002051	North Carolina Industrial Home for Colored Girls	1/26/2018	Efland	Building
02000435	Occoneechee Speedway	5/2/2002	Hillsborough	Site
94000570	Old Chapel Hill Cemetery	6/3/1994	Chapel Hill	District
66000596	Old East, University of North Carolina	10/15/1966	Chapel Hill	Building
71000611	Old Orange County Courthouse	6/24/1971	Hillsborough	Building
79001740	Paisley-Rice Log House	1/31/1979	Mebane	Building
71000605	Playmakers Theatre	6/24/1971	Chapel Hill	Building
13000206	Pope, Capt. John S., Farm	4/23/2013	Cedar Grove	Building
100009620	Ridge Road School	12/15/2023	Hillsborough	Building
88002026	Rigsbee's Rock House	10/20/1988	Hillsborough	District
89001039	Rocky Ridge Farm Historic District	8/8/1989	Chapel Hill	District
07001501	Rocky Ridge Farm Historic District (Boundary Increase)	1/30/2008	Chapel Hill	District

Ref#	Property Name	Status Date	City	Category
71000612	Ruffin-Roulhac House	8/5/1971	Hillsborough	Building
71000613	Sans Souci	8/26/1971	Hillsborough	Building
100005203	Schley Grange Hall	4/24/2020	Schley	Building
78001968	St. Mary's Chapel	7/12/1978	Hillsborough	Building
71000614	St. Matthew's Episcopal Church and Churchyard	6/24/1971	Hillsborough	Building
98001528	West Chapel Hill Historic District	12/31/1998	Chapel Hill	District
100003930	West Chapel Hill Historic District	5/15/2019	Chapel Hill	District
Person County				
80002893	Burleigh	5/1/1980	Concord	Building
83001902	Henry-Vernon House	2/3/1983	Bushy Fork	Building
88000698	Holloway-Jones-Day House	6/9/1988	Roxboro	Building
82003496	Holloway-Walker Dollarhite House	6/1/1982	Bethel Hill	Building
06000229	House on Wagstaff Farm	4/5/2006	Roxboro	Building
05000267	Long, James A. and Laura Thompson, House	4/6/2005	Roxboro	Building
05001031	Merritt-Winstead House	9/15/2005	Roxboro	Building
79001744	Person County Courthouse	5/10/1979	Roxboro	Building
84002415	Roxboro Commercial Historic District	3/1/1984	Roxboro	District
09000660	Roxboro Cotton Mill	8/27/2009	Roxboro	Building
82003497	Roxboro Male Academy and Methodist Parsonage	7/29/1982	Roxboro	Building
74001369	Waverly Plantation	10/9/1974	Cunningham	Building

Source: National Parks Service, National Register of Historic Places, March 2025

3.4 HOUSING

According to the 2019-2023 ACS 5-Year Estimates, there are 294,567housing units in the Eno-Haw region, of which approximately 94.9 percent are occupied. Compared to the state, housing occupancy rates are greater in the Eno-Haw region, with Alamance, Durham, and Orange Counties exceeding the state rate. Approximately 44% of housing units are renter-occupied. A high percentage of renters is an indicator of higher pre- and post-disaster vulnerability because, according to Cutter, et al. (2003), renters often do not have the financial resources of homeowners, are more transient, are less likely to have information about or access to recovery aid following a disaster and are more likely to require temporary shelter following a disaster. Higher rates of home ownership in some counties, including Alamance Orange, and Person may indicate that more residents in these areas are able to implement certain types of mitigation in their homes.

Compared to the state average, housing growth has been high across the region with growth rates between 12-15 percent with the exception of Person County, where total housing units have increased by 1.6 percent compared to 2010 counts. Nearly 24 percent of householders moved into their current homes since the year 2018, and another 27 percent moved in between 2010 and 2017, which indicates the growth the area has experienced. Due to their relatively new tenancy, many householders may be unfamiliar with some hazard risks of the region.

Approximately 52 percent of all housing units in the region were built after 1990, and 14.6 percent were built between 1980 and 1989. While this housing stock is not particularly new, it is not very old, either. Age can indicate the potential vulnerability of a structure to certain hazards. For example, Alamance County first entered the National Flood Insurance Program in 1981, Durham County in 1979, Orange County in 1981, and Person County in 1990. Therefore, based on housing age estimates at least 41.7

percent of housing in Alamance County, 32 percent of housing in Durham County, 33.8 in Orange County, and 57.4 in Person County were built before any floodplain development restrictions were required.

The average median home value in the Eno-Haw region is $290,720, which is approximately 34 percent higher than 2010 average and 12 percent higher than the state average. However, this value is slightly skewed high by Durham and Orange Counties. Compared to the state average, median home value is 36 percent higher in Durham County and 65 percent higher in Orange County. Conversely, median home value is 15 percent lower than the state average in Alamance County and 26 percent lower in Person County.

Over 65 percent of housing units in the Eno-Haw Region are detached single family homes. Approximately 6.4 percent of units are mobile homes, which can be more vulnerable to certain hazards, such as tornadoes and windstorms, especially if they aren't secured with tie downs.

Across the four counties, an average of 5.2 percent of occupied housing units have no vehicle available to them; these residents may have difficulty in the event of an evacuation.

Table 3.8 provides details on housing characteristics in the Eno-Haw Region according to data from the 2023 ACS 5-Year Estimates and the 2010 Census.

Table 3.8 – Eno Haw Region Housing Characteristics, 2023

Housing Characteristics	Alamance County	Durham County	Orange County	Person County	North Carolina
Housing Units (2010)	66,576	120,217	55,597	18,193	4,327,528
Housing Units (2023)	75,456	138,502	62,127	18,482	4,815,195
Housing Units Percent Change (2010-2023)	13.0%	15.0%	12.0%	1.6%	11.3%
Owner-Occupied, % (2023)[1]	65.5%	55.0%	64.2%	75.9%	66.4%
Vacant Units, % (2023)[2]	9.3%	7.1%	9.1%	12.3%	13.0%
% of Housing Units that are mobile homes	12.0%	1.3%	6.1%	17.9%	11.3%
Median Home Value	$221,200	$351,700	$428,500	$192,800	$259,400

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2019-2023 5-Year Estimates
Owner-Occupied units reported as percent of occupied units; 2) Vacant units reported as a percent of the total number of housing units.

3.5 INFRASTRUCTURE

3.5.1 TRANSPORTATION

Major highways located in the Eno-Haw region include: I-40, I-85, I-540/NC 540, US 15, US 70, US 158, US 501, NC 49, NC 54, NC 55, NC 57, NC 62, NC 86, NC 87, NC 98, NC 147, NC 157, and NC 751.

Air travel is serviced primarily by Raleigh-Durham International Airport (RDU), 12 miles southeast of Durham, which enplaned over 15.5 million passengers in 2024. RDU is partially owned by the City of Durham and Durham County. Non-stop daily service is provided to 63 destinations in the United States and international service is available to 11 destinations.

Amtrak operates a daily train between Charlotte and New York City (the Carolinian) which stops at the Durham Transit Station in downtown Durham and the Depot in the City of Burlington. The State of North Carolina, in cooperation with Amtrak, operates two additional daily trains between Raleigh and Charlotte which also stop in Durham and Burlington. Amtrak currently does not stop in Orange County, but the Town of Hillsborough is working with the state, North Carolina Railroad and Amtrak to establish passenger rail service.

National bus service is provided by Greyhound and Megabus at several stops in Alamance County and the Durham Transit Station in downtown Durham.

ALAMANCE COUNTY

In addition to RDU, air travel for Alamance County is provided by Piedmont Triad International Airport (PTI), located in Guilford County 34 miles west of Burlington. PTI offers non-stop daily service to 14 destinations.

City of Burlington has a municipal bus service with five routes covering several portions of the county. GoTriangle and Piedmont Area Regional Transportation began operating a weekday bus service in the Town of Mebane on Monday, with a stop at the park-and-ride lot at Alamance Regional Medical Center's MedCenter Mebane location, 3940 Arrowhead Blvd., and at City Hall, 106 E. Washington Street. The City of Graham is also served by GoTriangle and Piedmont Area Regional Transportation which also operates weekday service to citizens of Graham with transportation to Chapel Hill and Greensboro areas.

Amtrak lines – the Carolinian and the Piedmont pass through Alamance County. Burlington's Station is located at 101 N. Main Street and is directly across Webb Avenue from LINK's Temporary Transfer Hub.

As of 2023, an estimated 80.1 percent of commuters drove alone to work, while 8.4 percent carpooled and only 0.24 percent used public transportation.

DURHAM COUNTY

Most travel in Durham County is by private vehicle. Important arteries for traffic include NC 147, which connects Duke University, downtown, and Research Triangle Park (RTP), U.S. 15-501 between Durham and Chapel Hill, I-85, connecting Durham to Virginia and western North Carolina cities, and I-40 running across southern Durham County between RTP and Chapel Hill. The I-40 corridor has been the main site of commercial and residential development in Durham since its opening in the early 1990s. In 2023, an estimated 65.8 percent of commuters drove alone to work, 8.1 percent carpooled, and 3.6 percent used public transportation.

The City of Durham maintains an extensive network of bicycle routes and trails and has been recognized with a Bicycle Friendly Community Award. The American Tobacco Trail begins in downtown and continues south through RTP and ends in Wake County.

GoTriangle offers scheduled, fixed-route regional and commuter bus service between Raleigh and the region's other principal cities of Durham, Cary, and Chapel Hill, as well as to and from RDU, RTP, and several of the region's larger suburban communities. Go Triangle also coordinates an extensive vanpool and rideshare program that serves the region's larger employers and commuter destinations. GoDurham provides municipal bus service. Duke University also maintains its own transit system, Duke Transit, which operates more than 26 buses with routes throughout the campus and health system.

ORANGE COUNTY

As of 2023, an estimated 57.7 percent of commuters drove alone to work, 6.7 percent carpooled, another 7.5 percent used public transportation, and 5 percent walked.

GoTriangle provides regional bus service linking the Town of Chapel Hill to Research Triangle Park, Raleigh-Durham International Airport, Duke University, NC State University, and other key regional locations. GoTriangle also contracts with Orange Public Transportation (OPT) to provide service between the Towns of Hillsborough and Chapel Hill. In addition, GoTriangle has a vanpool program for commuters that have a greater than 20-mile round-trip.

PERSON COUNTY

As of 2023, an estimated 75.9 percent of commuters drove alone to work, while 6.7 percent carpooled and only 0.67 percent walked.

Rail transportation is provided by Norfolk and Western. Motor freight coming into and going out of Person-Roxboro has decreased significantly. Motor freight coming into and going out of Person-Roxboro is handled by a number of carriers including Motor Freight Carriers, Walker Transfer Co., Spector, Freight, Branch, Pilot, Estes, Carolina Freight Carriers and UPS. Air transportation is provided locally at the Person-Roxboro Executive Airport located just went off US 501 south of the City of Roxboro.

3.5.2 UTILITIES

Electric power for the region is provided by Duke Power. In unincorporated Alamance, Orange, and Person Counties, Piedmont Electric Membership Corporation is the electric provider. Natural gas is provided by Dominion Energy (formerly Public Service of North Carolina) for all areas and by Piedmont Natural Gas for Alamance County.

In Alamance County, municipal water service is provided by the Cities of Burlington, Elon, and Graham, the Town of Haw River, the Graham Water System, Mebane Water System, and the Orange-Alamance Water System. The City of Durham provides water, sewer, and stormwater service to City residents. In Orange County, water and sewer services are provided by the Town of Hillsborough and Orange Water and Sewer Authority. In Person County, the City of Roxboro provides water and sewer service.

3.6 CURRENT AND FUTURE LAND USE

Alamance, Durham, Orange, and Person Counties as well as several of the towns and cities within the Eno-Haw region have comprehensive land use plans in place. A community's comprehensive plan and future land use map guide development decisions and indicate where growth can be expected to occur based on land suitability and the community's overall vision and priorities. This section summarizes current and future land use and growth and development trends in each county.

ALAMANCE COUNTY

In 2020 Alamance County updated it previous comprehensive plan (2007). The 2020 Land Development Plan and Snow Camp Small Area Plan reviews existing conditions within the county and outlines a vision for future development. The Alamance County Planning Department is responsible for planning and development activities in the County.

Alamance County is characterized by substantial divide between rural and urban development. In recent years, the county has experienced increased development in unincorporated areas. In 2000, Alamance County's population totaled 130,800. By 2019, the population had increased by 30% to an approximate total of 170,000. As such, there was an influx of new housing – 18,000 new units between 2000 and 2019. Around 30% of this population growth (10,700 people) and 5,000 of the new residential units were located in the unincorporated county. Unincorporated areas that experienced growth include the NC-49 corridor between Burlington and Liberty, north and south of Mebane, and the Swepsonville area.

Agricultural uses make up almost 40 percent of total land use. Over 30 percent of the land area is designated as residential – 22 percent rural residential, 8 percent single family, and 1 percent multi-family/townhouse. More intense uses, including multi-family, commercial, industrial, and institutional land uses are concentrated in municipalities. Figure 3.6 displays a map of the county's existing land use.

FUTURE LAND USE

The future land use map is categorized by character areas that outline allowable uses, design characteristics, and density recommendations. The overall vision for future land use in the county includes focused growth near municipalities, defined opportunities for commercial and employment land uses, protection of rural character in less developed areas, and a decrease in development pressure in agricultural areas. Figure 3.7 displays the future land use map with the following land use categories:

- Municipal Growth
- Suburban Transition
- Rural Residential
- Agricultural
- Open Space and Parks
- Rural Center
- Mill Village
- Employment Centers

Figure 3.6 – Alamance County Existing Land Use Map, 2020

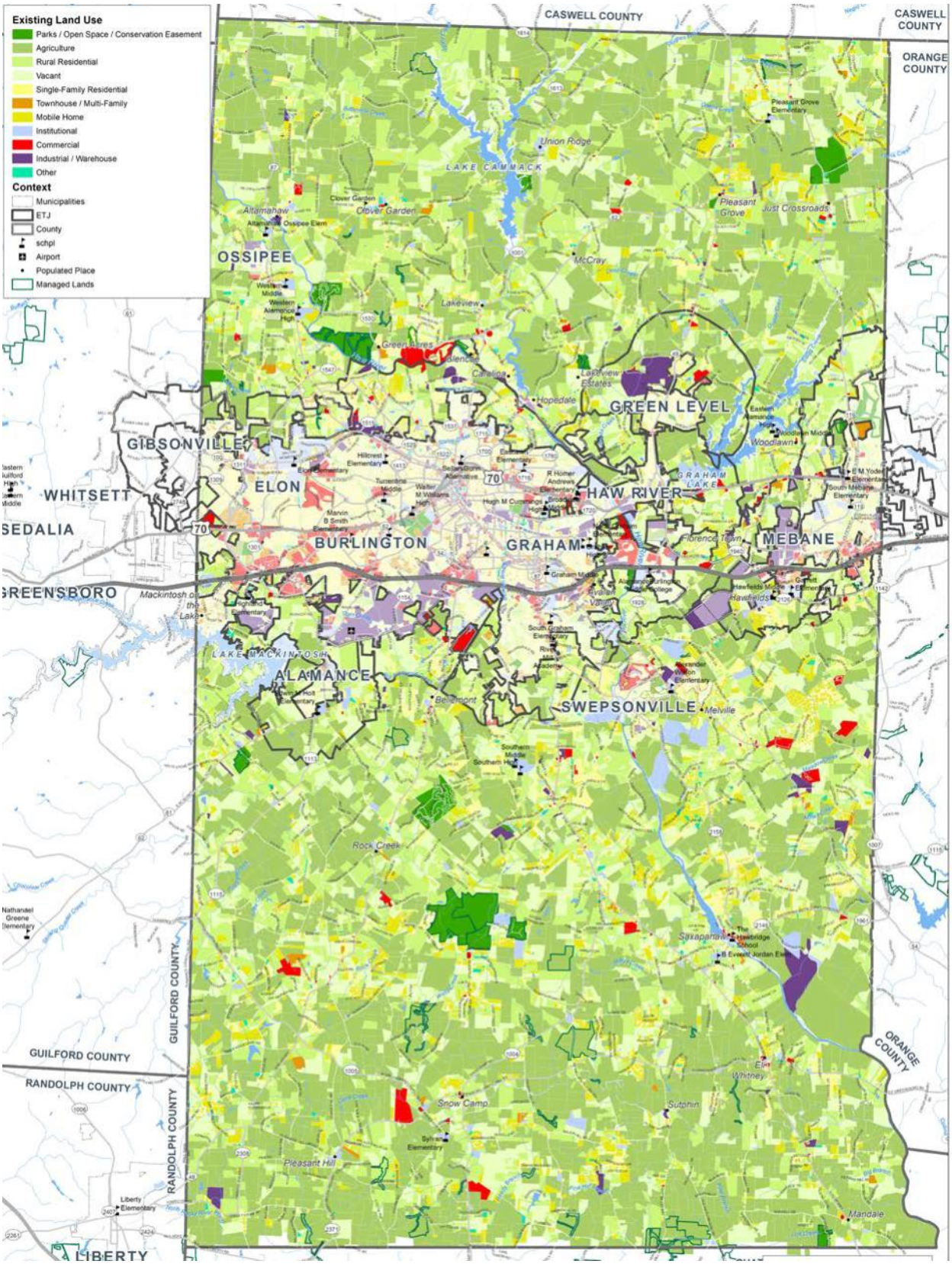
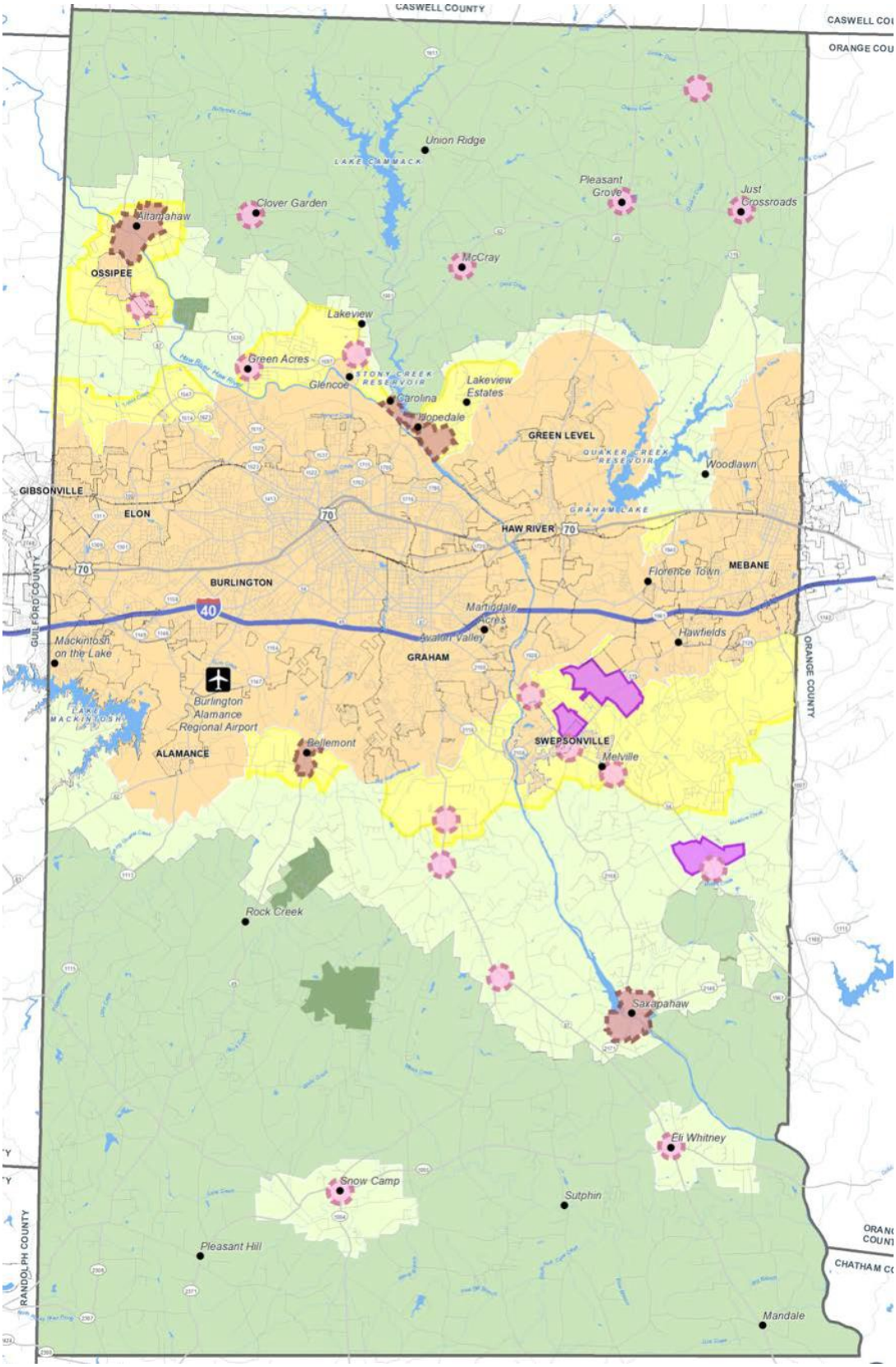


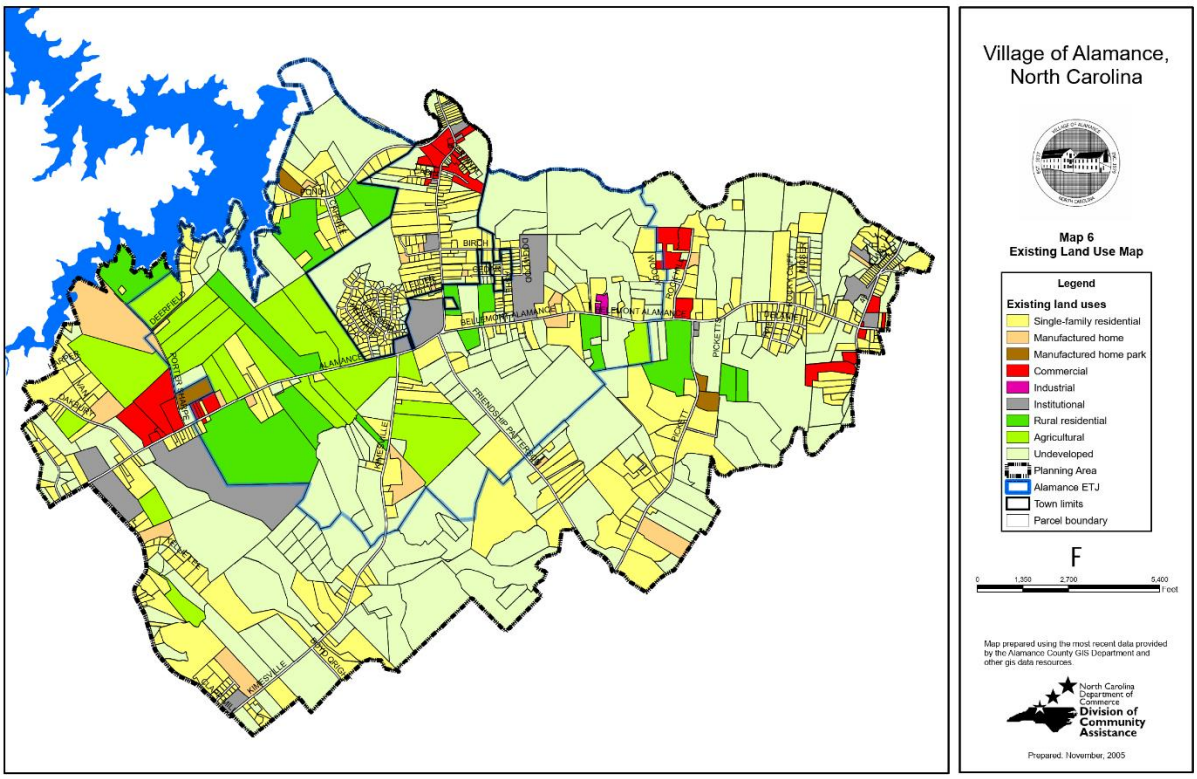
Figure 3.7 - Alamance County Future Land Use Map, 2020



VILLAGE OF ALAMANCE

The Village of Alamance 2024 Land Use Plan conveys a vision of the community for the next 15 to 20 years. Based on the previous land use analysis completed in 2005, the planning area covers a total land area of 6,417 acres. The ETJ area contains 1,319 acres and the village contains 458 acres. The remaining acreage is located in the area beyond the ETJ. Slightly more than 76 percent of the land in the ETJ was undeveloped, and in the village 36.08 percent of the land was undeveloped. Around 51 percent of the entire planning area was characterized as vacant and 25 percent single-family residential, however, single-family residential designates over 53 percent of the land uses within the village boundary. Figure 3.8 shows the existing land use map.

Figure 3.8 – Village of Alamance Existing Land Use Map, 2024



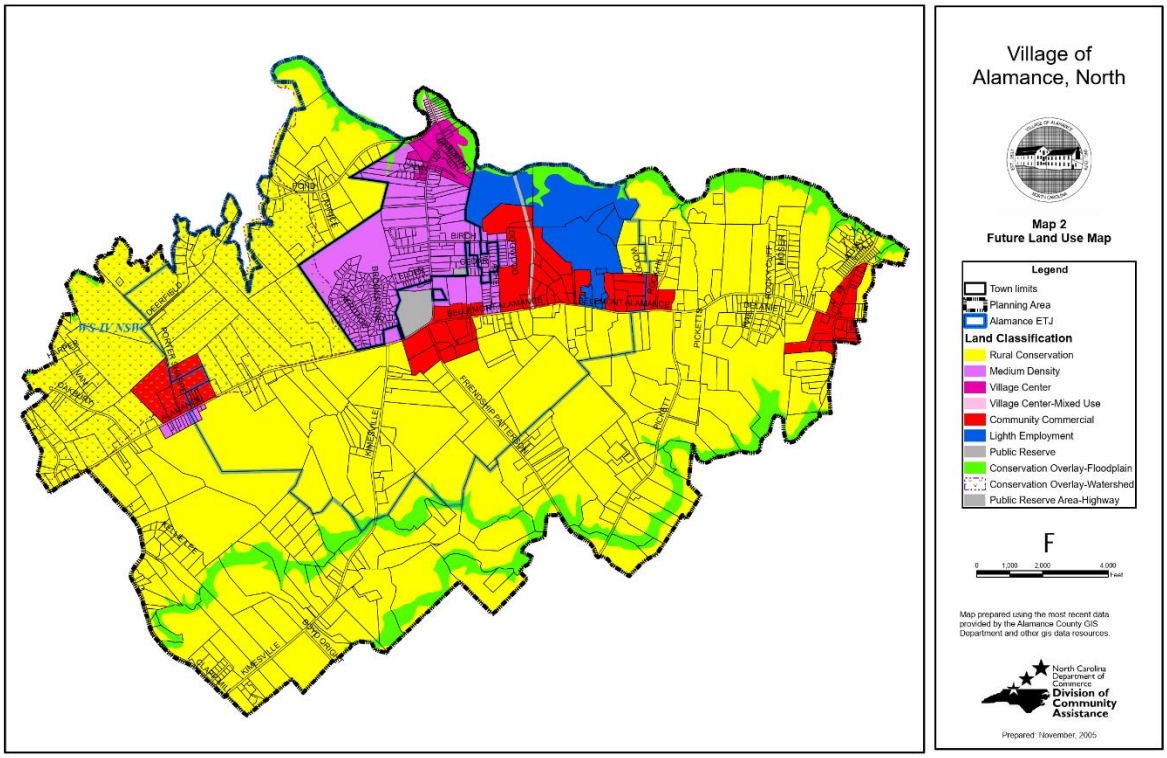
FUTURE LAND USE

The future land use map is broken down into land classification categories. Each classification is defined by established criteria for type, intensity, and location of land uses and public improvements that should occur in the planning area. The land classifications area as follows:

- Resource Conservation Overlay
- Public Reserve Areas
- Rural Conservation Areas
- Medium Density Residential
- Traditional Neighborhood Area
- The Village Center
- Community Commercial Areas
- Light Employment Center

A future land use map for the village is show in Figure 3.9.

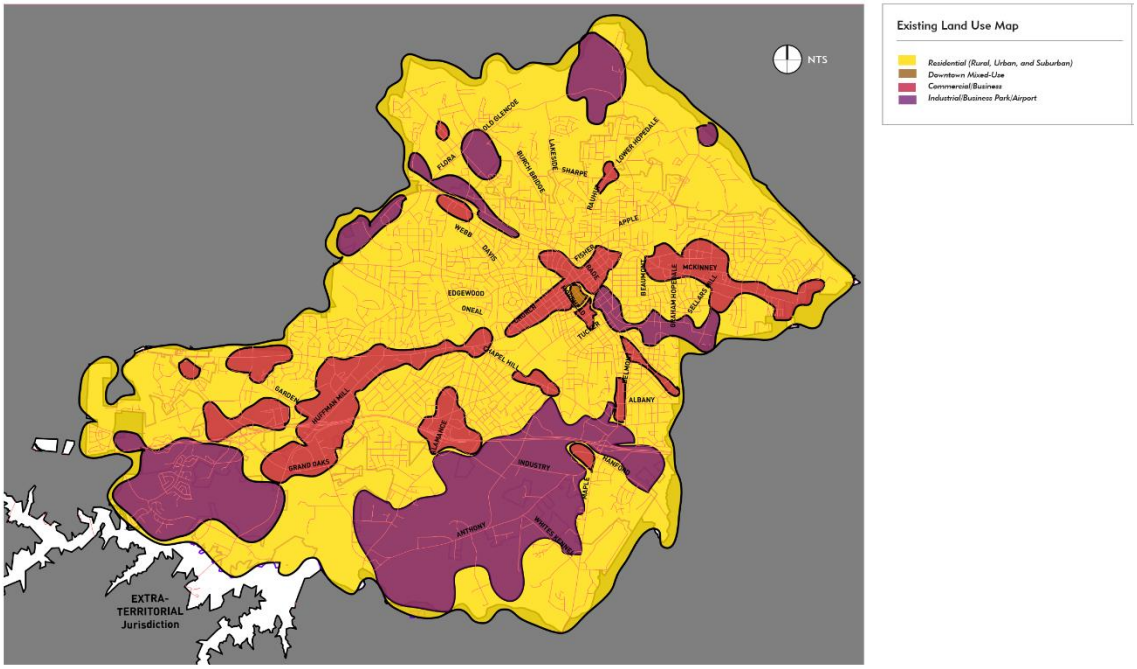
Figure 3.9 – Village of Alamance Future Land Use Map, 2024



CITY OF BURLINGTON

Based on the city's current comprehensive plan, 2015, there has been a growth pattern outward from the center – new development has for decades trended towards the south and west sides of the city and near the airport. Neighborhoods surrounding the core transitioned from mixed-use, typically mill-centric villages to primarily residential neighborhoods. However, Downtown and the city's major corridors throughout the city have remained commercial in nature. There are some remaining pockets of industry within, but those are concentrated in small districts throughout the city and its south side. Figure 3.10 displays the existing land use map.

Figure 3.10 – City of Burlington Existing Land Use Map, 2015



FUTURE LAND USE

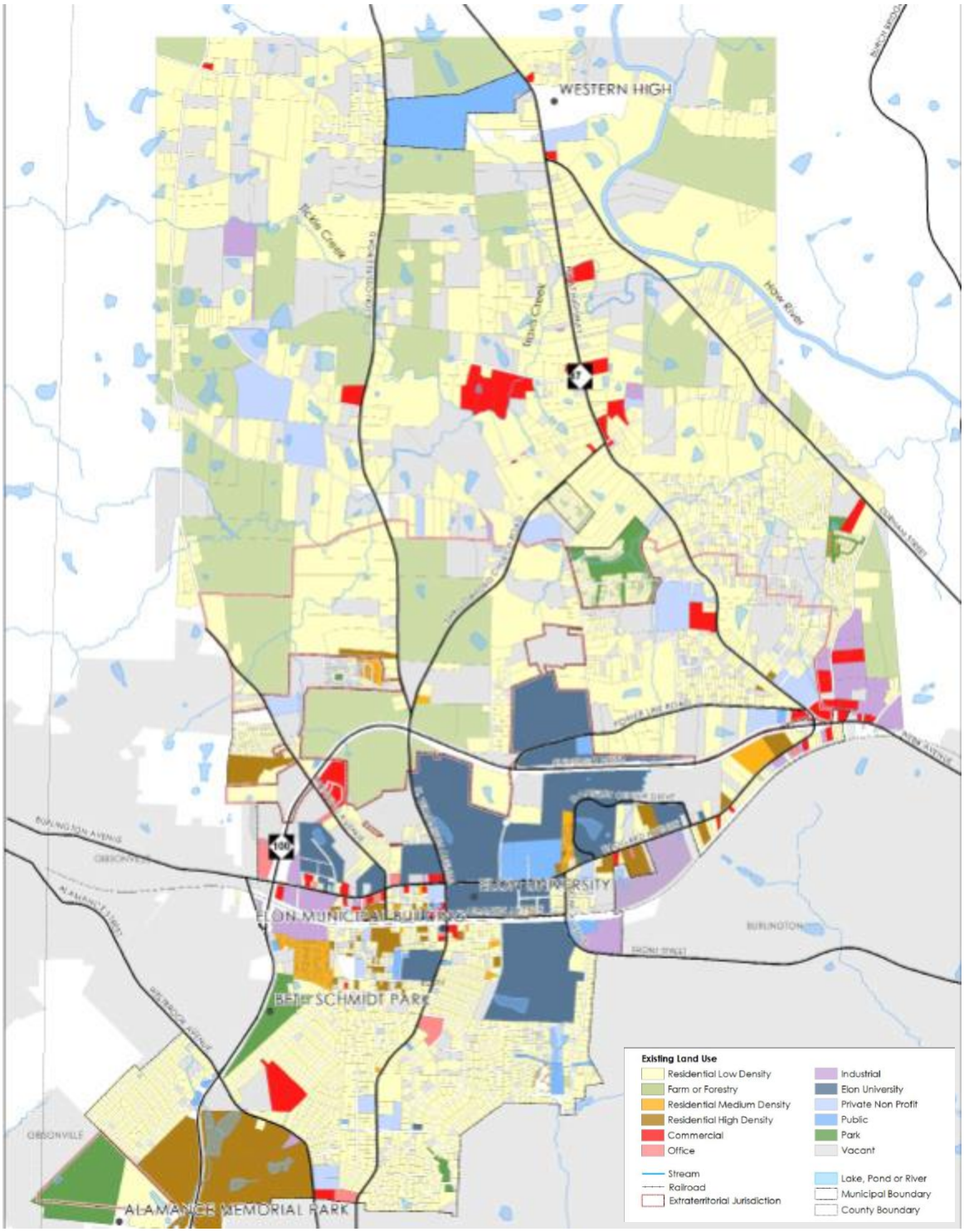
Burlington has room to grow on its fringe within its existing corporate limits but also has the opportunity to expand within its ETJ into the adjacent agricultural and rural lands. Based on its future land use goals, Burlington has a desire to focus on the redevelopment and revitalization of portions of the city that have suffered from little investment in infrastructure or buildings in decades. Particularly the east side of the city needs considerable attention from a development perspective and land use and zoning will need to support opportunities to revitalize that area of the city. A future land use map can be found in the City of Burlington Comprehensive Plan: Destination Burlington, 2015.

TOWN OF ELON

The Envision Elon 2040 Comprehensive Land Use Plan was adopted in 2019. Development is overseen by the Planning and Zoning and Development Services department.

Elon is intertwined with the college and has seen a noticeable increase in population of 9% from 2010 to 2017. Around 32.5 percent of the land area in the Elon is developed. The university is located in the southern portion of the Town and is surrounded by commercial and residential land uses. An existing land use map is shown in Figure 3.11.

Figure 3.11 – Town of Elon Existing Land Use Map, 2019



FUTURE LAND USE

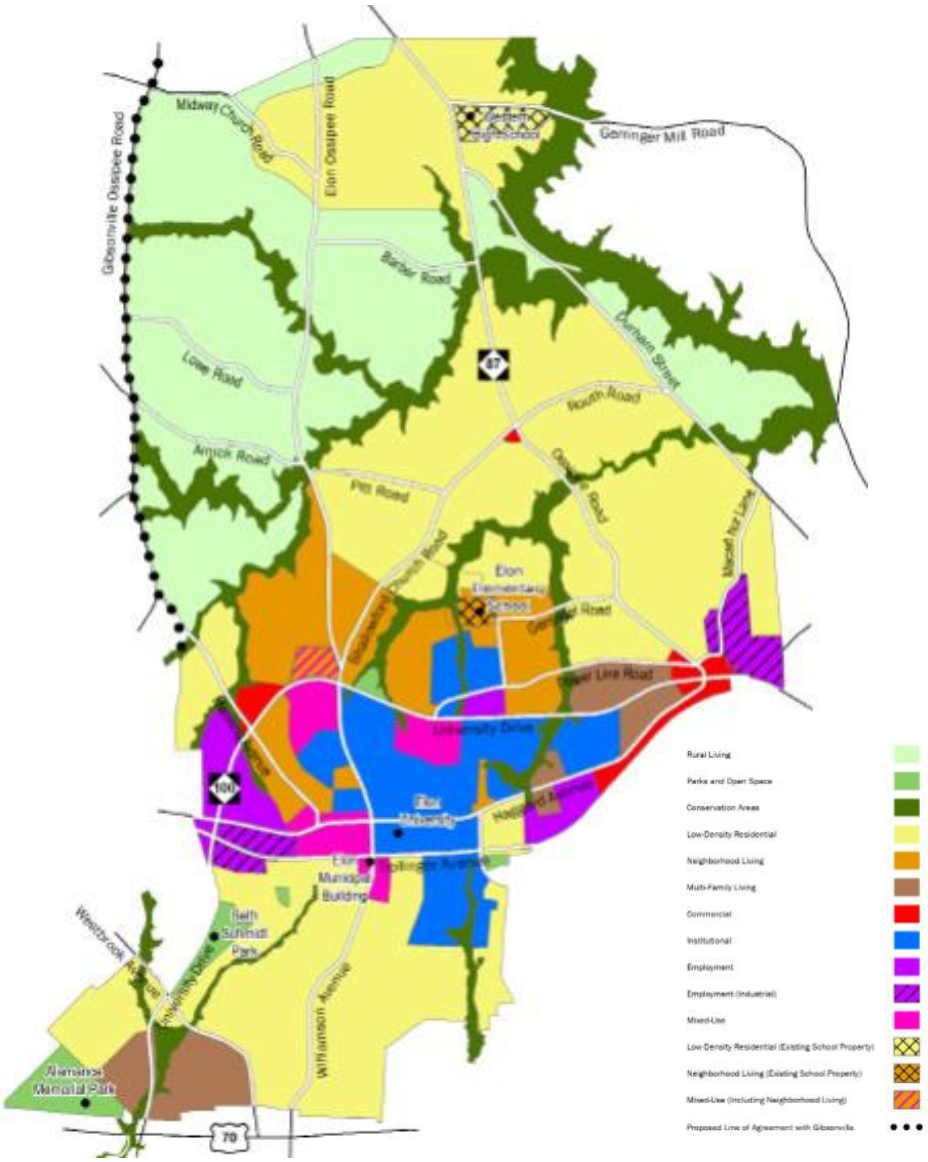
The town's future land use map is shown in Figure 3.12. Based on the town's vision and goals, they aim to concentrate future development in the "core" around Elon University and downtown to help foster walkability for those that live and work in the town. The town aims to integrate cultural and recreational

opportunities into the development pattern, fostering social connections. Also, by directing future development to the center of Elon, existing infrastructure capacity can be utilized, which is another goal.

The community is also committed to conserving valuable natural resources. The map delineates areas where such assets exist and should therefore be the subject of future conservation efforts. The map supports policies for lower density development near such assets and the use of conservation design to ensure minimal impacts to such resources. The future land use classifications area as follows:

- Commercial
- Employment
- Mixed-Use
- Multi-Family Living
- Neighborhood Living
- Low-Density Residential
- Rural Living
- Institutional
- Parks and Open Space
- Conservation

Figure 3.12 – Town of Elon Future Land Use Map, 2019



CITY OF GRAHAM

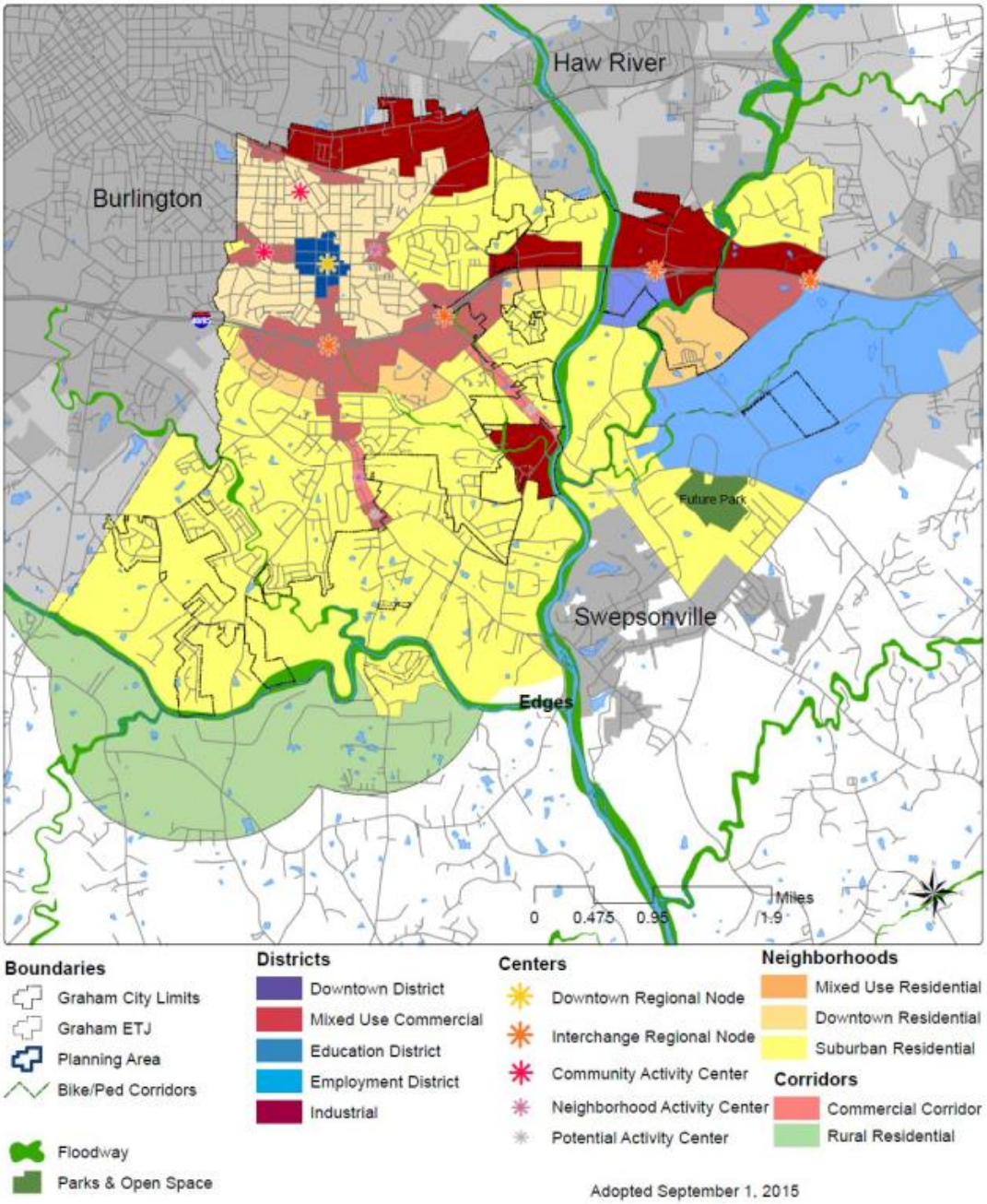
The Graham 2035 Comprehensive Plan was adopted in 2015. Based on the existing land use analysis described in this plan, existing land use development has remained consistent with previous spatial policies with the majority of the city zoned for residential uses.

FUTURE LAND USE

Graham will focus compact development in well-defined areas in order to increase the viability of regional transit, preserve open space, rural areas, and environmentally sensitive lands, efficiently provide public services and infrastructure, and promote infill development and redevelopment. Compact growth areas include a number of communitywide activity destinations, including downtown and future mixed-use activity centers that will serve as focal points and centers of activity. A future land use map is show in Figure 3.13. Future land use areas are categorized by the following classes:

- Downtown District
- Mixed Use Commercial
- Education District
- Employment District
- Industrial
- Downtown Regional Node
- Interchange Regional Node
- Community Activity Center
- Neighborhood Activity Center
- Potential Activity Center
- Mixed Use Residential
- Downtown Residential
- Suburban Residential
- Commercial Corridor
- Rural Residential

Figure 3.13 – City of Graham Future Land Use Map, 2015



TOWN OF GREEN LEVEL

Existing land uses were mapped and analyzed in the Town of Green Level Land Development Plan, 2018. The town has experienced limited land use changes over the past two decades. Changes that have occurred over the years have been attributed to forested lands being cleared for timber, loss of farmland to housing development, and some residential development throughout the town.

Table 3.9 below shows the acreage and percent of land area for each land use. Over 43 of the Town's land area is single-family residential and around 41 percent is farmland. A map of existing land use is in Figure 3.14.

Table 3.9 – Green Level Existing Land Use Categories and Acreage

Existing Land Use	Acres	Percent
Farmland	1,453.5	41.2%
Single-Family*	1,530.1	43.4%
Vacant	216.6	6.1%
Industrial	173.8	4.9%
Commercial/Office	58.6	1.7%
Institutional/Governmental	44.9	1.3%
Multi-family and Mobile Home Parks	42.3	1.2%
Recreation/Open Space	5.5	0.2%

*includes mobile homes

Source: Green Level Land Development Plan, 2018

FUTURE LAND USE

The town has experienced limited land use changes over the past two decades, however, it expects an increase in growth and development over the new few years. The future land use plan aims to mange growth to align with the overall vision and goals of Green Level. The town's future land use plan is shown in Figure 3.15. The future land use classes are as follows:

- Developed
  - City Core
- Transition
  - Town Activity Center
- Rural
- Conservation Overlay

Figure 3.14 – Town of Green Level Existing Land Use Map, 2018

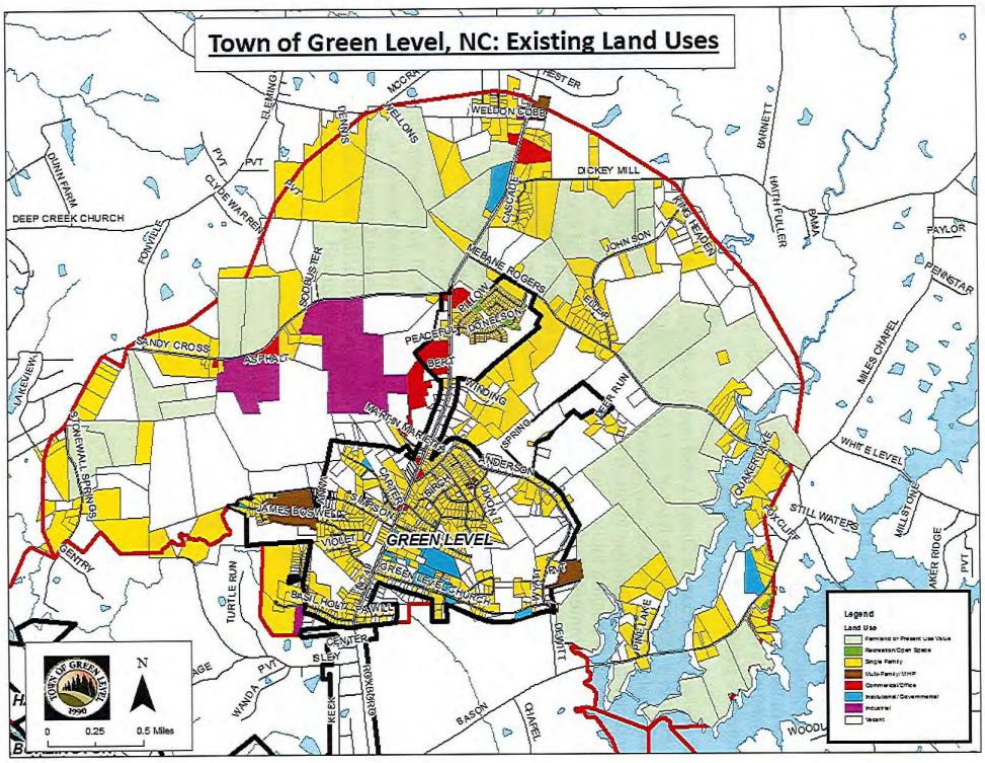
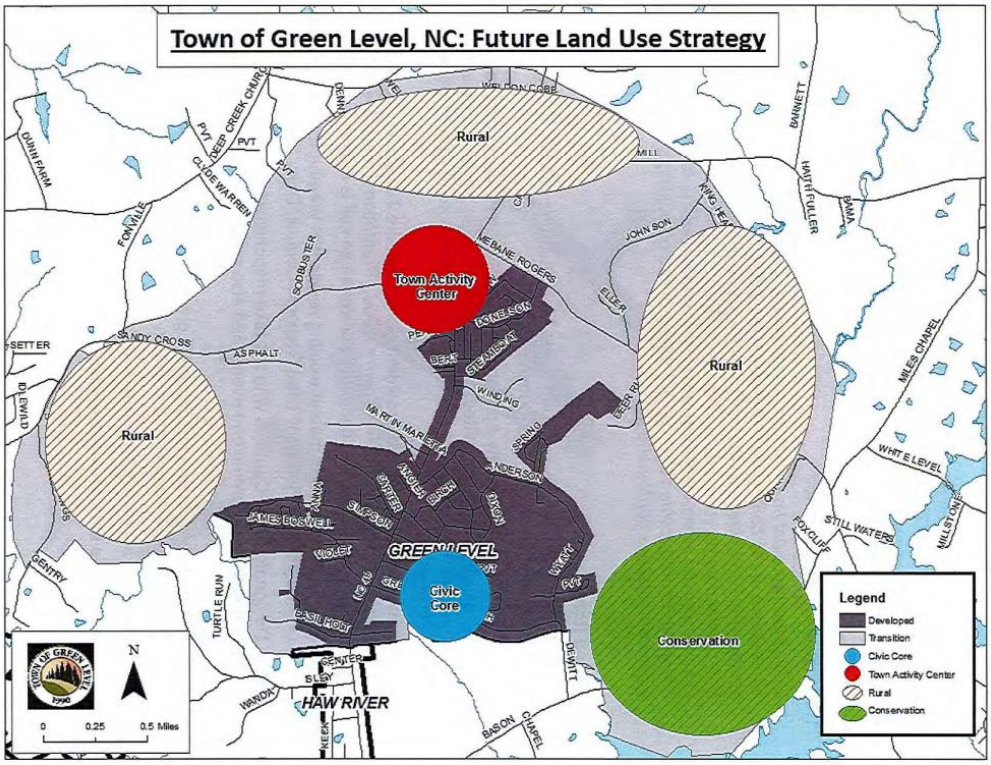


Figure 3.15 – Town of Green Level Future Land Use Map, 2018



TOWN OF HAW RIVER

The Town of Haw River created the Town Plan 2040, a Comprehensive Plan Use and Master Plan which was adopted in 2020.

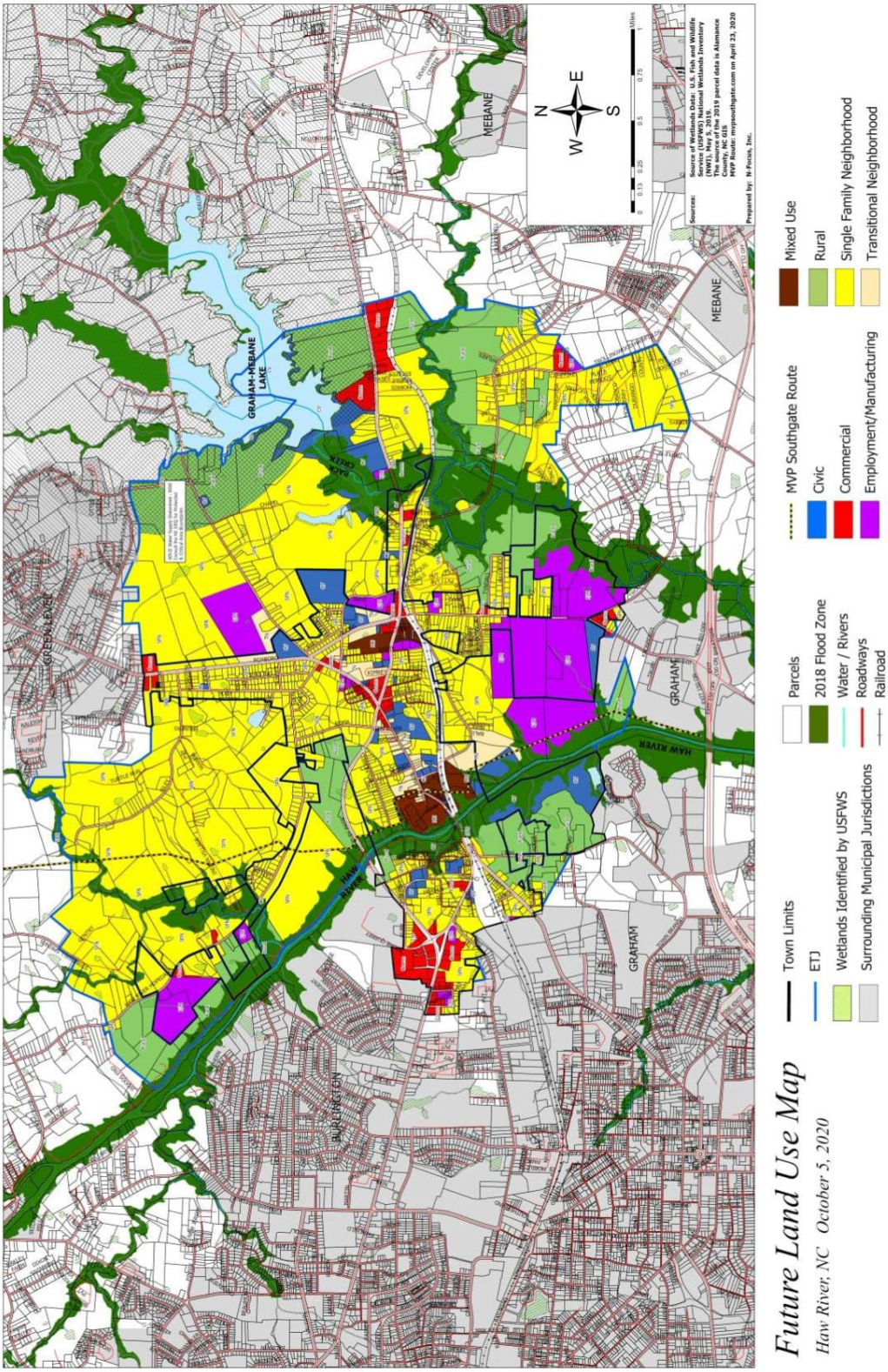
The town's main street is larger than any other commercial/industrial area of the Town and as such, includes the greatest number of employees. The majority of the remainder of the property includes low density neighborhoods, an elementary school, restaurants, a grocery store, civic/public service buildings, gas stations, places of worship and a few textile manufacturers and businesses developed somewhat in isolation from other buildings.

FUTURE LAND USE

For the most part, the future land use map has been developed to focus redevelopment and new development of sufficient densities in areas where utilities already exist or are already programed to be extended. Several areas of town have been identified and designated on the future land use map for mixed use and commercial land uses as these areas should be encouraged to be redeveloped or enhanced as vacant or underperforming properties are replaced. The future land use map is shown in Figure 3.16 and the designation categories area as follows:

- Civic
- Commercial
- Employment/Manufacturing
- Mixed Use
- Rural
- Single Family Neighborhood
- Transitional Neighborhood

Figure 3.16 – Town of Haw River Future Land Use Map, 2020



CITY OF MEBANE

Mebane's land uses were mapped in the City of Mebane Comprehensive Land Development Plan, 2017. The city's existing land use map is shown in Figure 3.17. Table 3.10 below shows the acreage totals for each major category of land use within the city limits, the city's ETJ, and the remaining study area, as shown on the following map.

The City of Mebane has seen steady growth since the last land development plan, completed in 2001. Recent growth has occurred across sectors: manufacturing, distribution, commercial and residential. It has been particularly concentrated along I-40/85 in close proximity to interchanges.

Around 31 percent of the city is single-family homes. Only 3.5 percent of the land area is occupied by multi-family homes, however, these units make up 65 percent of new residential units within Mebane. Within the Mebane city limits, 25% of the land (1,409 acres) is undeveloped, scattered in various locations. About 204 acres of the Mill Creek subdivision remain undeveloped, comprising nearly 15% of the City's total undeveloped acreage. In the City's ETJ, 32% of the land (2,364 acres) is undeveloped.

Table 3.10 – Mebane Existing Land Use Acreage, 2017

Land Use	City		ETJ		Remaining Study Area		Total Study Area	
	Acres	%	Acres	%	Acres	%	Acres	%
Single Family <10 Acres	1,463.1	25.5%	1,530.0	20.4%	2,368.3	19.2%	5,361.3	21.0%
Single Family 10+ Acres	32.7	0.6%	1,023.1	13.6%	1,229.7	10.0%	2,285.5	8.9%
Mobile Home <10 Acres	10.2	0.2%	166.0	2.2%	373.3	3.0%	549.5	2.2%
Mobile Home 10+ Acres	0.0	0.0%	33.4	0.4%	217.5	1.8%	250.9	1.0%
Mobile Home Park	8.5	0.1%	197.0	2.6%	106.8	0.9%	312.3	1.2%
Duplex	3.6	0.1%	0.9	0.0%	0.0	0.0%	4.5	0.0%
Townhome	21.6	0.4%	0.0	0.0%	0.0	0.0%	21.6	0.1%
Apartments	173.5	3.0%	0.0	0.0%	0.0	0.0%	173.5	0.7%
Institutional	251.3	4.4%	139.9	1.9%	130.3	1.1%	521.4	2.0%
Office	44.0	0.8%	5.0	0.1%	1.0	0.0%	49.9	0.2%
Commercial	386.9	6.7%	66.3	0.9%	65.1	0.5%	518.3	2.0%
Industrial	804.8	14.0%	300.0	4.0%	58.2	0.5%	1,163.0	4.6%
Infrastructure	0.7	0.0%	6.2	0.1%	27.6	0.2%	34.5	0.1%
Mixed Use	0.1	0.0%	0.0	0.0%	0.0	0.0%	0.1	0.0%
Recreation	489.7	8.5%	44.0	0.6%	191.1	1.6%	724.9	2.8%
Agriculture	72.3	1.3%	1,159.7	15.4%	4,277.8	34.8%	5,509.7	21.6%
Undeveloped	1,409.4	24.6%	2,363.5	31.5%	2,673.6	21.7%	6,446.4	25.2%
ROW	565.3	9.9%	475.9	6.3%	587.6	4.8%	1,628.8	6.4%
TOTAL	5,737.6		7,510.9		12,307.7		25,556.2	

Source: Mebane Comprehensive Land Development Plan

FUTURE LAND USE

Three community building principles were used in developing the City of Mebane's growth strategy and to define the geography of its primary growth strategy areas. Principle one focuses on incorporating a mix of land uses to achieve a classic village feel and function. This will prioritized in the at the NC-119 Bypass/US-70 confluence and the Cameron Lane areas. Principle two aims to expand the road network to avoid "unconnected roads". The aim is to develop a network that will disperse traffic, making roads safer for cyclists and pedestrians, and less congested at rush hours. Principle three focuses on the expansion of conservation development. The primary purpose of conservation development is to optimize the efficiency of development projects, protecting areas of open space within each development and connecting them together for a shared green infrastructure that benefits the larger community. A growth strategy map is displayed in Figure 3.18.

Figure 3.17 – Mebane Existing Land Use Map, 2017

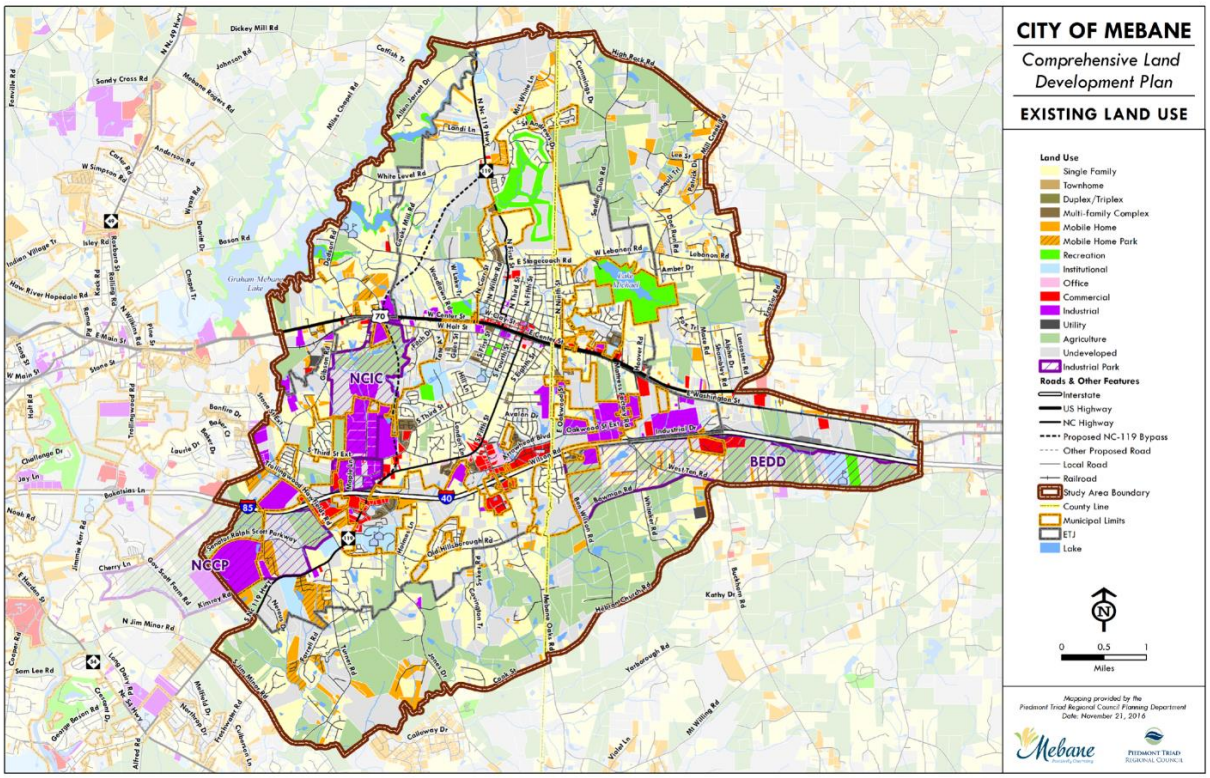
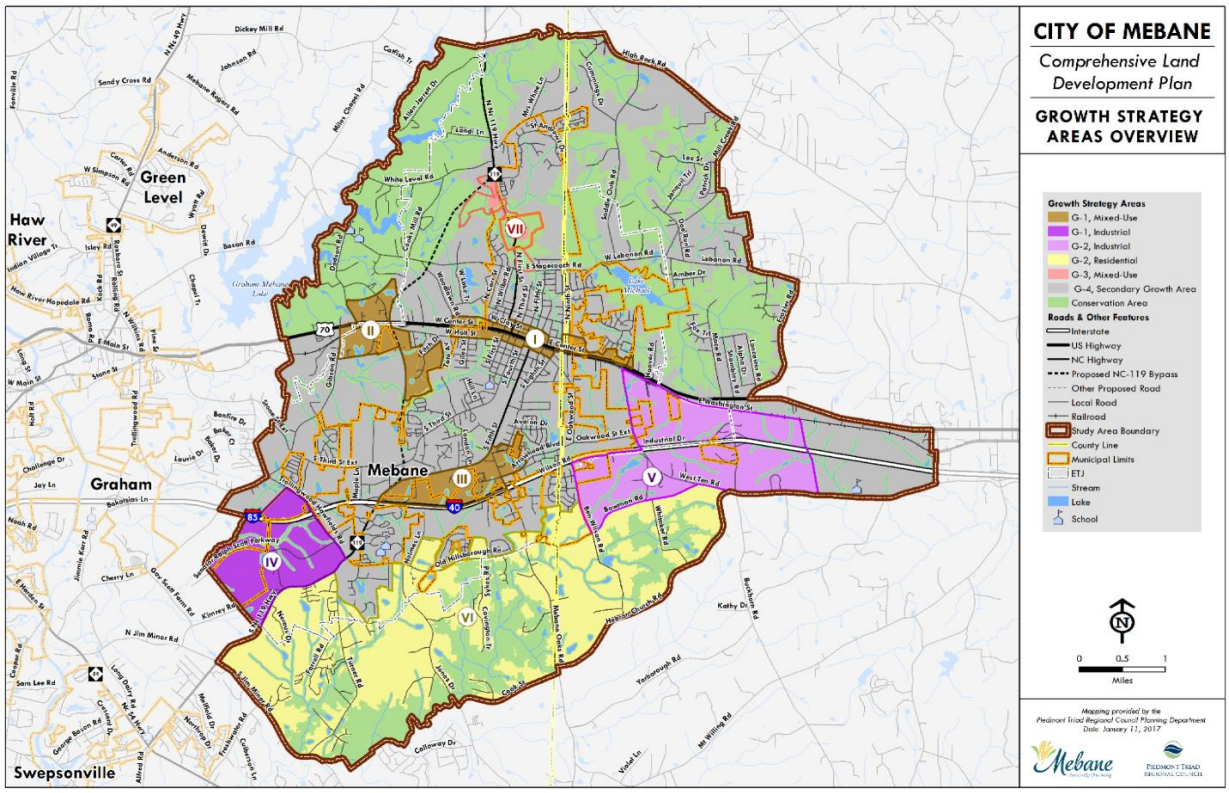


Figure 3.18 – Mebane Growth Strategy Areas Map, 2017



TOWN OF SWEPSONVILLE

The Town's corporate limits encompass approximately 1.4 square miles of land. The Town's population has increased steadily over the past 20 years and is projected to continue increasing slowly over the next decade.

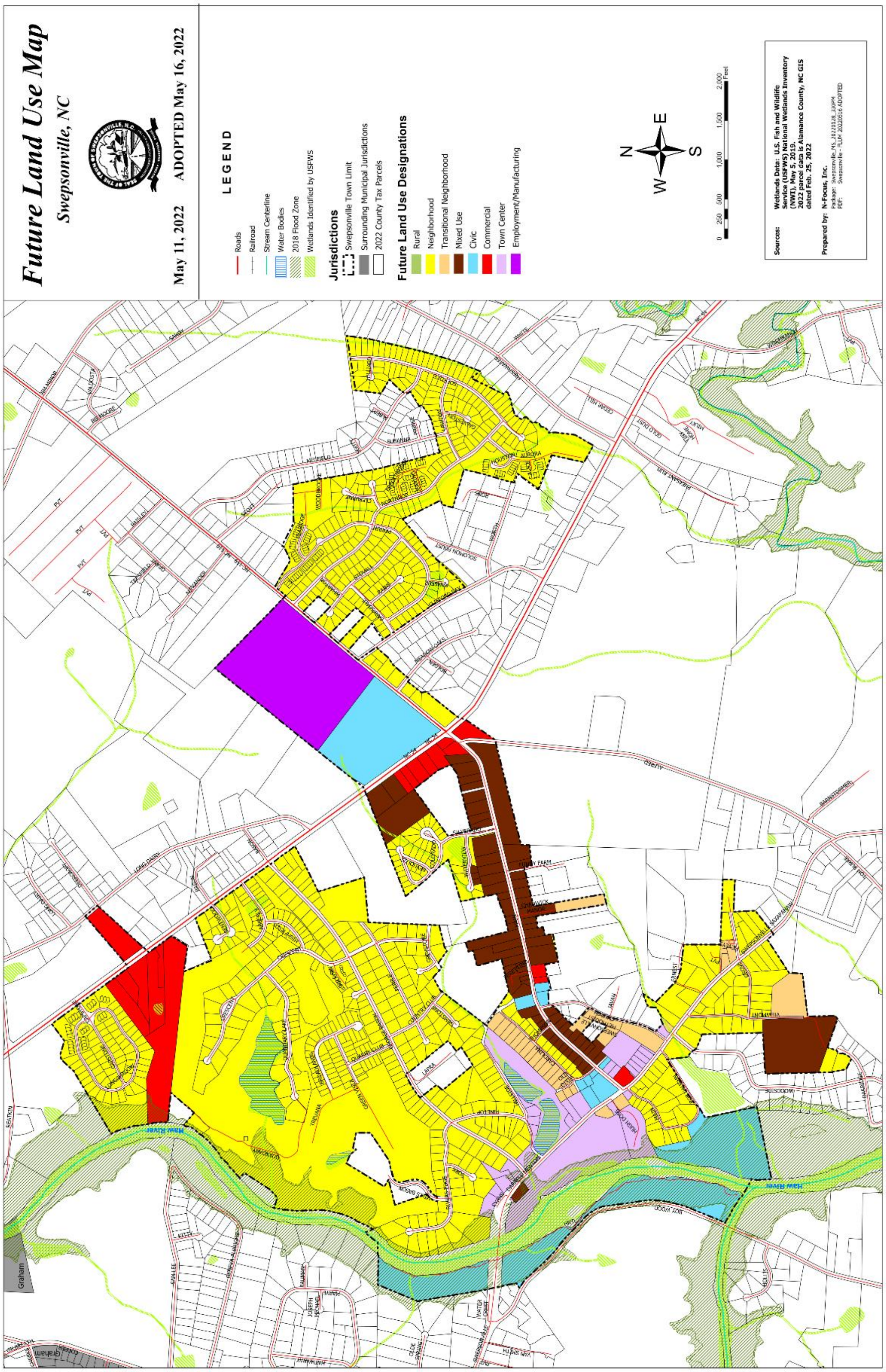
According to the Town of Swepsonville's 2040 Comprehensive Land Use and Master Plan (2022), the majority of the town's existing land uses is comprised of single-family residences. Along NC Highway 54 and Highway 119 is the Honda Power Equipment Manufacturing Plant, the largest manufacturing operation in the community. The town's historic "Main Street" area is an untapped resource with potential for development. Additionally, the parcel, across from the Swepsonville Farmers Market, has frontage on the Haw River and has a lot of redevelopment potential from both a local economic and cultural perspective.

FUTURE LAND USE

The future land use map in Figure 3.19 depicts a pattern of development to accommodate a combination of residential, non-residential and mixed-use growth and redevelopment. One of the recommendations detailed in the 2022 comprehensive plan, is the development of a 'town campus' housing government operations (i.e. administration, police, etc.) and community recreational amenities as well as expanding commercial development/redevelopment along the Swepsonville-Saxapahaw Road corridor as a means of establishing a downtown commercial area within the community.

The Town has also designated several parcels along the NC Highway 54 corridor as viable for redevelopment into Commercial/Mixed Use land uses. The Town envisions phasing out several existing residential land uses within the corridor in support of additional non-residential development.

Figure 3.19 – Swepsonville Future Land Use Map, 2022



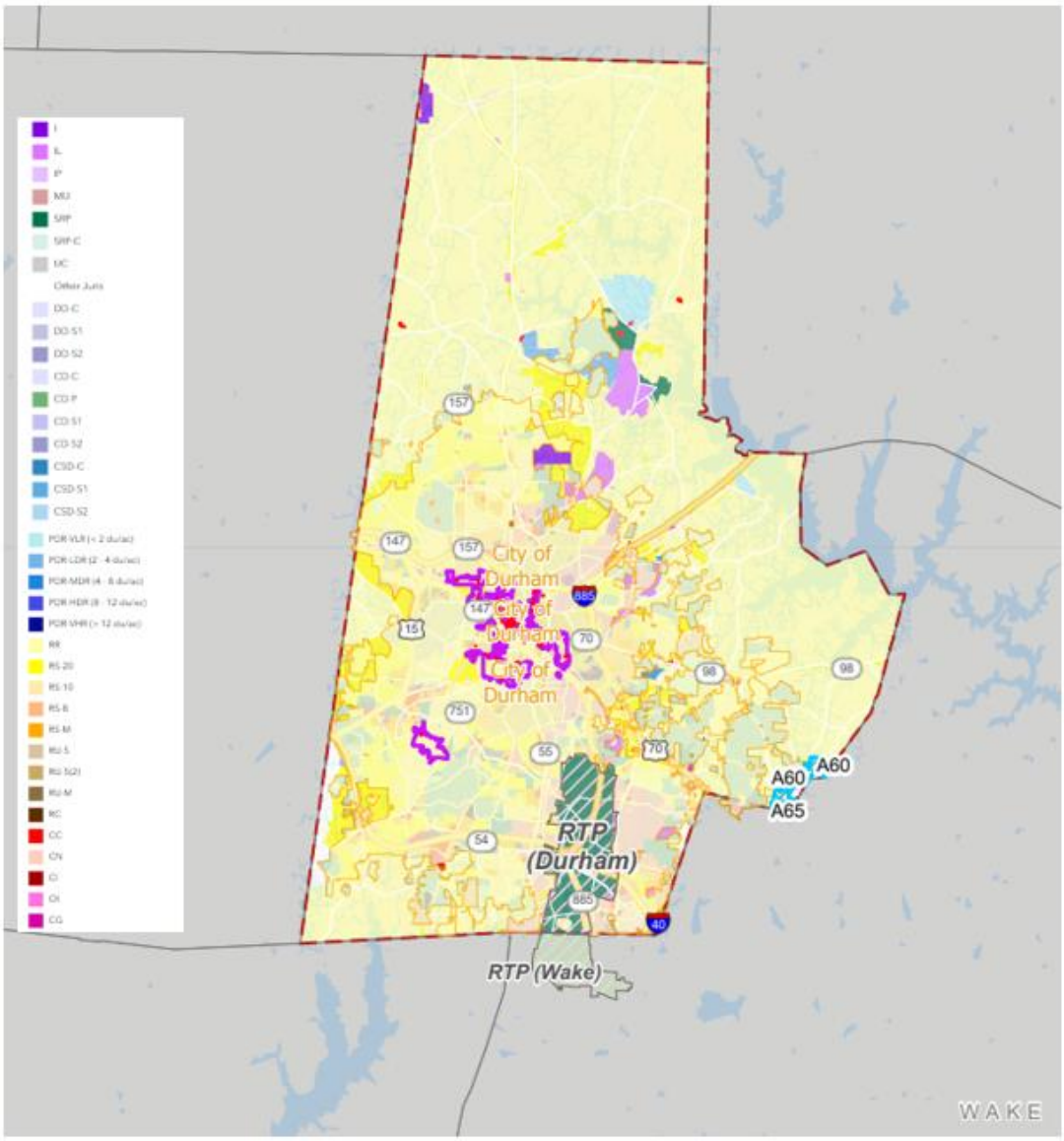
DURHAM COUNTY & CITY

Durham City-County Planning Department is responsible for planning activities throughout the City and County. Durham has a Comprehensive Plan adopted in 2023.The plan guides where and how private development should occur as well as how the City and County should provide public facilities and services to support future growth. The plan is long range in scope, focusing on the next 30 years.

Based on the zoning map in Figure 3.20, a large portion of Durham County is zoned for residential uses while the city has a range of uses including residential, commercial, and industrial with varying levels of intensity.

Since the previous comprehensive plan (2008), Durham has seen a rapid increase in growth that has resulted in a higher cost of living and disproportionately impacted residents. The overall growth strategy aims to manage growth to provide equitable access to services, transportation, housing and mitigate negative impacts of potential displacement.

Figure 3.20 – Durham City-County Zoning Map, 2023



FUTURE LAND USE

Outlined in the 2023 comprehensive plan, Durham created a growth management strategy that outlines how the City of Durham and County of Durham make decisions about where to direct new development, what infrastructure to invest in, and what kind of development to approve. Areas of future growth are shown in Figure 3.21. Future Growth Areas have been identified as parts of Durham within the Urban Growth Boundary that are currently undeveloped or sparsely developed and need critical infrastructure upgrades (like water, sewer, or fire service) to serve new development.

In conjunction with the growth management strategy, Durham created Place Types which show where, geographically different types of land uses (ex. houses, businesses, farmland etc.) should be in the future. The Place Type Map, shown in Figure 3.22, is also where you can see how the growth management strategy functions geographically. The map shows the Urban Growth Boundary, Future Growth Areas, and all the Place Types that work together to guide how Durham develops. Additionally, different Place Type designations work together on the Place Type Map to move Durham towards a 15- minute community, part of Durham's Growth Management Strategy.

As new developments are proposed in Zoning Map Change applications and Annexation applications, Planning staff, City Council, County Commissioners, Planning Commission, and residents will use the Place Types, Place Type Map, and Policies to evaluate whether or not the development proposal meets the community's vision. The place types are as follows:

- Apartment & Townhouse Neighborhood
- Community Institution
- Downtown
- Employment Campus
- Established Residential
- General Industrial
- Highway Commercial
- Institutional Campus
- Mixed Employment
- Mixed Residential Neighborhood
- Mixed Use Neighborhood
- Neighborhood Services
- Planned Suburban Neighborhood
- Rural & Agricultural Reserve
- Rural Commercial
- Resource Extraction
- Recreation & Open Space
- Suburban Commercial
- Transit Opportunity Area
- Utility & Public Works Facilities
- Urban Growth Boundary
- Future Growth Areas

Figure 3.21 – Durham Urban Growth Boundary and Future Growth Areas

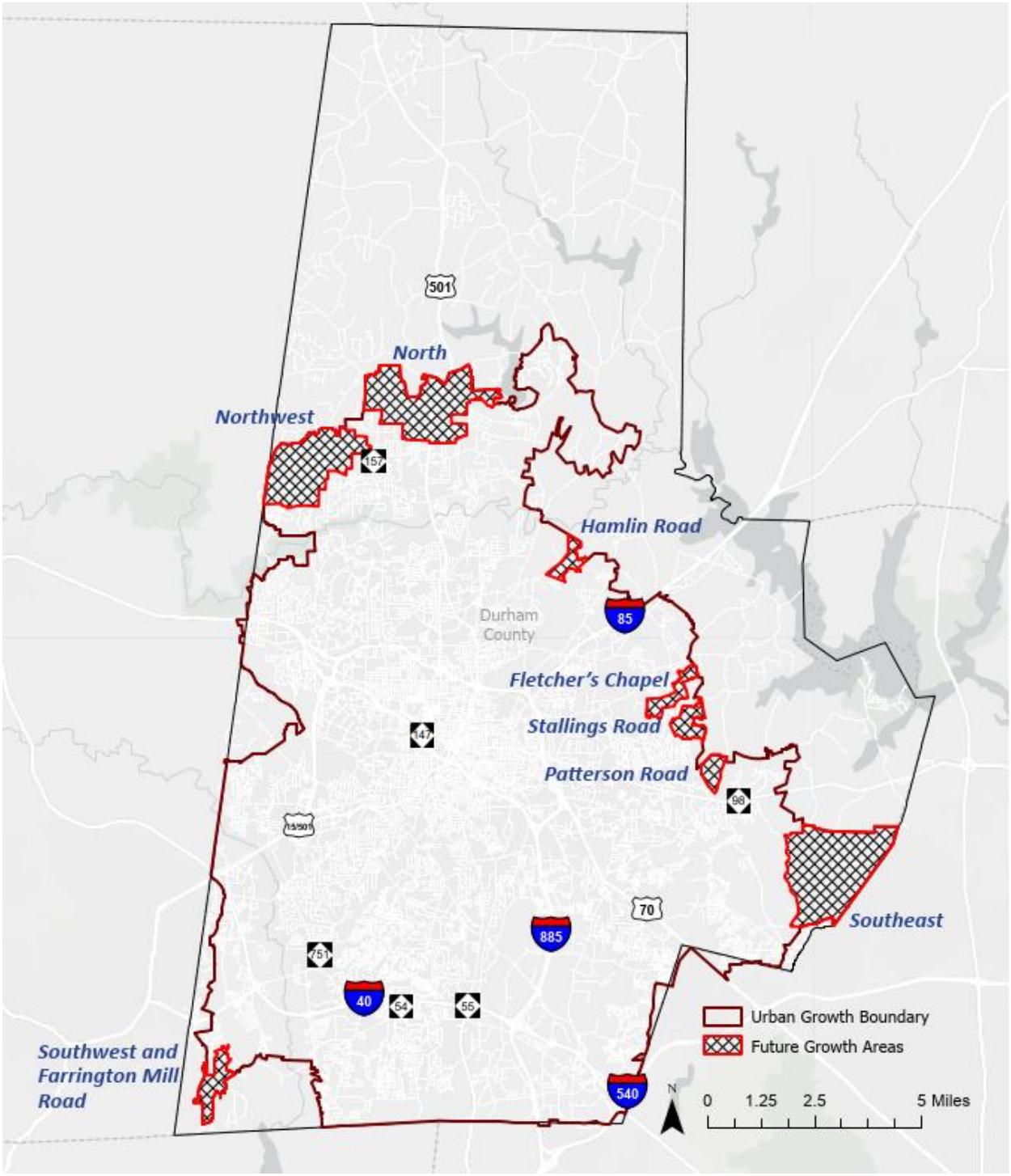
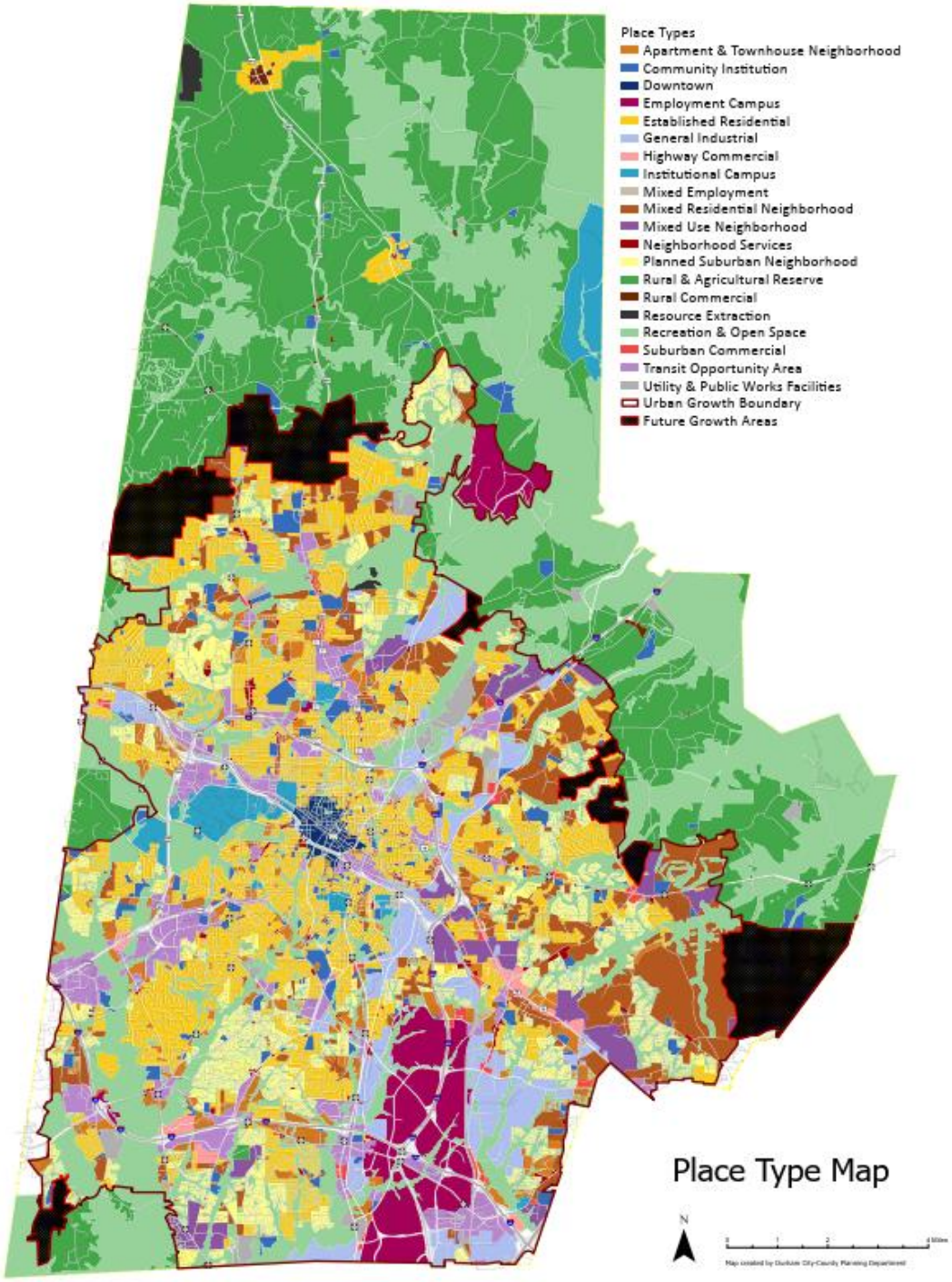


Figure 3.22 – Durham Place Type Map



ORANGE COUNTY

The Orange County Comprehensive Plan (2008) is an official public document that provides the framework for long range decision making in the community. The Plan serves to guide the County's growth and development through the year 2030 by addressing the multitude of issues facing the county.

In 2023 the county began updating the comprehensive plan and developing the Orange County Land Use Plan 2050. This plan will serve to guide the County's growth and conservation efforts through the year 2050. The Land Use Plan will consider a variety of topics related to physical planning in the community, including:

- Community Equity
- Community Resiliency and Climate Change
- Economic Development
- Farmland Protection
- Housing
- Natural and Cultural Systems
- New development and redevelopment
- Parks and Recreation
- Services (Utilities) and Community Facilities
- Transportation

In preparation for the 2050 plan, Orange County developed a New Issues and Opportunities report to reflect on changes since the development of the previous plan in 2008. The report notes that county has experienced modest population growth with a difference of about 23% between 2005 (population of 121,991) and 2022 (150,477). From 2010 to 2020, the greatest increase in population numbers in Orange County was in the unincorporated areas. Within the context of these population changes, Orange County has experienced shifts in four key topic areas related to land use planning: agriculture, natural and water resources, housing, and climate action.

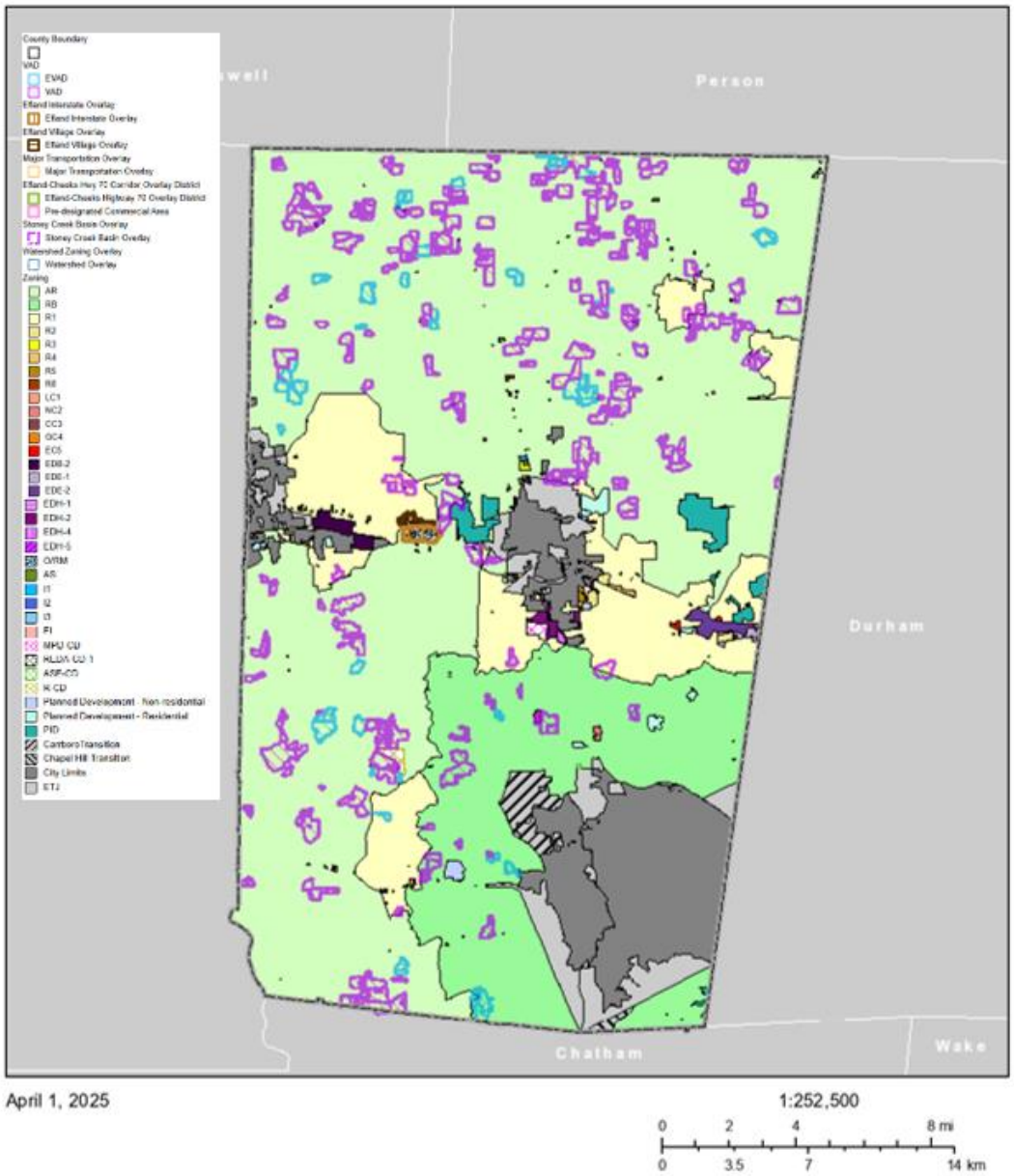
Currently, nearly 75% of Orange County consists of prime farmland soil. However, farmland conversion—the change of farmland to non-agricultural uses, such as low-density residential uses—continues to be a threat to Orange County's working lands. Based on the zoning map in Figure X, the county is primarily zoned for residential and agricultural uses.

FUTURE LAND USE

Orange County's Future Land Use Map is shown in Figure 3.24 on the following page. Orange County identifies 10-year and 20-year transition areas for growth but also has a significant area in the southeastern quadrant of the county around the Towns of Chapel Hill and Carrboro designated as rural buffer area. The county is currently updating its future land use map, however, the new plan will follow four overarching themes that will guide future development and policies:

- Protecting Critical Watershed Areas and Open Spaces and Preserving Agricultural Lands
- Advancing Attainability of Equitable Housing and Upward Mobility
- Supporting Climate Responsive Transportation Systems and Economic Development Initiatives
- Cultivating Sustainable Development

Figure 3.23 – Orange County Zoning Map



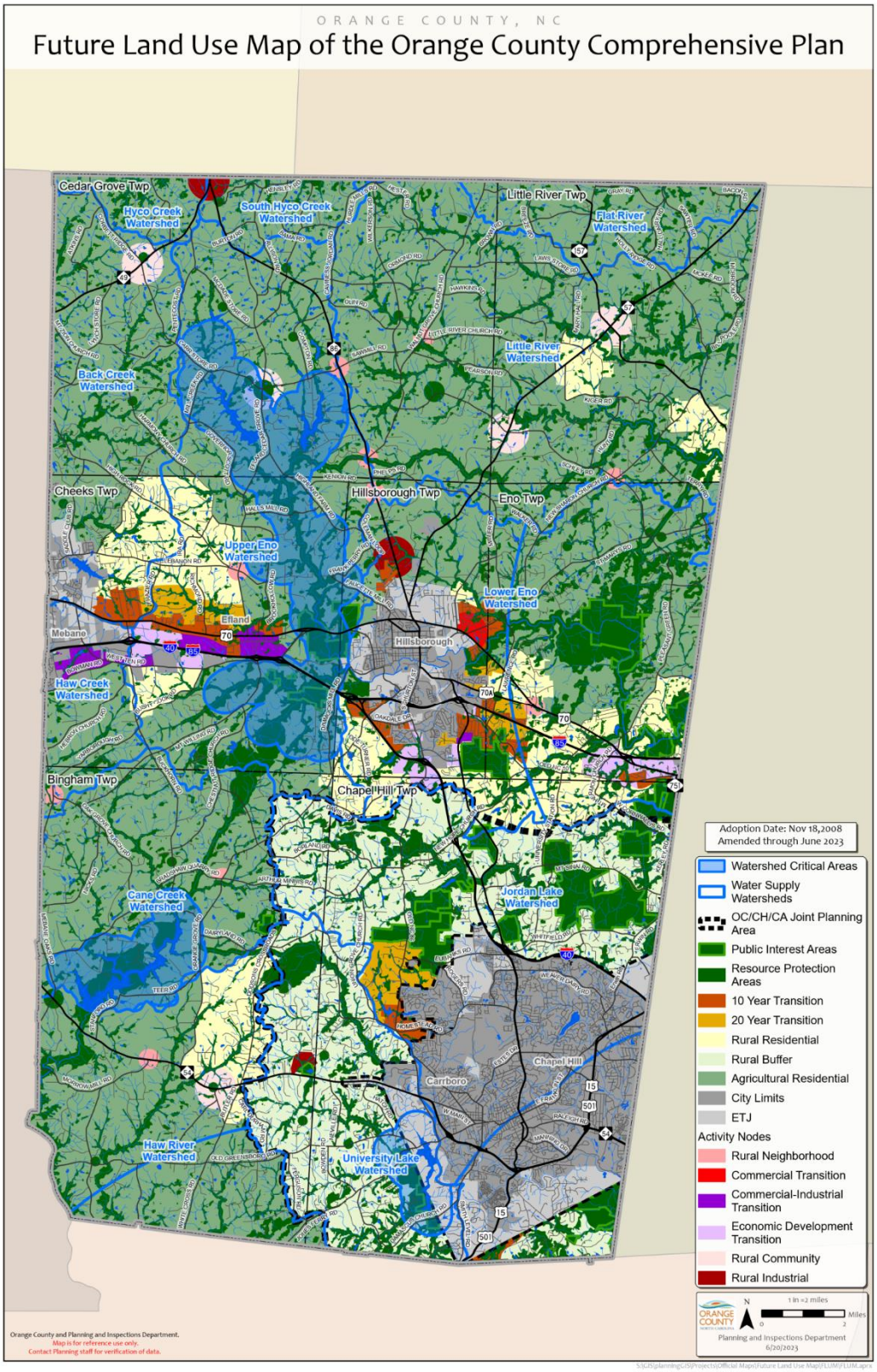
April 1, 2025

1:252,500

0 2 4 8 mi

0 3.5 7 14 km

Figure 3.24 – Orange County Future Land Use Map, 2008



TOWN OF CARRBORO

The Town of Carrboro developed its first comprehensive plan in 2022, the Carrboro Connects Comprehensive Plan. The plan looks 20 years into the future and is focused around themes of race and equity and climate action, which are integral across every aspect of the plan.

Based on the existing land use map in Figure 3.25, Carrboro's largest land use consists of residential areas with a mix of housing types and a concentration of multi-family housing in the southeastern side of the town. There are several areas designated for parks, open space, and conservation easements scattered throughout the town. A mix of business, commercial, and government uses are clustered in the southeastern part of Carrboro.

FUTURE LAND USE

The future land use map in Figure 3.26 shows existing and proposed land uses throughout the town, Northern Study Area, and ETJ. Proposed changes are shown hatch lines on the map. Strategies and projects outlined in this plan call for establishing greater density near transit and key nodes, and more land available for affordable housing, commercial and light industrial development, and parkland. The plan also outlines specific changes and development for four corridor projects that include redevelopment of business districts, increasing affordable housing, transportation upgrades, new recreation areas, and new commercial and mixed-used development. Details and maps of the proposed projects can be found in the comprehensive plan. The focus areas are as follows:

- Jones Ferry Road Corridor and Downtown
- NC 54
- Rogers, Homestead and Old NC 86
- Estes and N. Greensboro

Figure 3.25 – Town of Carrboro Existing Land Use, 2022

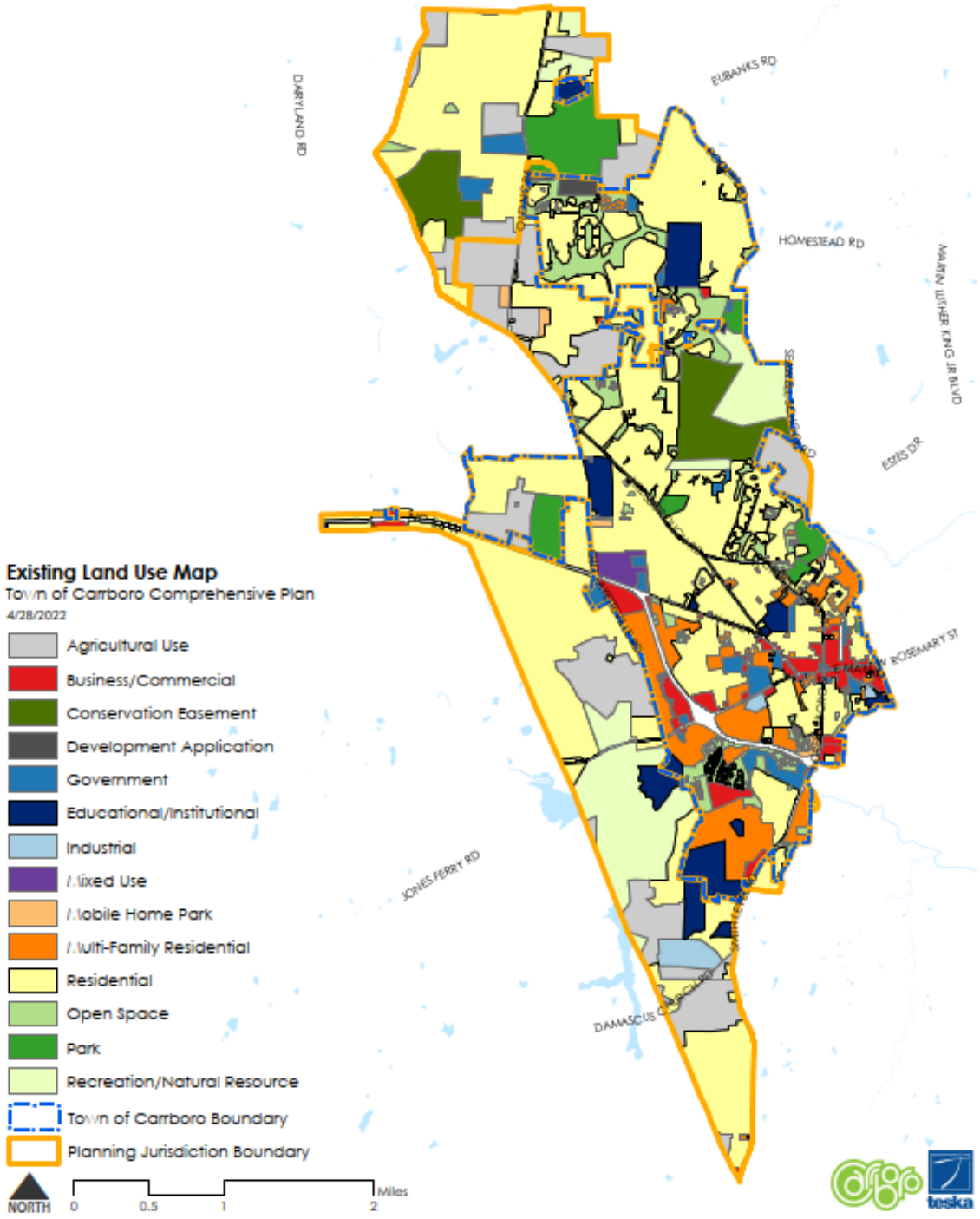
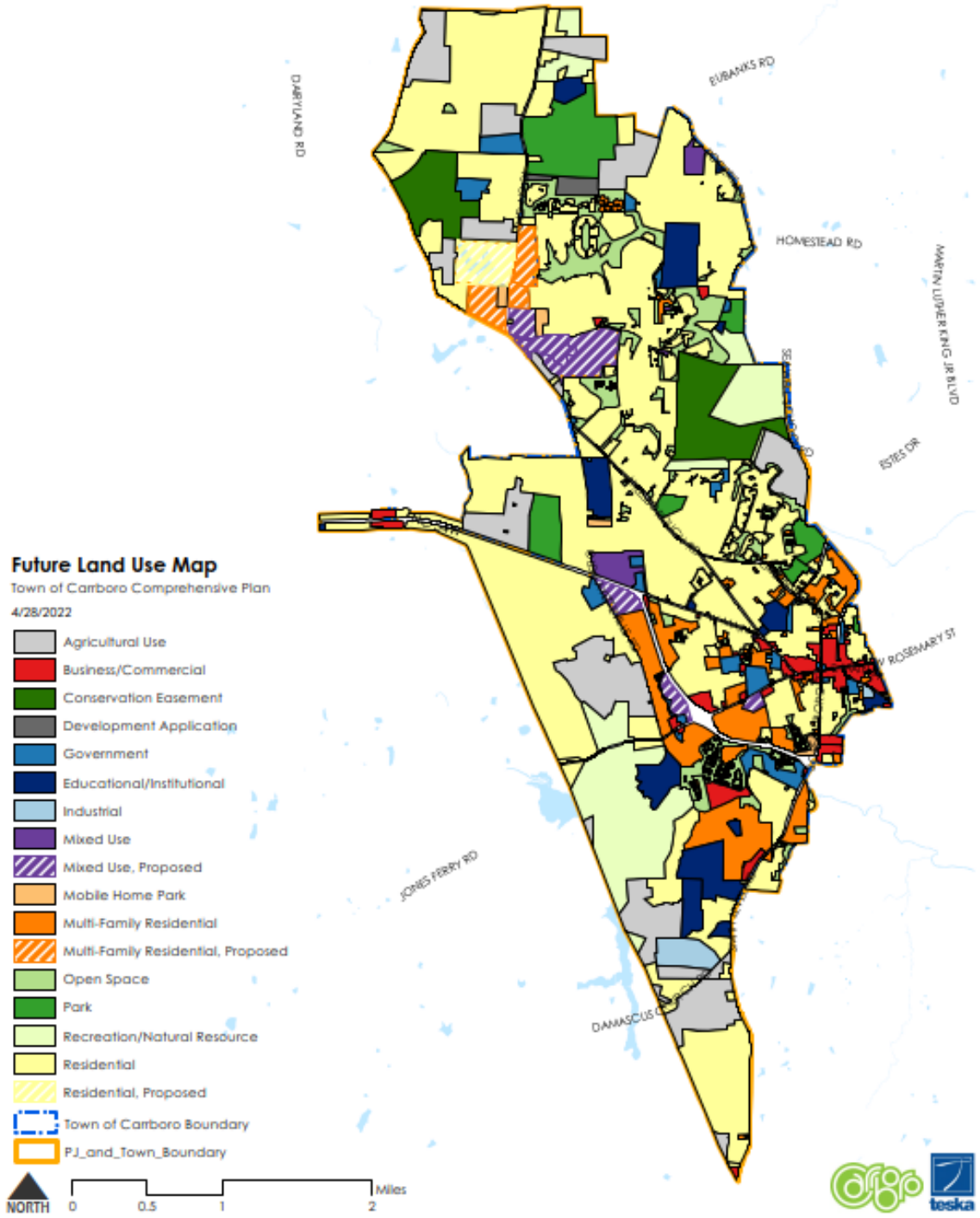


Figure 3.26 – Town of Carrboro Future Land Use Map, 2022



TOWN OF CHAPEL HILL

Chapel Hill adopted a comprehensive plan in 2012 called *Chapel Hill 2020*. In 2017 the Town developed a complimentary plan update, *Chapel Hill, Charting our Future, A Land Use Charter,* which provides and update to the town's future land use plan.

Based on the existing land use map in Figure 3.28, a large portion of the Town is designated for residential uses, particularly low residential comprising of 1-4 units, however medium (408 units) and high (8+ units) residential uses are located throughout the town. Several areas of parks/open space are consistently spaced throughout Chapel Hill. The university occupies a significant portion of land use as well. Commercial uses are concentrated along Fordham Rd and Frankling St.

FUTURE LAND USE

The future land use map is organized into two components – a focus area map, Figure 3.30, that reflect six areas of opportunity, and a overall map, Figure 3.29, that depicts the desired land use for all parcels in town outside of the focus areas. The focus areas represent the portions of Chapel Hill most likely to change in the future due to the existence of vacant land; underdeveloped sites; and their locations along transportation and transit corridors. Each focus area is mapped separately and includes a vision for the area, a matrix of the preferred and discouraged land uses and desirable building heights, a description of the desired form of development, and a set of focus area principles tailored to the unique circumstances of the area. The areas are as follows:

- North Martin Luther King Jr Boulevard
- South Martin Luther King Jr Boulevard
- North 15-501 Corridor
- Downtown
- NC 54 Corridor
- South Columbia Gateway

For the general future land use map, each parcel is labeled with a land use that indicates its desired future land use. The desired future land uses include residential; commercial; mixed use; industrial; and open space. The land use categories are summarized in Figure 3.27 below.

Figure 3.27 – Chapel Hill Future Land Use Categories

Land Use Categories		
Residential	*Non-Residential*	*Mixed-Use*
▪ Rural Residential, 1 unit/5 acres ▪ Rural Residential, 1 unit/acre ▪ Very Low Residential, 1 unit/acre ▪ Low Residential, generally 1 to 4 units/acre ▪ Medium Residential, generally 4 to 8 units/acre ▪ High Residential, generally 8 to 15+ units/acre	▪ Commercial/Office ▪ Institutional ▪ University ▪ Parks/Open Space	▪ Mixed Use ▪ Village Center ▪ Traditional University Supportive Uses

Figure 3.28 - Chapel Hill Existing Land Use Map, 2018

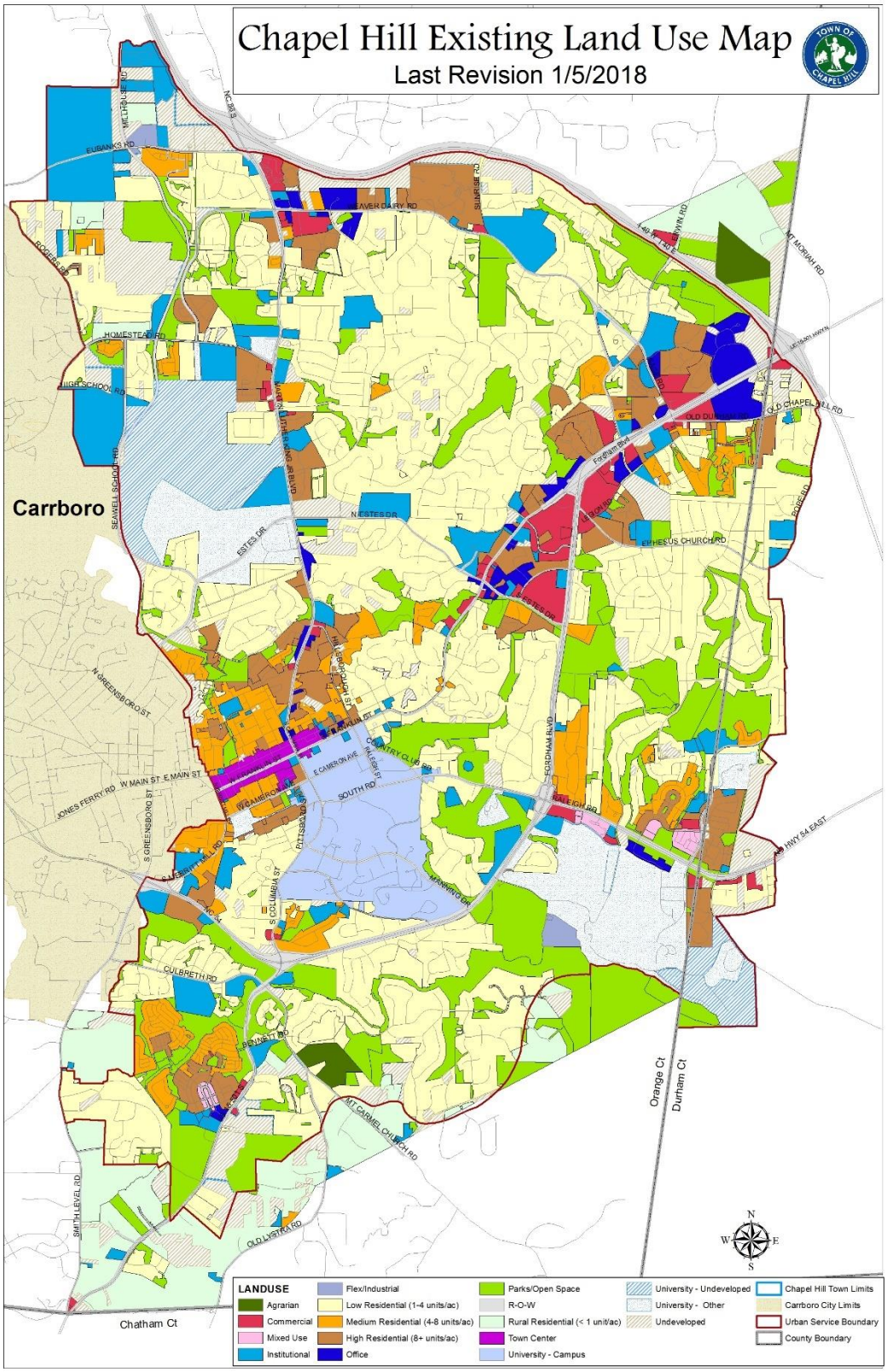


Figure 3.29 - Chapel Hill Future Land Use Map

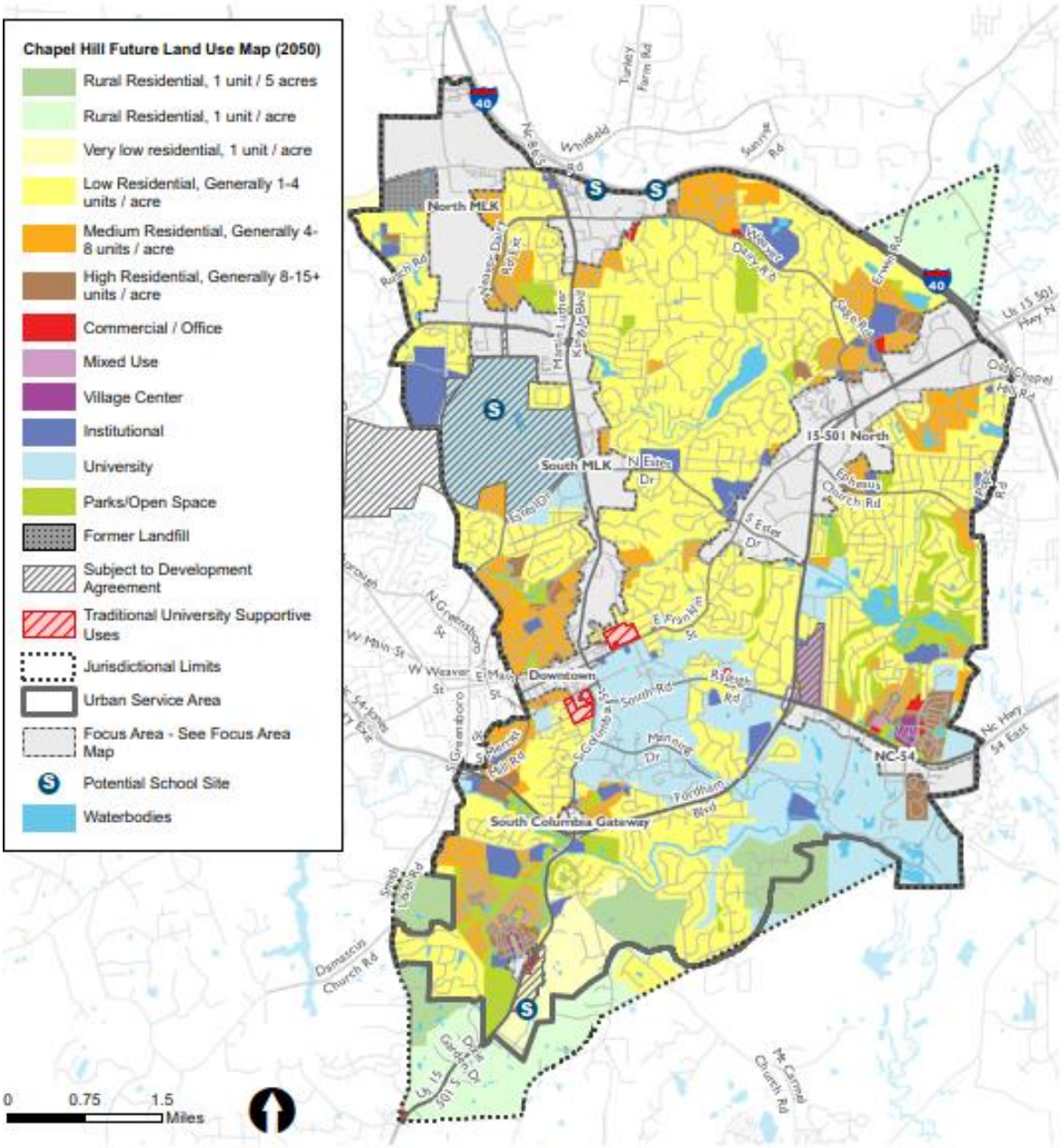
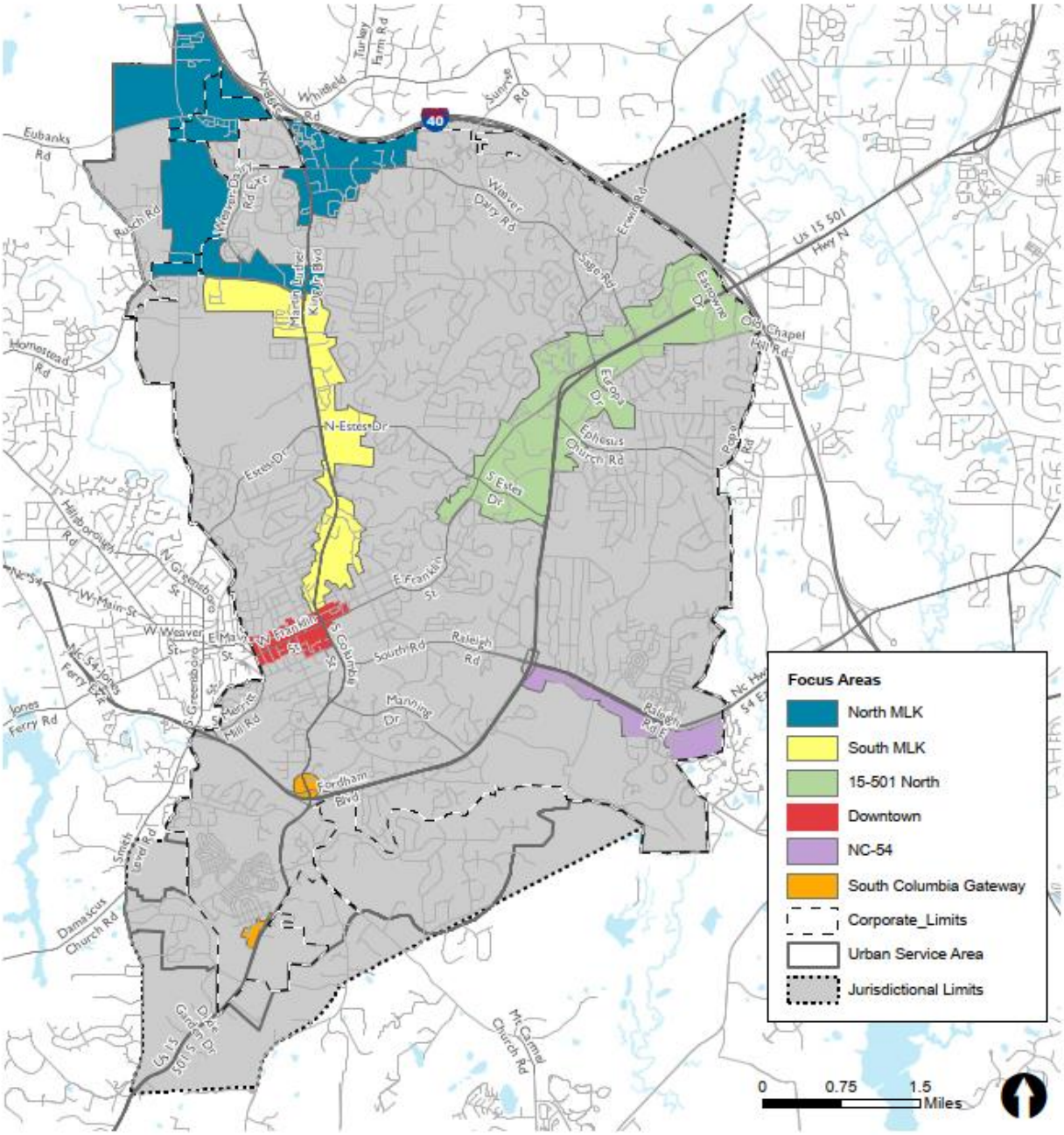


Figure 3.30 – Chapel Hill Focus Area Map



HILLSBOROUGH

The Town of Hillsborough outlines their existing and future land use in the Comprehensive Sustainability Plan adopted in 2023. Located on the Eno River in Orange County, Hillsborough is situated within one of the fastest growing corridors in North Carolina. Hillsborough has experienced growth similar to the Triangle counties over the last decade. Growth is expected to continue as new residents and businesses move to the area.

Based on the zoning map shown in Figure 3.32, the majority of the town is zoned for residential uses. Agricultural uses are clustered in the center of the town with office institutional in the northern portion.

FUTURE LAND USE

The future land use plan for the town considers the existing zoning and land use and demonstrates what uses are projected or desired in the future for specific locations. The future land uses within the town are defined by classification and show in Figure 3.31. Residential land uses account for approximately 60 percent of the future land use in the town, varying from rural living to small lot and mixed residential neighborhoods. Commercial uses represent approximately 20 percent of land use, and natural resources represent approximately 12 percent of land uses. The town has a small amount (approximately 4.5 percent) of light industrial uses identified as future land use. The figure below shows acreage and percentage of land within each future land use class.

The comprehensive plan discusses the importance of focusing development in key areas, particularly those already accommodated by water and sewer infrastructure to encourage smart growth in Hillsborough. Based on the water and sewer capacity constraints, growth should be focused in the southern part of town in the Elizabeth Brady Basin. Some growth is also anticipated in the northern portion of the town (in the Eno River Basin). A potential growth areas map is shown in Figure 3.33.

Figure 3.31 – Town of Hillsborough Future Land Use Classifications

Land Use Classification	Acres	% of Land Use	Zoning Districts
Permanent Open Space	744.03	9.03%	AR; PW & PW-Critical Area
Working Farm	258.53	3.14%	AR; R-40
Residential	5,053.48	61.33%	
Rural Living	1,321.21	16.03%	AR; PW & PW-Critical Area; R-40
Small Lot Residential	1,374.30	16.68%	R-10; R-15; R-20; ESU; R SU
Medium-Density Residential	568.72	6.90%	R-10; R-15; R-20; MF; MHP; ESU; MF SU; R SU;
Attached Residential	208.82	2.53%	MF; MF SU; ESU; R SU
Mixed Residential Neighborhood	1,175.90	14.27%	R-10; R-15; R-20, MF; MF SU; ESU; MF SU; R SU; SD SU
Urban Neighborhood	404.53	4.91%	R-10; R-15; R-20; A R-U; NB SU; R SU
Education	172.49	2.09%	Adaptive Re-Use; Office Institutional
Employment	529.17	6.42%	HIC; BP; EDD; L I, GI; E SU; SD SU
Light Industrial	374.16	4.54%	HIC; BP; EDD; LI; GI
Mixed Use	157.14	1.91%	R-10, MF; BP, EDD; OI; HIC; MF SU; R SU; SD SU
Neighborhood Mixed Use	280.65	3.41%	A RU; R-10; MF; NB; NB SU; CC; CC SU; MF SU; R SU
Retail Services	538.56	6.54%	A RU; NB; NB SU; CC; CC SU; GC; HIC; ESU; SD SU
Suburban Office	92.33	1.12%	LO; OI; BP; EDD; ESU; SD SU
Town Center	39.51	0.48%	R-20; O I; CC; CC SU
Totals	**8,240.04**	**100.0%**	

Source: Town of Hillsborough Future Land Use Plan

AR = Agricultural/Residential	A RU = Adaptive Re-Use	BP = Business Park	CC = Central Commercial	CCSU = Central Commercial Special Use
EDD = Economic Development	ESU = Entranceway Special Use	GC = General Commercial	GI = General Industrial	HIC = High Intensity Commercial
L I = Light Industrial	LO = Limited Office	MF = Multi-Family	MF SU = Multi-Family Special Use	MHP = Mobile Home Park
NB = Neighborhood Business	NBSU = Neighborhood Business Special Use	OI = Office/Institutional	PW = Upper Eno Protected Watershed	R = Residential
RSU = Residential Special Use	SD SU = Special Design Special Use			

Figure 3.32 – Town of Hillsborough Zoning Map

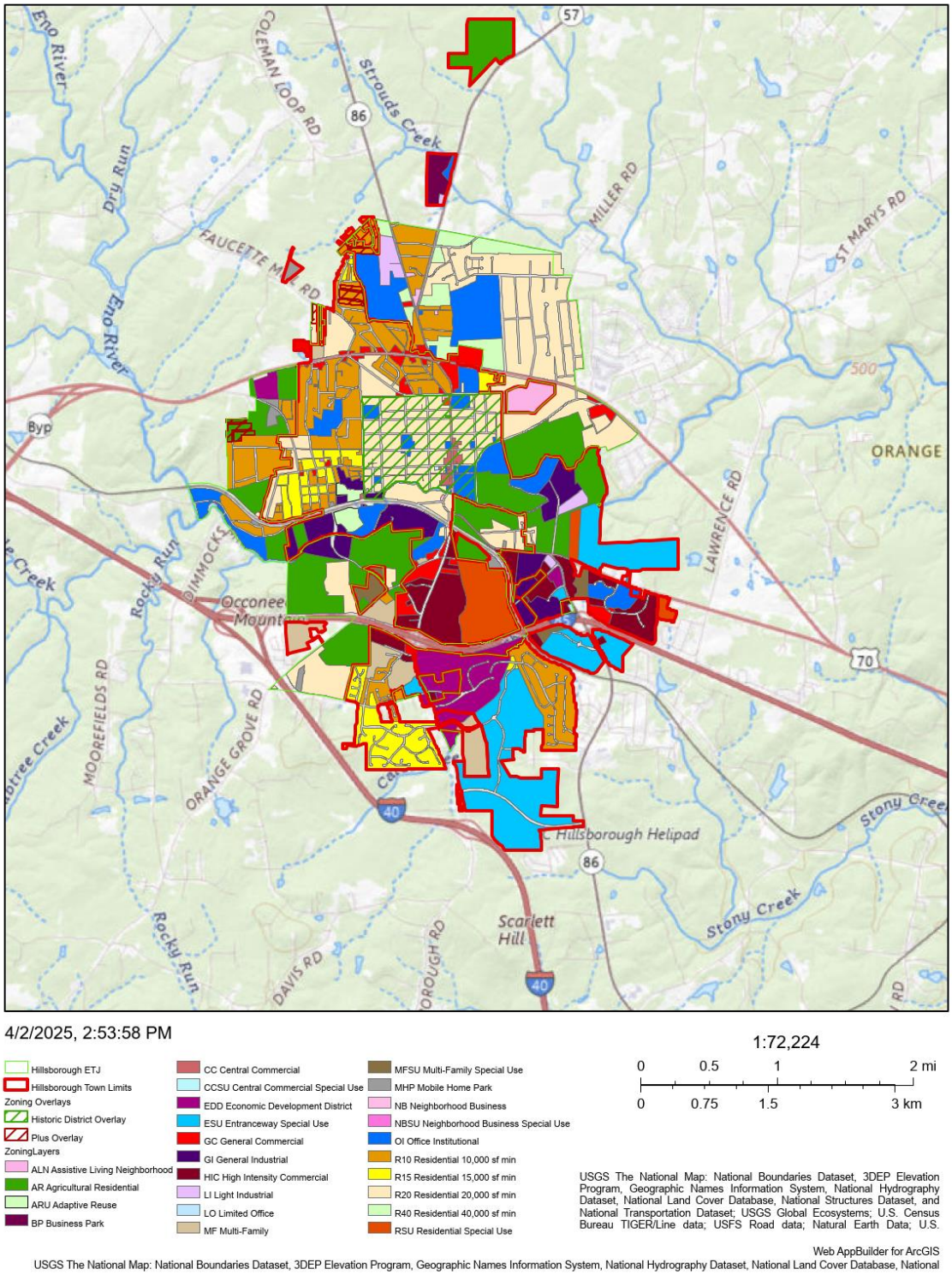
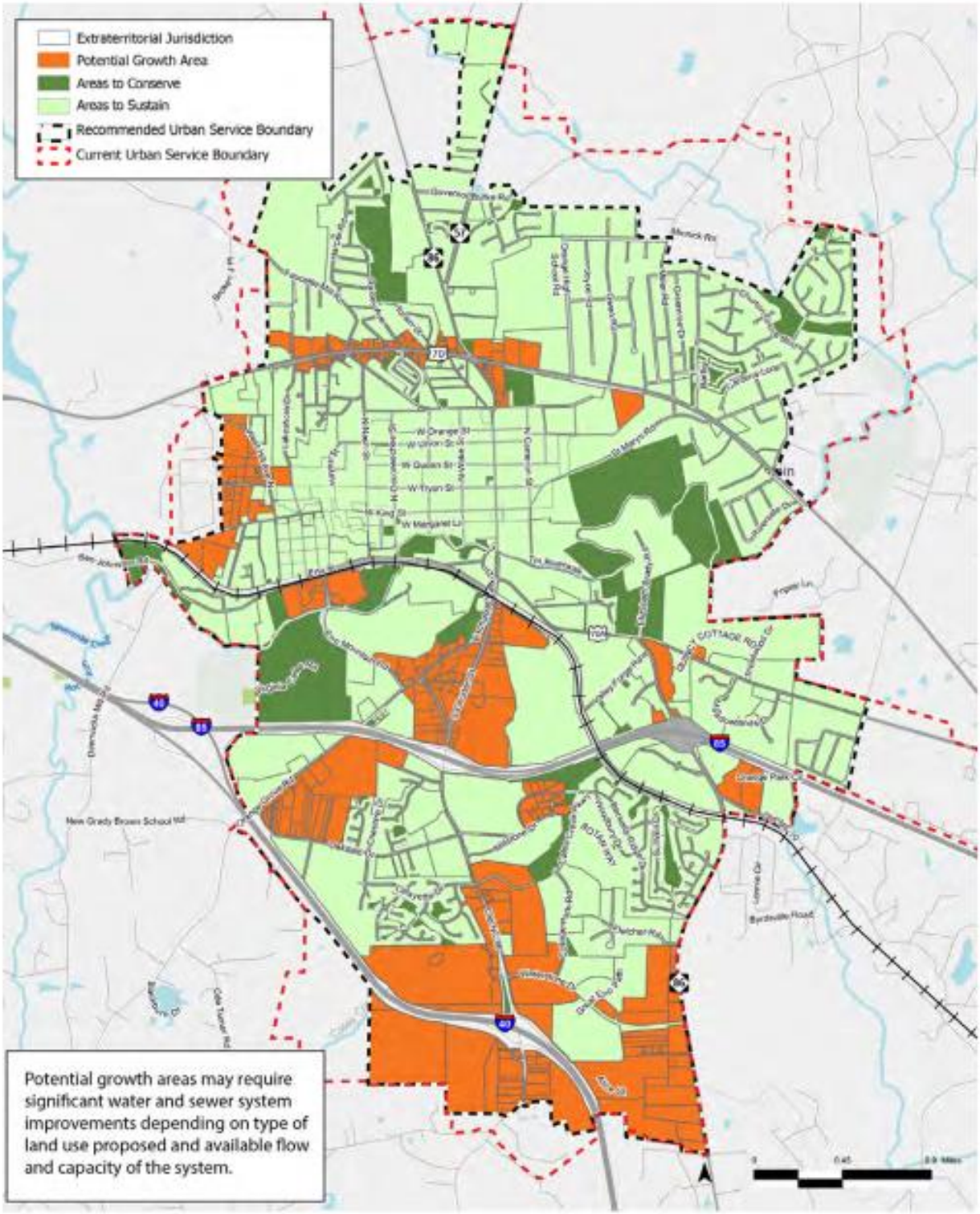


Figure 3.33 - Town of Hillsborough Growth Areas Map



PERSON COUNTY

Person County and the City Roxboro adopted a joint comprehensive plan in 2021 that aims to guide future development for both communities in a coordinated and strategic manner. Roxboro and Person County have historically centered around agricultural and manufacturing industries, however, the area has experienced new residential growth in recent years, particularly in the southern portion of the County. Person County has grown by a rate of around 2% to 3% in the last decade but remains gradual compared to the rapid growth experienced in neighboring Durham-Chapel Hill metro area. Growth of the County has been hindered by a lack of available housing. While the current demand for housing does not appear to be driving a large increase in housing construction, it is possible that larger-scale housing development in southern Person County could increase the County's population growth, as residents from Raleigh-Durham seek to live in more rural, and more affordable locations.

The primary land use, over 90 percent, within the County is rural/agriculture/undeveloped with the remaining land mostly designated for residential uses. A summary of the existing land use is show in Table 3.11 and an existing land use map is shown in Figure 3.34.

Table 3.11 – Person County Land Use Percentage

Land Use	Percent of County
Rural/ Agriculture/ Undeveloped	90.5%
Residential	7.3%
Government /Exempt	1.2%
Commercial	0.8%
Industrial	0.2%

Source: Person County and City of Roxboro Joint Comprehensive Plan, 2021

CITY OF ROXBORO

The City of Roxboro is almost eight miles long and is located in central Person County. Roxboro is the hub of commercial development and an area where industrial, retail, and residential properties intermingle to serve the citizens of the area. Over the last decade, the City of Roxboro's population has actually decreased by almost 3%.

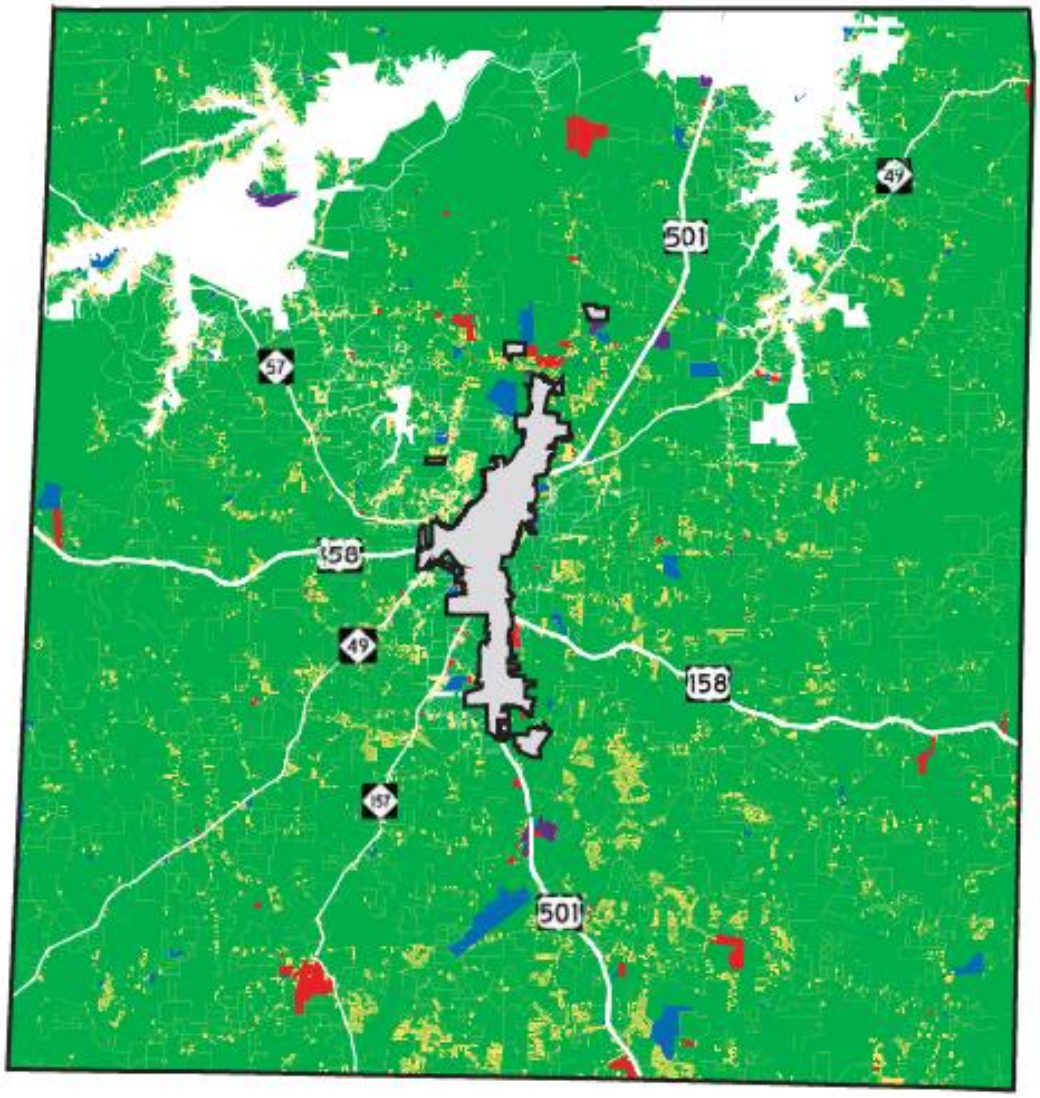
Like the County, the city's primary land use, around 40 percent is classified as rural / agriculture / undeveloped. However, a larger portion of the city is dedicated to residential uses, around 26 percent. A sizable portions of the land is dedicated to commercial uses and government uses. Table 3.12 provides and existing land use summary and a map of existing uses is shown in Figure 3.35.

Table 3.12 – City of Roxboro Land Use Percentage

Land Use	Percent of County
Rural/ Agriculture/ Undeveloped	39.6%
Residential	25.9%
Government /Exempt	12.0%
Commercial	15.6%
Industrial	6.9%

Source: Person County and City of Roxboro Joint Comprehensive Plan, 2021

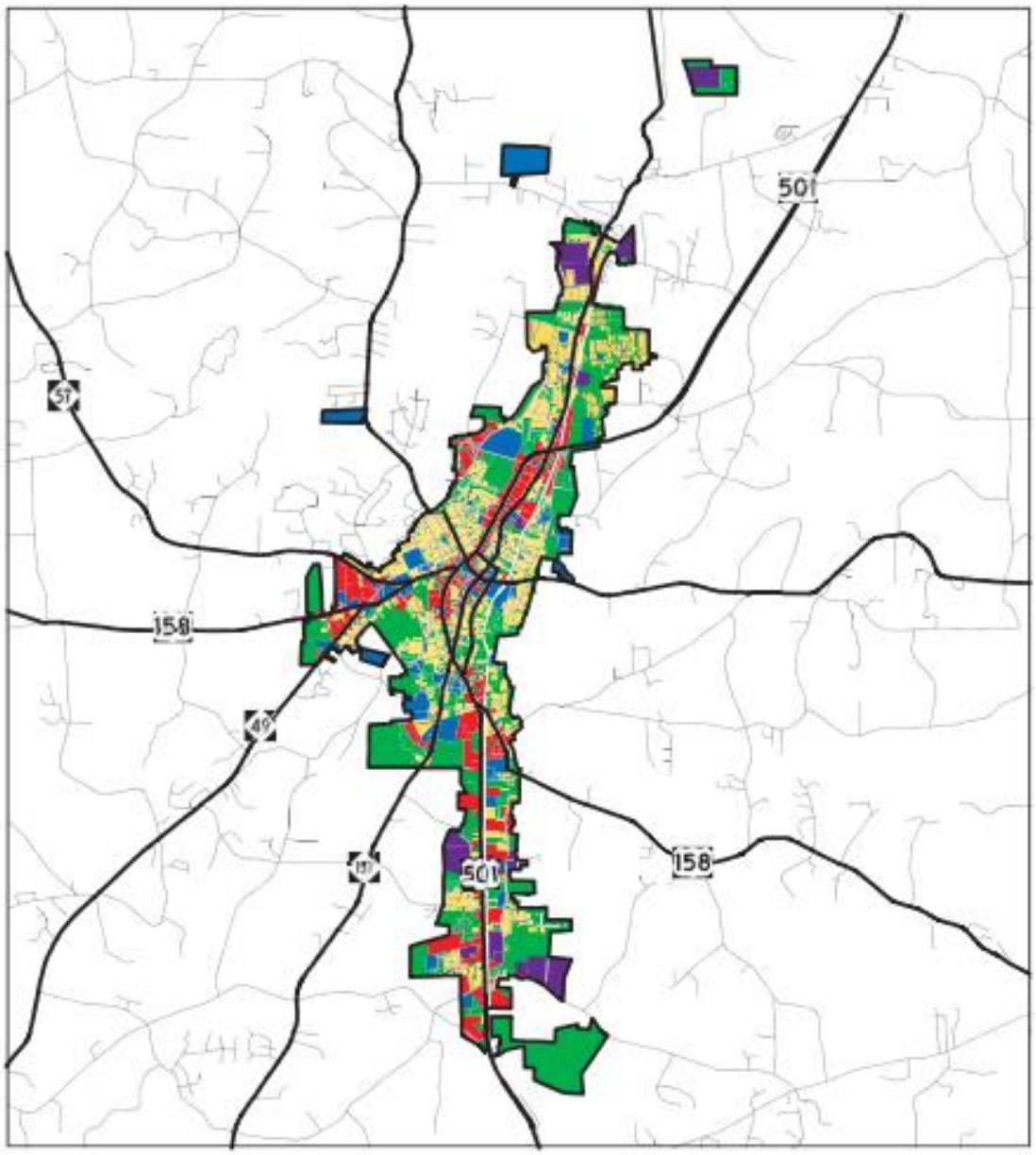
Figure 3.34 – Person County Existing Land Use Map, 2021



Residential
Government / Exempt
Commercial
Industrial
Rural / Agriculture / Undeveloped
City of Roxboro

Note: These are generalized land use classifications generated from County parcel data to provide a general view of the existing land use patterns.

Figure 3.35 – City of Roxboro Existing Land Use Map, 2021



Residential
Government / Exempt
Commercial
Industrial
Rural / Agriculture / Undeveloped

Note: These are generalized land use classifications generated from County parcel data to provide a general view of the existing land use patterns.

FUTURE LAND USE (CITY AND COUNTY)

The 2021 comprehensive plan outlines that the overall future development in the area seeks to preserve the general existing development patterns, particularly in residential areas, restricted water supply watershed areas, prime agricultural lands, and established commercial areas. It also seeks to provide opportunities for growth in commercial uses in the City of Roxboro, as well as denser residential growth in and around the city, directing growth where necessary infrastructure is available to support it. This focus on growth in and around the city aims to help preserve prime agricultural lands and rural communities.

Based on the future land use map, rural land uses are the most dominant classification. Land classified as growth areas surrounds the City of Roxboro with pockets of residential neighborhoods established around the city. The city has a more diverse set of future land use classifications with growth areas designated around the perimeter and commercial uses placed along major roads in the center of the city. Residential neighborhoods occupy the northern portion of the city with some industrial uses in the southern end. A table of the future land use classifications and acreage for both the city and county are summarized in Figure 3.36 and future land use maps for Person and Roxboro are displayed in Figure 3.37 and Figure 3.38 respectively.

Figure 3.36 – Person County and City of Roxboro Future Land Use Designations

FUTURE LAND USE	ACRES IN ROXBORO	ACRES IN UNINCORPORATED PERSON COUNTY
Rural	59.4 AC	185,996.8 AC
Residential Neighborhoods	1,164.4 AC	3,581.3 AC
Uptown	38.2 AC	0 AC
Uptown Transition	38.7 AC	0 AC
Urban Mixed Use	285.6 AC	0 AC
Campus District	114.2 AC	297.2 AC
Commercial	667.1 AC	0 AC
Growth Areas	1,250.6	21,991.2 AC
Industrial	434.3 AC	4,986.5 AC
Airport Compatibility Area	0 AC	8,077.8 AC
Hyco Lake	0 AC	8,459.3 AC
Mayo Lake	0 AC	5,616.7 AC

Source: Person County and City of Roxboro Joint Comprehensive Plan, 2021

Figure 3.37 – Person County Future Land Use Map, 2021

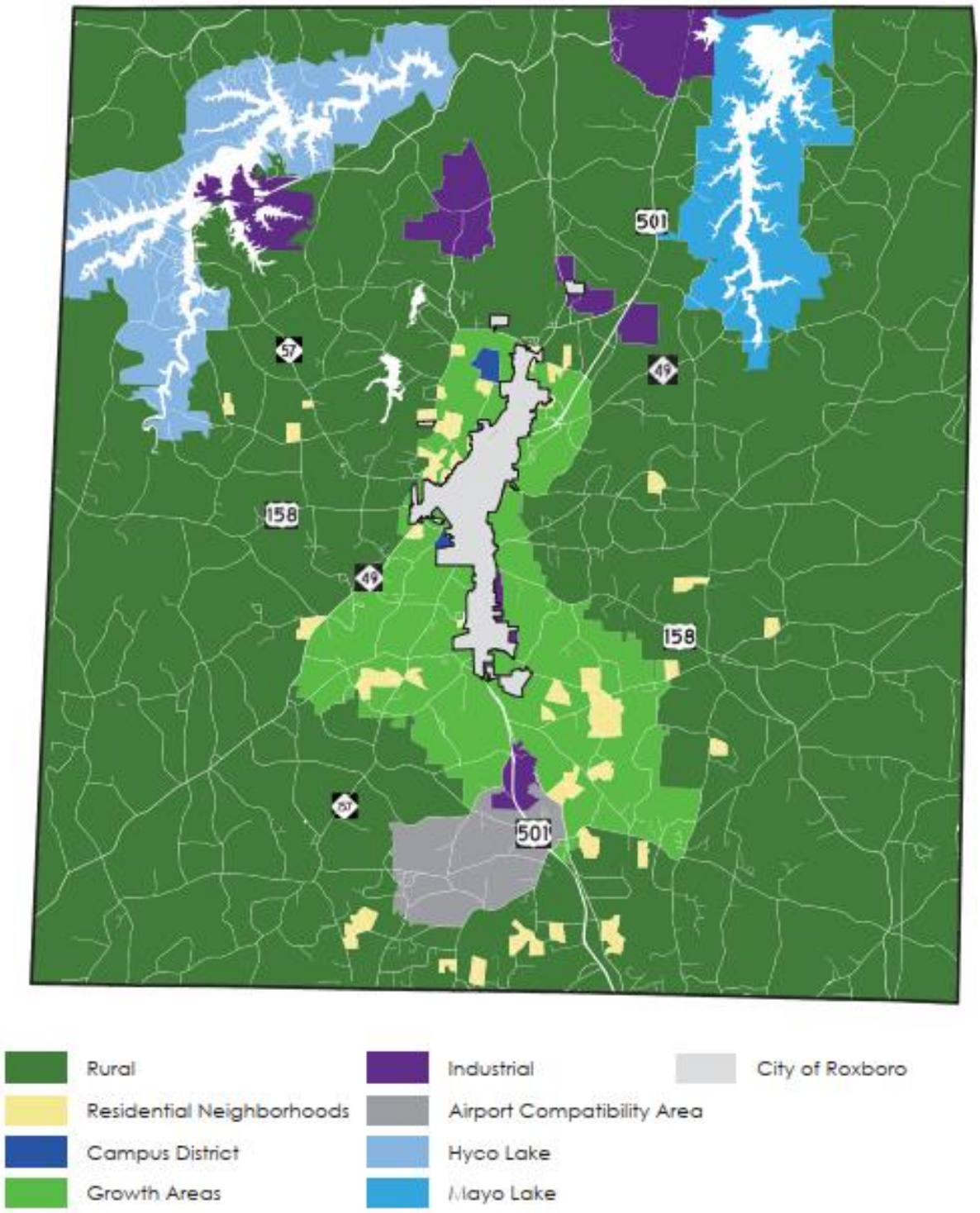
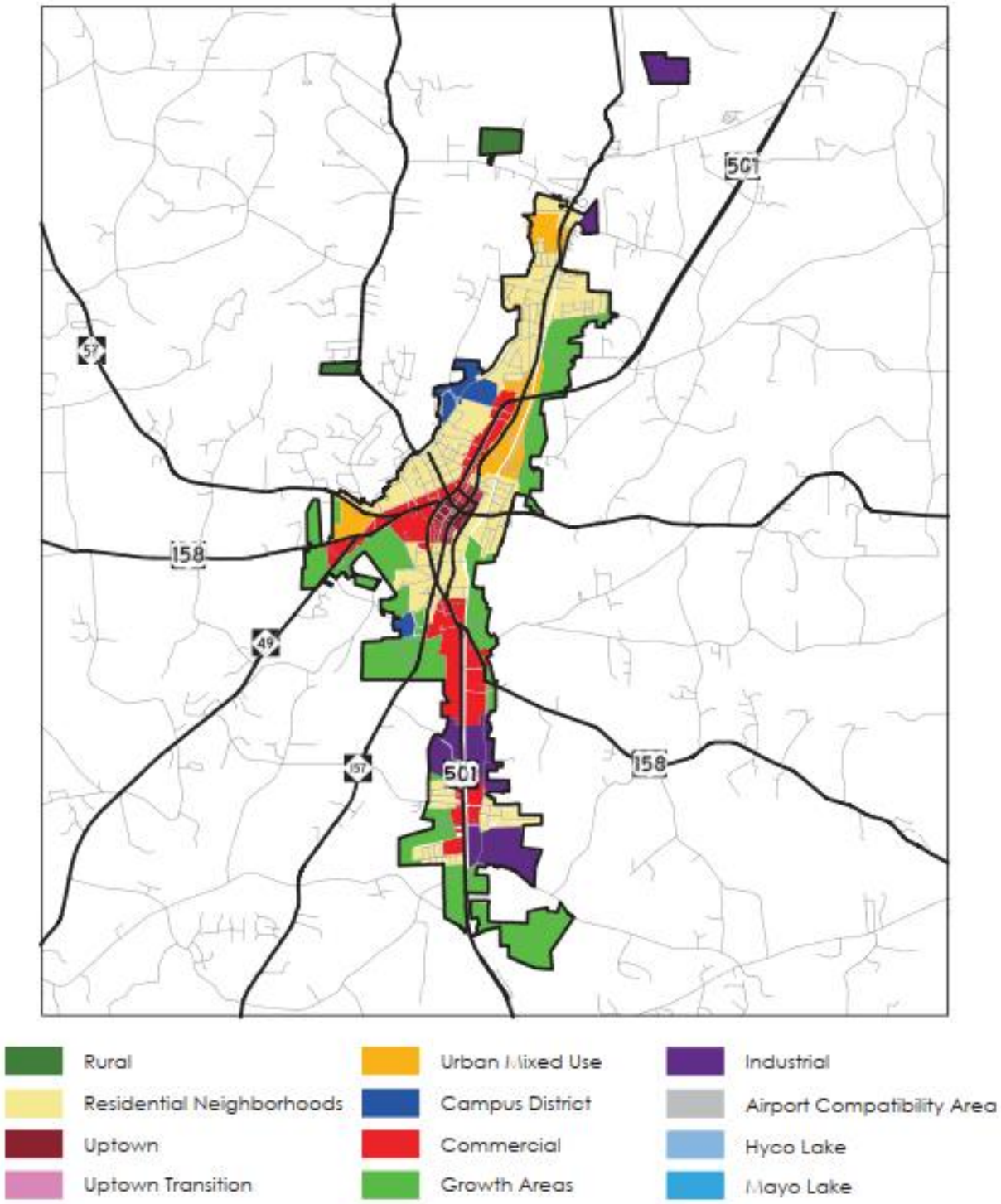


Figure 3.38 – City of Roxboro Future Land Use Map, 2021



3.7 EMPLOYMENT AND INDUSTRY

The counties and communities in the Eno-Haw region have several of the state's major colleges, universities, and hospitals. The area is home to thousands of students and educators that define the industry and economy of the region. Additionally, Durham County contains the majority of Research Triangle Park.

WAGES AND EMPLOYMENT

Per the 2019-2023 ACS 5-Year Estimates, the average median household income for the Eno-Haw region was $74,357, which exceeds the state's median household income ($69,904). However, by county median household income is lower than the state average in Alamance and Person Counties and higher in Durham and Orange Counties. Per capita income statistics mirror this pattern. Compared to the state, a greater proportion of the population is living below the poverty level in Alamance and Person Counties and more of the population lacks health insurance coverage in Alamance and Durham Counties, however, the population in both counties have a larger proportion of coverage compared to the state.

Table 3.13 shows economic statistics and Table 3.14 shows employment statistics for all counties in the region. Economic statistics by participating jurisdiction can be found in each jurisdiction's annex.

Table 3.13 – Employment Statistics for Eno-Haw Region, 2023

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Unemployment Rate (%)	Median Household Income
Alamance County	**88,133**	**60.0%**	**4.9%**	**$64,445**
Alamance	618	62.6%	0.2%	$88,438
Burlington	28,815	59.4%	5.9%	$54,941
Elon	4,625	43.3%	2.8%	$82,717
Graham	9,087	58.5%	7.9%	$54,783
Green Level	1,342	55.9%	3.0%	$54,020
Haw River	1,479	67.1%	2.3%	$67,366
Mebane	10,136	66.7%	3.4%	$84,312
Ossipee	366	55.6%	16.9%	$59,076
Swepsonville	1,375	69.1%	3.1%	$94,028
Durham County	**181,367**	**64.5%**	**4.2%**	**$79,501**
City of Durham	163,004	66.2%	4.2%	$79,234
Orange County	**76,010**	**59.7%**	**3.6%**	**$88,553**
Carrboro	12,461	69.3%	3.9%	$85,927
Chapel Hill	29,993	54.9%	4.6%	$85,825
Hillsborough	5,055	61.9%	4.8%	$98,467
Person County	**19,832**	**59.1%**	**3.9%**	**$64,927**
Roxboro	3,475	49.9%	5.3%	$39,283

Source: U.S. Census Bureau, 2019-2023 American Community Survey 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.2% of the population 16 and over across the region. Population employed, population unemployed, and population not in labor force are reported as a percent of the total population aged 16 years and older.

Table 3.14 – Eno-Haw Region Employment by Industry, 2023

Industry	Alamance County	Durham County	Orange County	Person County
Agriculture, forestry, fishing and hunting, and mining	0.5%	0.4%	0.6%	1.6%
Construction	7.7%	6.4%	5.0%	7.6%
Manufacturing	13.6%	7.1%	5.7%	14.5%
Wholesale trade	2.3%	1.4%	1.1%	2.4%
Retail trade	12.9%	7.9%	8.0%	11.3%
Transportation and warehousing, and utilities	4.6%	3.0%	2.1%	5.2%
Information	1.0%	1.7%	2.2%	0.6%
Finance and insurance, and real estate and rental and leasing	4.9%	5.8%	4.6%	4.5%
Professional, scientific, and management, and administrative and waste management services	9.0%	16.9%	16.2%	8.8%
Educational services, and health care and social assistance	26.5%	33.7%	37.9%	24.6%
Arts, entertainment, and recreation, and accommodation and food services	8.7%	7.5%	9.1%	9.2%
Other services, except public administration	4.7%	4.3%	4.1%	4.3%
Public administration	3.5%	3.9%	3.3%	5.4%

Source: U.S. Census Bureau, 2019-2023 American Community Survey 5-Year Estimates

Across the region, the largest industry sector in 2023 was "educational services, and health care and social assistance," comprising between 24.6 and 37.9 percent of employment across the participating counties. In Alamance and Person Counties, the next largest industry by employment was "manufacturing." In Alamance County, this prominence is due in part to the continued presence of textile manufacturing; however, both counties have a variety of manufacturing. In Durham and Orange Counties, the next largest industry by employment was "professional, scientific, and management, and administrative and waste management services." Durham County contains the majority of Research Triangle Park, a major employment hub for the region, which partially explains the presence of more large employers in Durham County.

Table 3.15 summarizes the major employers in each county in the Eno-Haw region from AccessNC as of the 2024 3rd quarter.

Table 3.15 – Major Employers, Eno-Haw Region

Company	Industry	Employment range
Alamance County		
Laboratory Corporation of America H	Health Care and Social Assistance	1000+
Alamance-Burlington School System	Educational Services	1000+
Alamance Regional Medical Center	Health Care and Social Assistance	1000+
Elon University	Educational Services	1000+
United Parcel Service Inc	Transportation and Warehousing	1000+
Wal-Mart Associates Inc	Retail Trade	1000+
Alamance County	Public Administration	1000+
City Of Burlington	Public Administration	500-999

Company	Industry	Employment range
Cedar Crest Staffing LLC	Administrative and Support and Waste Management and Remediation Services	500-999
Amazoncom Services Inc	Transportation and Warehousing	500-999
Industrial C&S LLC	Manufacturing	500-999
Gkn Driveline North America Inc	Manufacturing	500-999
Food Lion	Retail Trade	500-999
American Honda Motor Co Inc	Manufacturing	500-999
Alamance Community College	Educational Services	500-999
Sheetz Distribution Services LLC	Transportation and Warehousing	500-999
Glen Raven Inc	Manufacturing	250-499
Lutheran Retirement Ministries of A	Health Care and Social Assistance	250-499
Kernodle Clinic Inc	Health Care and Social Assistance	250-499
Luxor Contracting Inc	Administrative and Support and Waste Management and Remediation Services	250-499
Lowes Home Centers Inc	Retail Trade	250-499
Armacell LLC	Manufacturing	250-499
Carolina Biological Supply Co Inc	Wholesale Trade	250-499
Aramark Food and Support Services G	Accommodation and Food Services	250-499
Ice Age Management Inc	Accommodation and Food Services	250-499
Durham County		
Duke University	Health Care and Social Assistance	1000+
Fidelity Workplace Investing LLC	Finance and Insurance	1000+
Durham Public Schools Board of Ed	Educational Services	1000+
Cisco Systems Inc	Management of Companies and Enterprises	1000+
Wolfspeed Inc	Manufacturing	1000+
Veterans Administration Va Ro318	Health Care and Social Assistance	1000+
Internationl Business Machines Corp	Manufacturing	1000+
City of Durham	Public Administration	1000+
Research Triangle Institute	Professional, Scientific, and Technical Services	1000+
Durham County Government	Public Administration	1000+
Amazoncom Services Inc	Transportation and Warehousing	1000+
Iqvia Rds Inc	Professional, Scientific, and Technical Services	1000+
Biogen Idec Us Limited Partnership	Manufacturing	1000+
N C Central University 18341	Educational Services	1000+
Glaxosmithkline LLC	Manufacturing	1000+
Aisin North Carolina Corp	Manufacturing	1000+
Intervet Inc	Manufacturing	1000+
Laboratory Corporation Of America H	Health Care and Social Assistance	1000+
Environmental Protection Agency	Public Administration	1000+
Netapp Inc	Wholesale Trade	1000+
Alliance Behavioral Healthcare	Public Administration	1000+

Company	Industry	Employment range
KBI Biopharma Inc	Professional, Scientific, and Technical Services	1000+
Harris Teeter LLC	Retail Trade	500-999
Credit Suisse Services Usa LLC	Finance and Insurance	500-999
BASF Corporation	Manufacturing	500-999
Orange County		
UNC Chapel Hill	Educational Services	1000+
UNC Health Care System	Health Care and Social Assistance	1000+
Chapel Hill-Carrboro City Schools	Educational Services	1000+
Orange County	Public Administration	1000+
Orange County Schools	Educational Services	1000+
Sports Endeavor Inc	Retail Trade	1000+
Town Of Chapel Hill Inc	Public Administration	500-999
Wal-Mart Associates Inc	Retail Trade	500-999
Aramark Food and Support Services G	Accommodation and Food Services	250-499
Summit Design & Engineering Service	Professional, Scientific, and Technical Services	250-499
Wegmans Food Markets Inc	Retail Trade	250-499
A K G of America Inc	Manufacturing	250-499
Harris Teeter LLC	Retail Trade	250-499
Hyatt Corporation	Accommodation and Food Services	250-499
Chapel Hill Residential Retirement	Health Care and Social Assistance	250-499
Rex Healthcare Inc	Health Care and Social Assistance	250-499
Food Lion	Retail Trade	250-499
Asklepios Biopharmaceutical Inc	Professional, Scientific, and Technical Services	250-499
P H E Inc	Retail Trade	250-499
Residential Services Inc	Health Care and Social Assistance	250-499
Weaver Street Market Inc	Retail Trade	250-499
Justworks Employment Group LLC	Professional, Scientific, and Technical Services	250-499
Piedmont Health Services Inc	Management of Companies and Enterprises	250-499
Westrock Services LLC	Manufacturing	100-249
Open Answer LLC	Other Services (except Public Administration)	100-249
Person County		
Person County Board Of Education	Educational Services	500-999
County of Person	Public Administration	500-999
Poly Wood LLC	Wholesale Trade	250-499
Wal-Mart Associates Inc	Retail Trade	250-499
DLP Partner LLC	Health Care and Social Assistance	100-249
Spuntech Industries Inc	Manufacturing	100-249
Duke Energy Progress LLC	Utilities	100-249

Company	Industry	Employment range
Food Lion	Retail Trade	100-249
Piedmont Community College	Educational Services	100-249
Louisiana-Pacific Corporation	Manufacturing	100-249
City Of Roxboro	Public Administration	100-249
Accu Reference Medical Lab LLC	Health Care and Social Assistance	100-249
Eaton Corporation	Manufacturing	100-249
Lowes Home Centers Inc	Retail Trade	100-249
Gkn Driveline North America Inc	Manufacturing	100-249
Us Flue Cured Tobacco Growers Inc	Manufacturing	100-249
Hscgp LLC Formerly Lifepoint Csgp L	Health Care and Social Assistance	100-249
Tires Unlimited Inc	Retail Trade	50-99
Piedmont Maintenance & Services Inc	Construction	50-99
Tri-Arc Food Systems Inc	Accommodation and Food Services	50-99
Carolina Qsc Management LLC	Accommodation and Food Services	50-99
Old Belt Extracts LLC	Manufacturing	50-99
Talbert Building Supply Inc	Retail Trade	50-99
United Home Care Inc	Health Care and Social Assistance	50-99
Person County Group Homes Inc	Health Care and Social Assistance	50-99

Source: ACCESSNC Employer Profile

3.8 SOCIAL VULNERABILITY

Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human caused threats, such as toxic chemical spills. That is to say that even if different groups share similar exposure to a hazard, some groups may have a greater capacity to anticipate, cope, and recover from a disaster than others. Social vulnerability often refers to the population characteristics that have historically put certain groups of people at varying risk when they are exposed to the impacts of a hazard event (Cutter, 2003; Berke et al., 2019). Common and determining characteristics include age, gender, income, race, and ethnicity, and language capacity (Cutter et al., 2003; Berke et al., 2015). However, additional characteristics can include social networks, education, cultural knowledge, and political power (Otto et al., 2017). Social vulnerability considerations were included in this plan update to identify areas across the County that might be more vulnerable to hazard impacts based on a number of factors.

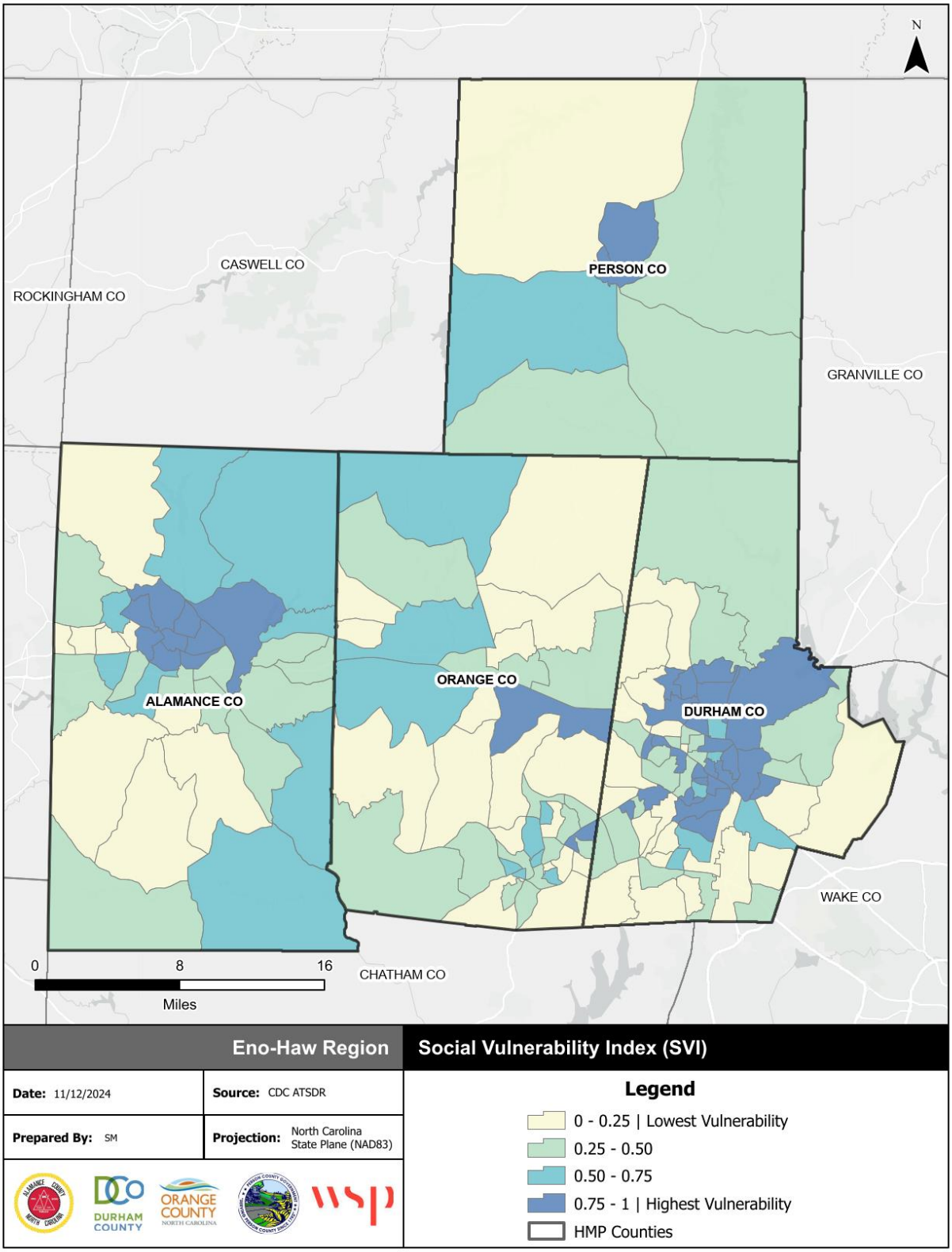
The Centers for Disease Control and Prevention (CDC) has developed a social vulnerability index (SVI) to measure the resilience of communities when confronted by external stresses such as natural or human-caused disasters or disease outbreaks. The CDC's SVI indicates the relative vulnerability within census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. Higher social vulnerability is an indicator that a community may be limited in its ability to respond to and recover from hazard events. Therefore, using this SVI information can help the Region and jurisdictions to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support. Results are presented via a score ranging from 0 (lowest vulnerability) to 1 (highest vulnerability).

The overall SVI scores reported for Orange County is 0.192, which indicates a low overall vulnerability. SVI scores reported for Alamance County and Person County are 0.414 and 0.273, respectively, which

indicates a low to medium overall vulnerability. Durham County has a slightly higher overall SVI score of 0.596, which indicates a high to medium overall vulnerability.

When viewed by Census tract, some areas of relatively higher social vulnerability are apparent in north central Alamance County near Burlington and portions of Graham. Areas throughout the City of Durham also have high SVI scores. Census tracts in central Person County right around Roxboro have higher SVI scores as well as areas south west of Hillsborough in Orange County. Figure 3.23 displays CDC SVI data for the Eno-Haw Region by Census tract.

Figure 3.39 – Social Vulnerability Index by Census Tract, 2022



4 RISK ASSESSMENT

Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…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.

44 CFR Subsection D §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 shall include an overall summary of each hazard and its impact on the community. 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; and

(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.

4.1 OVERVIEW

This section describes the Hazard Identification and Risk Assessment process for the development of the Eno-Haw Regional Hazard Mitigation Plan. It describes how the Region met the following requirements from the 10-step planning process:

- Planning Step 4: Assess the Hazard
- Planning Step 5: Assess the Problem

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

This regional hazard risk assessment covers all of Alamance, Durham, Orange, and Person Counties including unincorporated areas and all incorporated jurisdictions participating in this plan.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of the potential risk to natural hazards in the county and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. This risk assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:

Data collected through this process has been incorporated into the following sections of this plan:

- **Section 4.2**: **Hazard Identification** identifies the natural and human-caused hazards that threaten the region.
- **Section 4.3: Risk Assessment Methodology and Assumptions** describes how the risk and vulnerability assessment was conducted and presented.
- **Section 4.4: Asset Inventory** details the people, buildings, and critical facilities at risk in the region.
- **Section 4.5**: **Hazard Profiles, Analysis, and Vulnerability** discusses the threat to the region, describes previous occurrences of hazard events and the likelihood of future occurrences, and assesses the region's exposure to each hazard profiled; considering assets at risk, critical facilities, and future development trends.
- **Section 4.6: Conclusions on Hazard Risk** summarizes the results of the Priority Risk Index and defines each hazard as a Low, Medium, or High Risk hazard.

4.2 HAZARD IDENTIFICATION

To identify the full range of hazards relevant to the planning area, the HMPC began with a review of the list of hazards identified in the 2023 State Hazard Mitigation Plan and the 2020 Eno-Haw Regional Hazard Mitigation Plan. This review of hazards is summarized in Table 4.1. The HMPC used this process to ensure consistency across hazard mitigation planning efforts. All hazards listed below were evaluated for inclusion in this plan update, and, where appropriate, the hazard list in this plan was updated to be consistent with the State Hazard Mitigation Plan.

Table 4.1 – Full Range of Hazards Evaluated

Hazard	Included in 2023 State HMP?	Included in 2020 Eno-Haw HMP?
Flooding	Yes	Yes
Hurricanes and Coastal Hazards	Yes	Yes (Hurricanes)
Severe Winter Weather	Yes	Yes
Extreme Heat	Yes	Yes
Earthquakes	Yes	Yes
Wildfire	Yes	Yes
Dam Failures	Yes	Yes
Drought	Yes	Yes
Tornadoes & Thunderstorms	Yes	Yes (evaluated separately)
Geological (Landslides, Sinkholes)	Yes	Yes (Landslide)
Hazardous Substances	Yes	Yes
Radiological Emergency	Yes	Yes
Terrorism/Mass Casualty	Yes	Yes
Infectious Disease	Yes	Yes
Cyber Threat	Yes	Yes
Electromagnetic Pulse	Yes	No
Civil Disturbance	Yes	Yes
Critical Infrastructure Failure	No	Yes
Food Emergency	Yes	No

The HMPC evaluated the above list of hazards using existing hazard data, past disaster declarations, local knowledge, and information from the 2023 State Plan and the 2020 Eno-Haw Regional Plan to determine the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

One significant resource in this effort was the National Oceanic and Atmospheric Administration's (NOAA) National Center for Environmental Information (NCEI) Storm Events Database, which contains an archive by county of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. The database also provides a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. The database contains records of tornado events since 1950, thunderstorm wind and hail events since 1955, and all other tracked event types since 1996. NCEI receives storm data from the National Weather Service (NWS), which receives their information from a variety of sources, which include but are not limited to county, state and federal emergency management officials, local law enforcement officials, SkyWarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public, among others.

The NCEI database contains 1,654 records of severe weather events that occurred in the Eno-Haw Region in the 26-year period from 1998 through 2023. Table 4.2 summarizes these events.

Table 4.2 – NCEI Severe Weather Reports for Eno-Haw Region Counties, Jan 1998 – Dec 2023

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Blizzard	0	$0	$0	0	0
Cold/Wind Chill	0	$0	$0	0	0
Drought	0	$0	$0	0	0
Extreme Cold/Wind Chill	0	$0	$0	0	0
Excessive Heat	0	$0	$0	0	0
Flash Flood	165	$13,794,000	$0	0	1
Flood	15	$38,520,000	$15,000,000	0	0
Frost/Freeze	0	$0	$0	0	0
Hail	277	$2,117,500	$60,500	0	0
Heat	5	$0	$0	1	0
Heavy Rain	17	$0	$0	0	0
Heavy Snow	4	$0	$0	0	0
High Wind	14	$4,000	$0	0	0
Hurricane	10	$3,000,309,000	$503,000,000	0	0
Ice Storm	9	$3,634,000	$0	0	0
Lightning	28	$3,040,000	$0	4	9
Strong Wind	69	$5,529,150	$24,000	1	3
Thunderstorm Wind	736	$3,579,250	$165,000	3	5
Tornado	24	$6,505,000	$10,000	0	3
Tropical Storm	8	$4,200,000	$25,000	0	0
Wildfire	0	$0	$0	0	0
Winter Storm	127	$3,100,000	$25,000	0	0
Winter Weather	146	$115,000	$0	0	0
Total:	**1,654**	**$3,084,446,900**	**$518,309,500**	**9**	**21**

Source: National Center for Environmental Information Events Database, Dec 2024

Note: Losses reflect totals for all impacted areas for each event.

The HMPC also researched past events that resulted in a federal and/or state emergency or disaster declaration for the Eno-Haw Region counties in order to identify significant hazards. Federal and/or state disaster declarations may be granted when the Governor certifies that the combined local, county and state resources are insufficient and that the situation is beyond their recovery capabilities. When the local

government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state government capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

Records of designated counties for FEMA major disaster declarations start in 1964. Since then, Alamance, Durham, Orange, and Person Counties have been designated in 16 different major disaster declarations. Table 4.3 summarizes the count of major disaster declarations per county, and Table 4.4 provides details for these declarations.

Table 4.3 – Summary of Disaster Declarations by County

County	Disaster Declarations Received
Alamance	12
Durham	10
Orange	11
Person	12

Source: FEMA Disaster Declarations Summary, updated December 2, 2024

Table 4.4 – FEMA Major Disaster Declarations, Eno-Haw Region

County*	Disaster #	Date	Incident Type	Event Title
A, D, O, P	4487	3/25/2020	Biological	COVID-19 Pandemic
A, O, P	4412	1/31/2019	Hurricane	Tropical Storm Michael
A, D, O, P	4393	9/14/2018	Hurricane	Hurricane Florence
A, O, P	4167	3/31/2014	Severe Ice Storm	Severe Winter Storm
A	1969	4/19/2011	Severe Storm(s)	Severe Storms, Tornadoes, and Flooding
P	1801	10/8/2008	Severe Storm(s)	Tropical Storm Hanna
A	1553	9/18/2004	Hurricane	Hurricane Ivan
D, O, P	1490	9/18/2003	Hurricane	Hurricane Isabel
A, O, P	1457	3/27/2003	Severe Ice Storm	Ice Storm
A, D, O, P	1448	12/12/2002	Severe Ice Storm	Severe Ice Storm
A, D, O, P	1312	1/31/2000	Severe Storm(s)	Severe Winter Storm
A, D, O, P	1292	9/16/1999	Hurricane	Hurricane Floyd Major Disaster Declarations
D	1211	3/22/1998	Severe Storm(s)	Severe Storms, Tornadoes, and Flooding
A, D, O, P	1134	9/6/1996	Hurricane	Hurricane Fran
A, D, O, P	1087	1/13/1996	Snow	Blizzard of 96
D	827	5/17/1989	Tornado	Tornadoes

Source: FEMA Disaster Declarations Summary, December 2, 2024
*County code: A = Alamance, D = Durham, O = Orange, P = Person

Using the above information and additional discussion, the HMPC evaluated each hazard's significance to the planning area in order to decide which hazards to include in this plan update. Some hazard titles have been updated either to better encompass the full scope of a hazard or to assess closely related hazards together. Table 4.5 summaries the determination made for each hazard.

Table 4.5 – Hazard Evaluation Results

Hazard	Included in this plan update?	Explanation for Decision
Flooding	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. Multiple disaster declarations for the region are related to flooding. NCEI reports 176 flood-related events.
Hurricane and Coastal Hazards	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. Past disaster declarations and NCEI storm reports indicate hurricanes are a significant hazard for the region.
Severe Winter Weather	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. Past disaster declarations indicate this is a significant hazard for the region. NCEI reports 287 severe winter weather related events for the region.
Excessive Heat	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. NCEI reports 5 heat events for the region. Stakeholder input and climate change data indicate heat risk will increase.
Earthquake	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. The region could face minor impacts from the Eastern Tennessee Seismic zone and the Charleston fault.
Wildfire	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. Functional Wildland Urban Interface data from the Southern Wildfire Risk Assessment indicates that 23% of the region has direct exposure or property to wildfire risk.
Dam Failure	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. There are multiple dams in the region. While the State plan includes levee failure within this hazard, the USACE's National Levee Database does not identify any USACE or non-USACE levees in the region, so levee failure is not addressed.
Drought	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. There is significant agricultural exposure to drought in Alamance, Orange, and Person Counties.
Tornadoes & Thunderstorm	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. NCEI reports 24 tornado incidents and 1,041 thunderstorm incidents occurring in the region in the past 25 years. Multiple past disaster declarations indicate this is a significant hazard in the region.
Geological (Landslide, Sinkholes)	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed landslides as a hazard. The 2023 State plan also addresses sinkholes, but the Eno Haw region does not have soils susceptible to sinkhole. USGS data indicates the Eno Haw region has moderate susceptibility to landslide, which is included in the plan update.
Hazardous Materials Incident	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. The HMPC decided this hazard should be included given the presence of fixed facilities and transportation route that carry hazardous substances.

Hazard	Included in this plan update?	Explanation for Decision
Radiological Emergency	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. Most of the region falls within the IPZ of Harris Nuclear Station, but none of the region is within the EPZ. The HMPC decided this hazard should be included.
Terrorism/Mass Casualty	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. The HMPC wants to address this hazard in terms of an active shooter event.
Infectious Disease	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. The HMPC wants to address this hazard.
Cyber Threat	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. The HMPC wants to address this hazard.
Electromagnetic Pulse	No	The 2023 State plan addressed this threat, but the 2020 Eno-Haw did not. The region considers this threat more appropriately addressed at the State level.
Critical Infrastructure Failure	Yes	The 2023 State plan did not address this hazard, but HMPC representatives feel it is a local issue that should be included.
Civil Disturbance	Yes	The 2020 Eno-Haw plan and 2023 State plan addressed this hazard. HMPC representatives feel it is a local issue that should be included.

The final list of hazards included in this plan are as follows:

- Dam Failure
- Drought
- Earthquake
- Excessive Heat
- Flooding
- Landslide
- Hurricane & Tropical Storm
- Tornadoes & Thunderstorms
- Severe Winter Weather
- Wildfire
- Civil Disturbance
- Critical Infrastructure Failure
- Cyber Threat
- Hazardous Substances
- Infectious Disease
- Radiological Emergency
- Terrorism/Mass Casualty

4.3 RISK ASSESSMENT METHODOLOGY AND ASSUMPTIONS

The Disaster Mitigation Act of 2000 requires that the HMPC evaluate the risks associated with each of the hazards identified in the planning process. Each hazard was evaluated to determine its probability of future occurrence and potential impact. A vulnerability assessment was conducted for each hazard using either quantitative or qualitative methods depending on the available data, to determine its potential to cause significant human and/or monetary losses. A consequence analysis was also completed for each hazard.

Each hazard is profiled in the following format:

HAZARD DESCRIPTION

This section provides a description of the hazard, including discussion of its speed of onset and duration, as well as any secondary effects followed by details specific to the Eno-Haw region.

LOCATION

This section includes information on the hazard's physical extent, with mapped boundaries where applicable.

EXTENT

This section includes information on the hazard extent in terms of magnitude and describes how the severity of the hazard can be measured. Where available, the most severe event on record used as a frame of reference.

HISTORICAL OCCURRENCES

This section contains information on historical events, including the location and consequences of all past events on record within or near the Eno-Haw region.

PROBABILITY OF FUTURE OCCURRENCE

This section gauges the likelihood of future occurrences based on past events and existing data on current and future trends. The historical frequency is determined by dividing the number of events observed by the number of years on record and multiplying by 100. This provides the percent chance of the event happening in any given year according to historical occurrence (e.g. 10 winter storm events over a 30-year period equates to a 33 percent chance of experiencing a severe winter storm in any given year).

CLIMATE CHANGE

Where applicable, this section discusses how climate change may or may not influence the risk posed by the hazard on the planning area in the future. Resources on climate change projections and potential impacts include the Fourth National Climate Assessment, the Fifth National Climate Assessment, and the North Carolina State Climate Office.

VULNERABILITY ASSESSMENT

This section quantifies, to the extent feasible using best available data, assets at risk to natural hazards and potential loss estimates. People, properties and critical facilities, and environmental assets that are vulnerable to the hazard are identified. Future development is also discussed in this section, including how exposure to the hazard may change in the future or how development may affect hazard risk.

The vulnerability assessments followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (August 2001). The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard. Data used to support this assessment included the following:

- Geographic Information System (GIS) datasets, including building footprints, topography, aerial photography, and transportation layers;
- Hazard layer GIS datasets from state and federal agencies;
- Written descriptions of inventory and risks provided by the State Hazard Mitigation Plan; and
- Written descriptions of inventory and risks provided by the previous Eno-Haw Regional Hazard Mitigation Plan.
- Exposure and vulnerability estimates provided by the NCEM IRISK database.
- Crop insurance claims by cause from USDA's Risk Management Agency

Two distinct risk assessment methodologies were used in the formation of the vulnerability assessment: a quantitative analysis that relies upon best available data and technology and a qualitative analysis that relies on local knowledge and rational decision making.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Where hazard risk cannot be distinctly quantified and modeled, other information can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the vulnerability of that area to that hazard. The quantitative analysis for this plan update involved the use of NCEM's IRISK database, which provides modeled damage estimates for earthquake, flood, wind, and wildfire hazards.

NCEM's IRISK database incorporates county building footprint and parcel data. Footprints with an area less than 500 square feet were excluded from the analysis. To determine if a building is in a hazard area, the building footprints were intersected with each of the mapped hazard areas. If a building intersects two or more hazard areas (such as the 1-percent-annual-chance flood zone and the 0.2-percent-annual-chance flood zone), it is counted as being in the hazard area of highest risk. The parcel data provided building value and year built. Building value was used to determine the value of buildings at risk. Year built was used to determine if the building was constructed prior to or after the community had joined the NFIP and had an effective FIRM and building codes enforced.

Census blocks and Summary File 1 from the 2020 Census were used to determine population at risk. This included the total population, as well as the vulnerable elderly and children age groups. To determine population at risk, the census blocks were intersected with the hazard area. To better determine the actual number of people at risk, the intersecting area of the census block was calculated and divided by the total area of the census block to determine a ratio of area at risk. This ratio was applied to the population of the census block. For example, a census block has a population of 400 people. Five percent of the census block intersects the 1-percent-annual-chance flood hazard area. The ratio estimates that 20 people are then at risk within the 1-percent-annual-chance flood hazard area (5% of the total population for that census block).

Certain assumptions are inherent in any risk assessment. For the Eno-Haw Regional HMP, three primary assumptions were discussed by the HMPC from the beginning of the risk assessment process: (1) that the best readily available data would be used, (2) that the hazard data selected for use is reasonably accurate for mitigation planning purposes, and (3) that the risk assessment will be regional in nature with local, municipal-level data provided where appropriate and practical.

Key methodologies and assumptions for specific hazards analysis are described in their respective profiles.

PRIORITY RISK INDEX

The conclusions drawn from the hazard profiling and vulnerability assessment process can be used to prioritize all potential hazards to the Eno-Haw region. The Priority Risk Index (PRI) was applied for this purpose because it provides a standardized numerical value so that hazards can be compared 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 was assigned a value (1 to 4) and a weighting factor as summarized in Table 4.6.

The sum of all five risk assessment categories equals the final PRI value, demonstrated in the equation below (the highest possible PRI value is 4.0).

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

The purpose of the PRI is to categorize and prioritize all potential hazards for the Eno-Haw region as high, moderate, or low risk. The summary hazard classifications generated through the PRI allows for the prioritization of the high and moderate hazard risks for mitigation planning purposes.

The results of the risk assessment and PRI scoring are provided in Section 4.6 Conclusions on Hazard Risk.

Table 4.6 – Priority Risk Index

RISK ASSESSMENT	LEVEL	DEGREE OF RISK CRITERIA	INDEX	WEIGHT
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	4	
IMPACT In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & 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 > 1 DAY	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 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 > 30 DAYS.	4	
SPATIAL EXTENT How large of an area could be impacted by a hazard event? Are impacts localized or regional?	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	3	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	4	
WARNING TIME Is there usually some lead time associated with the hazard event? Have warning measures been implemented?	**MORE THAN 24 HRS**	SELF DEFINED	1	10%
	12 TO 24 HRS	SELF DEFINED	2	
	6 TO 12 HRS	SELF DEFINED	3	
	LESS THAN 6 HRS	SELF DEFINED	4	
DURATION How long does the hazard event usually last?	**LESS THAN 6 HRS**	SELF DEFINED	1	10%
	LESS THAN 24 HRS	SELF DEFINED	2	
	LESS THAN 1 WEEK	SELF DEFINED	3	
	MORE THAN 1 WEEK	SELF DEFINED	4	

4.4 ASSET INVENTORY

4.4.1 POPULATION

NCEM's IRISK database provided the asset inventory used for this vulnerability assessment. Population data in IRISK is derived from the 2020 Census and includes a breakdown of population into two subpopulations considered to be at greater risk than the general population, the elderly and children. Table 4.7 details the population counts by jurisdiction used for the vulnerability assessment. Note that more current population estimates are provided in Section 3 Planning Area Profile but are not integrated into the risk assessment, which relies on IRISK.

Table 4.7 – Population Counts by Jurisdiction, 2020

Jurisdiction	2020 Census Population	Elderly (Age 65 and Over)	Children (Age 5 and Under)
Alamance			
City of Burlington	63,032	10,440	3,975
City of Graham	18,650	3,356	1,288
City of Mebane	17,079	2,206	977
Town of Elon	9,355	1,524	331
Town of Green Level	1,541	273	104
Town of Haw River	5,843	979	395
Town of Ossipee	434	64	23
Town of Swepsonville	558	102	38
Village of Alamance	704	143	25
Unincorporated Alamance County	57,799	9,835	3,308
Subtotal Alamance	**174,995**	**28,922**	**10,464**
Durham			
City of Durham	235,187	27,521	15,501
Unincorporated Durham County	92,917	15,332	5,294
Subtotal Durham	**328,104**	**42,853**	**20,795**
Orange			
Town of Carrboro	18,405	2,281	671
Town of Chapel Hill	63,329	7,428	2,477
Town of Hillsborough	6,252	1,118	406
Unincorporated Orange County	61,819	10,806	3,164
Subtotal Orange	**149,805**	**21,633**	**6,718**
Person			
City of Roxboro	10,172	2,211	447
Unincorporated Person County	29,696	5,674	1,641
Subtotal Person	**39,868**	**7,885**	**2,088**
Region Total	**692,772**	**101,293**	**40,065**

Source: NCEM IRISK Database; 2020 Decennial Census

Note: The population counts in IRISK are compiled from a census tract level and are estimated for incorporated jurisdictions based on a State dataset of extra-territorial jurisdiction boundaries. As a result, the population estimates for some jurisdictions skew large due to the inclusion of unincorporated areas. In the case of the City of Roxboro, which

does not have an official extra-territorial jurisdiction, the state's estimate skews the City's population to 56% greater than the actual population by including parts of unincorporated Person County in the City of Roxboro estimates. The HMPC raised concerns about the errors in these estimates in order for corrections to be made in any future updates to IRISK.

4.4.2 PROPERTY

Building counts were also provided by the IRISK database and are detailed in Table 4.8. These values were generated using locally-provided building footprint and parcel data as well as data generated by NCEM. The methodology for generating the building asset inventory is described in greater detail in Section 4.3. The IRISK building inventory reflects a less than 1% decrease in total building count and in total exposed building value since the development of the 2020 plan. The Planning Area Profile in Section 3 describes recent growth and development and provides context for understanding the degree to which exposure and vulnerability may have increased.

Table 4.8 – Building Counts and Values by Jurisdiction

Jurisdiction	Building Count	Building Value
Alamance		
City of Burlington	24,403	$5,515,560,224
City of Graham	7,269	$1,316,164,837
City of Mebane	5,835	$1,292,288,024
Town of Elon	2,760	$719,062,825
Town of Green Level	1,177	$113,426,782
Town of Haw River	2,352	$409,669,987
Town of Ossipee	330	$135,545,050
Town of Swepsonville	573	$110,607,193
Village of Alamance	798	$111,618,918
Unincorporated Alamance County	29,650	$3,375,672,801
Subtotal Alamance	**75,147**	**$13,099,616,641**
Durham		
City of Durham	75,586	$18,138,906,233
Unincorporated Durham County	21,037	$3,613,460,037
Subtotal Durham	**96,623**	**$21,752,366,270**
Orange		
Town of Carrboro	5,782	$1,446,024,246
Town of Chapel Hill	15,108	$5,302,835,624
Town of Hillsborough	3,883	$704,636,732
Unincorporated Orange County	24,533	$3,203,843,233
Subtotal Orange	**49,306**	**$10,657,339,835**
Person		
City of Roxboro	6,617	$918,466,278
Unincorporated Person County	17,714	$1,424,187,837
Subtotal Person	**24,331**	**$2,342,654,115**
Total	**245,407**	**$47,851,976,861**

Source: NCEM IRISK Database

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Eno-Haw region, current parcel data was evaluated to identify recent development since NCEM's IRISK

database was last updated. The building footprint layer from IRISK was compared to current parcel data; any parcels with an improved value that did not already have a building in IRISK were appended the property inventory. This information is not incorporated into the risk assessment, which was prepared using IRISK. However, this summary of recent development provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table 4.9 provides a summary of estimated property exposure by occupancy type.

Table 4.9 - Current Improved Parcels, as of November 2024

Occupancy Type	Improved Parcel Count	Total Improved Value
Agriculture	11,128	$1,226,864,017
Commercial	12,385	$11,542,364,842
Education	1,282	$3,753,105,186
Government	1,686	$1,897,734,037
Industrial	3,467	$4,320,481,163
Religious	1,856	$1,019,237,035
Residential	256,268	$51,445,809,691
Regional Total	288,072	$75,205,595,971

Source: County parcel data, retrieved November 2024; IRISK database building footprints

4.4.3 CRITICAL FACILITIES

The IRISK database also identifies Critical Infrastructure and Key Resources (CIKR) buildings as well as High Potential Loss Properties. These properties are detailed in Table 4.10 and Table 4.11, respectively.

Table 4.10 – Critical Infrastructure and Key Resources by Type and Jurisdiction

Jurisdiction	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	Defense	Government Facilities	Healthcare	National Monuments and Icons	Nuclear Reactors, Materials and Waste	Postal and Shipping	Transportation Systems	Energy	Emergency Services	Water	Total
Alamance																	
Unincorporated Alamance County	2,325	0	0	783	0	273	0	89	14	0	0	0	211	6	12	25	**3,738**
Burlington	45	43	0	1,453	2	448	1	119	112	0	2	0	486	23	5	40	**2,779**
Graham	27	13	0	331	0	92	1	99	18	0	2	0	102	2	1	7	**695**
Mebane	32	10	0	265	0	108	1	15	14	0	0	0	76	2	4	2	**529**
Elon	4	1	0	75	0	14	0	152	62	0	0	0	13	1	1	1	**324**

Jurisdiction	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	Defense	Government Facilities	Healthcare	National Monuments and Icons	Nuclear Reactors, Materials and Waste	Postal and Shipping	Transportation Systems	Energy	Emergency Services	Water	Total
Green Level	15	0	0	76	0	16	0	5	0	0	0	0	7	1	0	0	**120**
Haw River	22	0	0	104	1	60	0	5	1	0	0	0	6	3	1	10	**213**
Ossipee	0	0	0	21	0	4	0	2	0	0	0	0	1	3	0	0	**31**
Swepsonville	2	0	0	13	0	5	0	2	0	0	0	0	6	0	1	1	**30**
Alamance	33	0	0	18	0	15	0	12	1	0	0	0	4	0	0	1	**84**
Durham																	
Unincorporated Durham County	1,230	353	0	765	1	542	0	91	41	0	0	0	0	1	6	17	**3,047**
Durham	88	1,464	0	3,527	11	1,212	0	996	362	0	0	0	0	1	16	117	**7,794**
Orange																	
Unincorporated Orange County	1,790	0	0	567	0	269	0	58	31	0	0	0	170	5	10	5	**2,905**
Carrboro	45	5	0	145	0	34	0	23	21	0	0	0	30	8	2	9	**322**
Chapel Hill	17	37	0	419	11	39	0	326	113	0	0	1	64	112	6	26	**1,171**
Hillsborough	9	53	0	234	1	59	0	56	15	0	0	0	25	10	4	6	**472**
Person																	
Unincorporated Person County	2,279	1	0	306	0	86	0	46	9	0	0	0	46	52	1	0	**2,826**
Roxboro	118	14	0	448	0	104	0	74	45	0	0	0	48	4	1	5	**863**
Total	**8,081**	**1,994**	**0**	**9,550**	**27**	**3,380**	**3**	**2,170**	**859**	**0**	**4**	**1**	**1,295**	**234**	**71**	**272**	**27,941**

Source: NCEM Risk Management Tool

Table 4.11 – High Potential Loss Properties by Use and Jurisdiction

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Alamance								
Unincorporated Alamance	6	58	28	25	0	28	20	**165**
Burlington	72	288	144	42	0	54	42	**642**
Graham	14	55	39	28	0	12	8	**156**
Mebane	35	42	31	7	0	9	2	**126**
Elon	12	44	5	51	0	9	1	**122**

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Green Level	0	1	4	1	0	0	1	**7**
Haw River	0	5	13	1	0	5	6	**30**
Ossipee	0	1	2	0	0	1	3	**7**
Swepsonville	0	5	3	2	0	0	0	**10**
Village of Alamance	0	1	4	2	0	3	0	**10**
Subtotal Alamance	**139**	**500**	**273**	**159**	**0**	**121**	**83**	**1,275**
Durham								
Unincorporated Durham County	25	75	87	19	0	5	18	**229**
Durham	467	680	137	246	0	57	51	**1,638**
Subtotal Durham	**492**	**755**	**224**	**265**	**0**	**62**	**69**	**1,867**
Orange								
Unincorporated Orange County	37	6	4	0	0	8	4	**59**
Carrboro	47	15	1	1	0	0	9	**73**
Chapel Hill	378	123	3	10	0	16	32	**562**
Hillsborough	18	24	2	2	0	1	6	**53**
Subtotal Orange	**480**	**168**	**10**	**13**	**0**	**25**	**51**	**747**
Person								
Unincorporated Person County	2	10	2	6	0	6	0	**26**
Roxboro	3	28	8	11	0	3	9	**62**
Subtotal Person	**5**	**38**	**10**	**17**	**0**	**9**	**9**	**88**
Total	**1,116**	**1,461**	**517**	**454**	**0**	**217**	**212**	**3,977**

Source: NCEM Risk Management Tool

Using the existing CIKR inventory and local data, the HMPC and community staff refined and supplemented the IRISK asset inventory with a current list of critical facilities. These assets are considered community lifelines, which are defined by FEMA as the buildings and infrastructure that enable the continuous operation of critical business and government functions and are essential to human health and safety or economic security. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. These critical facilities are a priority for mitigation planning and were examined against known hazard areas, where possible, in this risk assessment.

Critical facilities are summarized in Table 4.12 and shown by County in Figure 4.1 through Figure 4.4. More details on critical facilities are provided in the jurisdictional annexes.

Table 4.12 – Critical Facilities

Jurisdiction	FEMA Lifeline Type								Total
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health and Medical	Safety and Security	Transportation	Water Systems	
Alamance County Total	**5**	**4**	**167**	**0**	**4**	**37**	**1**	**101**	**319**
Unincorporated Alamance	0	1	40	0	0	12	0	28	81
Burlington	1	1	21	0	4	8	1	26	62
Graham	0	0	11	0	0	2	0	7	20
Mebane	0	0	4	0	0	4	0	24	32
Elon	3	1	88	0	0	8	0	12	112
Green Level	0	0	0	0	0	0	0	0	0
Haw River	0	0	1	0	0	1	0	1	3
Ossipee	0	0	0	0	0	0	0	0	0
Swepsonville	0	0	2	0	0	1	0	0	3
Alamance	1	1	0	0	0	1	0	3	6
Durham County Total	**0**	**2**	**57**	**0**	**10**	**44**	**0**	**93**	**206**
Unincorporated Durham	0	1	1	0	0	10	0	17	29
Durham	0	1	56	0	10	34	0	76	177
Orange County Total	**4**	**16**	**128**	**0**	**12**	**39**	**1**	**4**	**204**
Unincorporated Orange	2	7	30	0	3	13	0	1	56
Carrboro	0	1	10	0	3	4	0	1	19
Chapel Hill	1	8	82	0	2	13	1	1	108
Hillsborough	1	0	6	0	4	9	0	1	21
Person County Total	**3**	**6**	**3**	**0**	**4**	**23**	**1**	**6**	**46**
Unincorporated Person	0	5	1	0	1	11	1	3	22
Roxboro	3	1	2	0	3	12	0	3	24
Region Total	**12**	**28**	**355**	**0**	**30**	**143**	**3**	**204**	**775**

Source: NCEM IRISK Database; GIS analysis

Note: Mebane has seven critical facilities located in unincorporated Orange County.

Figure 4.1 – Critical Facilities, Alamance County

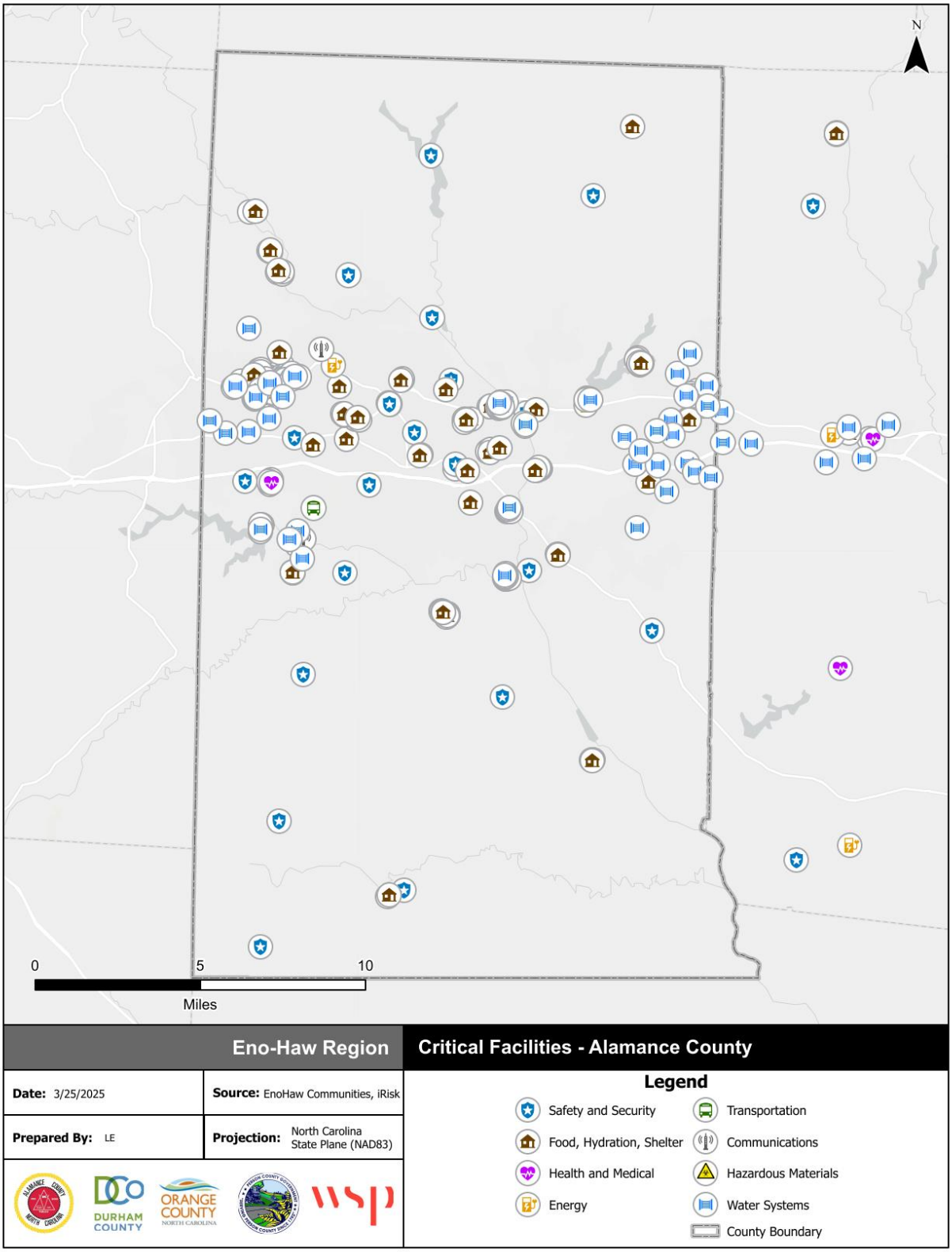


Figure 4.2 – Critical Facilities, Durham County

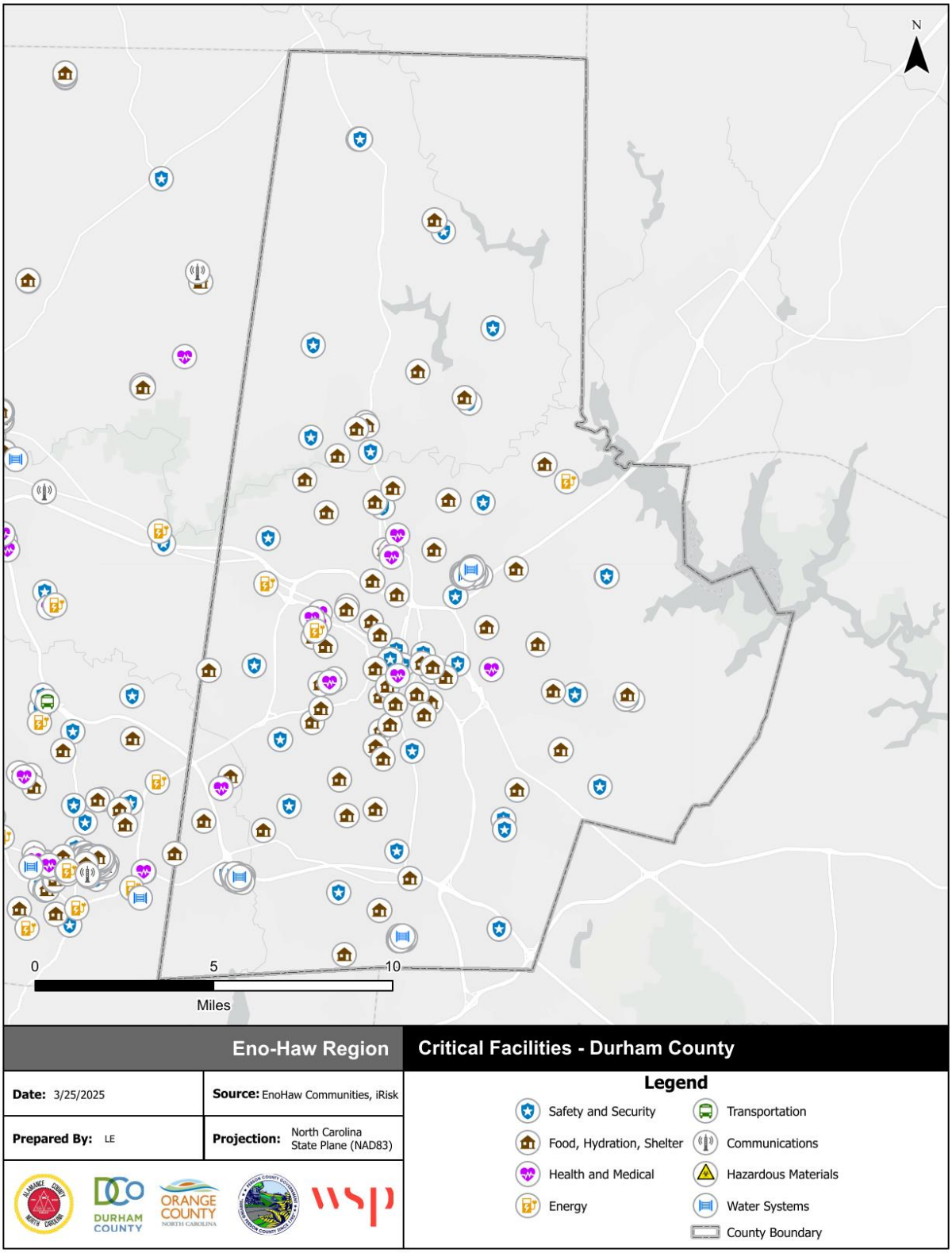


Figure 4.3 – Critical Facilities, Orange County

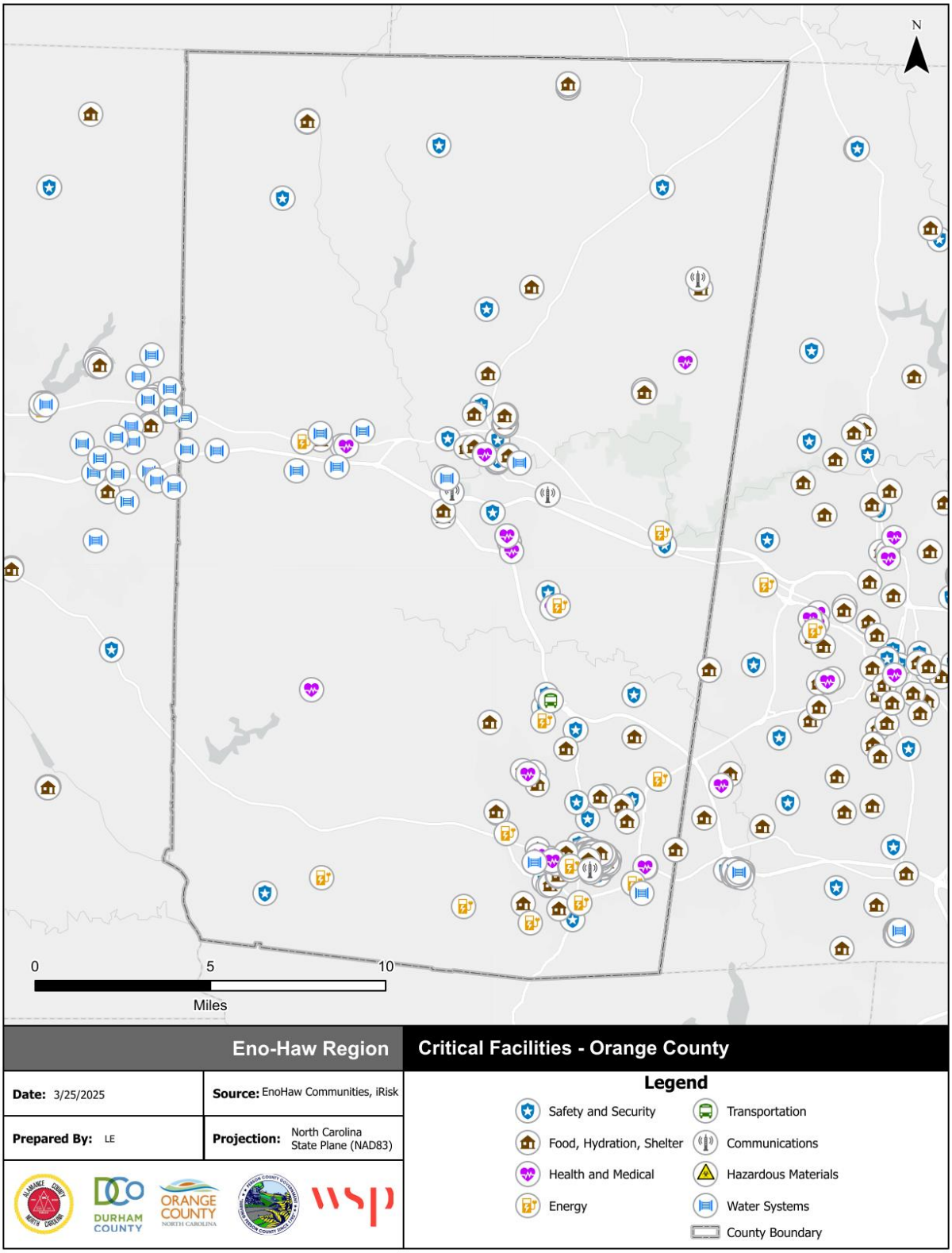
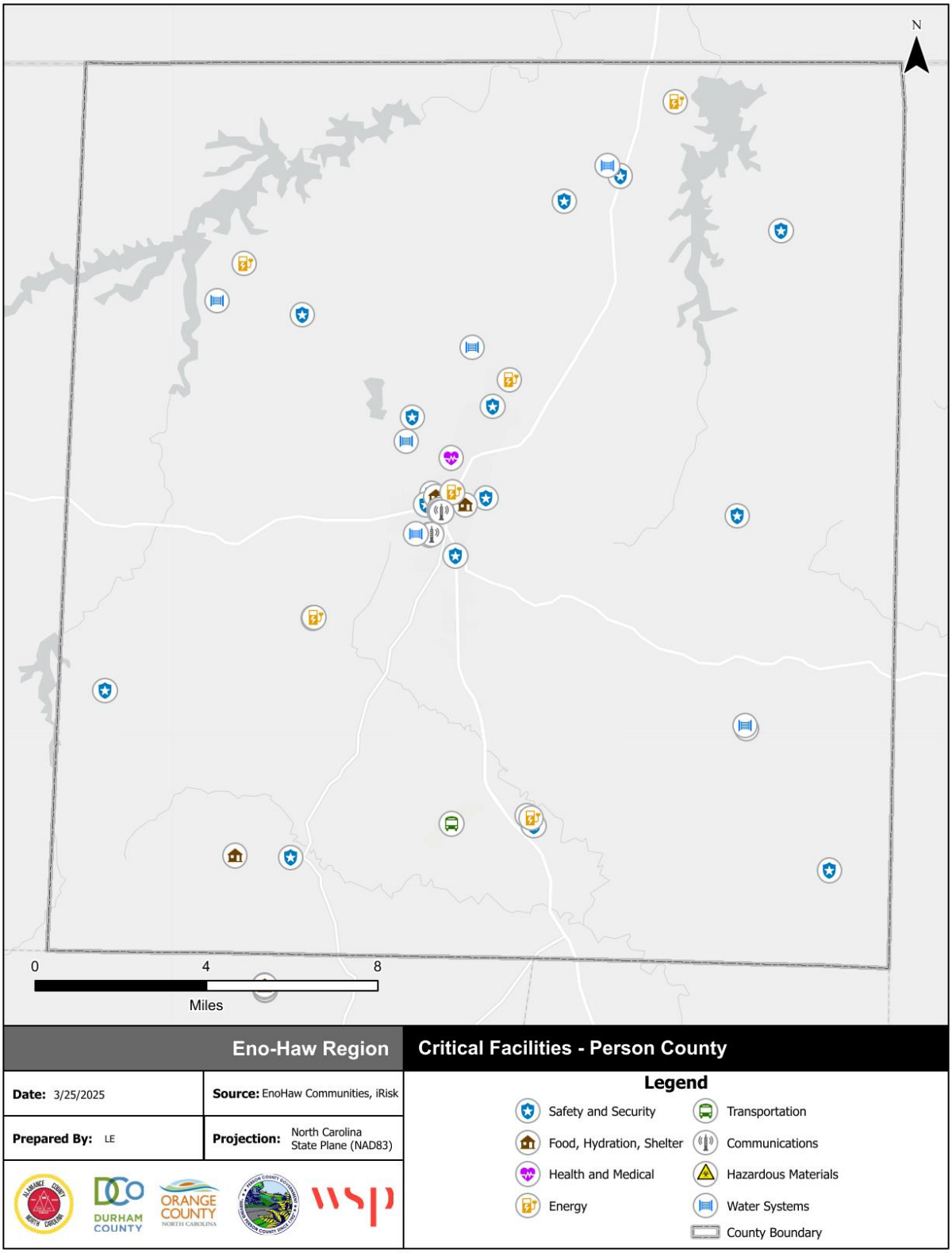


Figure 4.4 – Critical Facilities, Person County



4.4.4 AGRICULTURE

The agricultural industry is also highly vulnerable to natural hazards, which can cause both crop and livestock losses. The exposure of agriculture in the region was measured using the USDA's 2022 Census of Agriculture. Table 4.13 below summarizes the agricultural exposure in the Region by county.

Table 4.13 – Summary of Agriculture Exposure by County

County	Number of Farms	Acreage in Farms	Proportion of Total Land Area in Farms	Acreage with Crop Insurance	Estimated Market Value of Land & Buildings
Alamance County	724	68,769	25.4%	4,637 (6.7%)	$565,101,000
Durham County	212	16,166	8.8%	997 (6.2%)	$147,689,000
Orange County	687	53,068	20.9%	7,442 (14.0%)	$463,912,000
Person County	364	88,571	35.3%	28,442 (32.1%)	$439,075,000

Source: USDA 2022 Census of Agriculture

4.5 HAZARD PROFILES, ANALYSIS, AND VULNERABILITY

4.5.1 DAM FAILURE

HAZARD BACKGROUND

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, concrete, or mine tailings. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Dams can benefit farmland, provide recreation areas, generate electrical power, and help control erosion and flooding issues. A dam failure is the collapse or breach of a dam that causes downstream flooding. Dam failures may be caused by natural events, manmade events, or a combination. Due to the lack of advance warning, failures resulting from natural events, such as earthquakes or landslides, may be particularly severe. Prolonged rainfall and subsequent flooding is the most common cause of dam failure.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion in dam foundation occurs (also known as piping). If internal erosion or overtopping causes a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying anything in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway; or
- High winds, which can cause significant wave action and result in substantial erosion.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. Dam failures are generally catastrophic if the structure is breached or significantly damaged. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects to roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

Dam failure can occur with little warning. Intense storms may produce a flood in a few hours or even minutes for upstream locations. Flash floods occur within six hours of the beginning of heavy rainfall, and dam failure may occur within hours of the first signs of breaching. Other failures and breaches can

take much longer to occur, from days to weeks, as a result of debris jams or the accumulation of melting snow.

Dam failures are of particular concern because the failure of a large dam has the potential to cause more death and destruction than the failure of any other manmade structure. This is because of the destructive power of the flood wave that would be released by the sudden collapse of a large dam. Dams are innately hazardous structures. Failure or poor operation can result in the release of the reservoir contents—this can include water, mine wastes, or agricultural refuse–causing negative impacts upstream or downstream or at locations far from the dam. Negative impacts of primary concern are loss of human life, property damage, lifeline disruption, and environmental damage.

Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

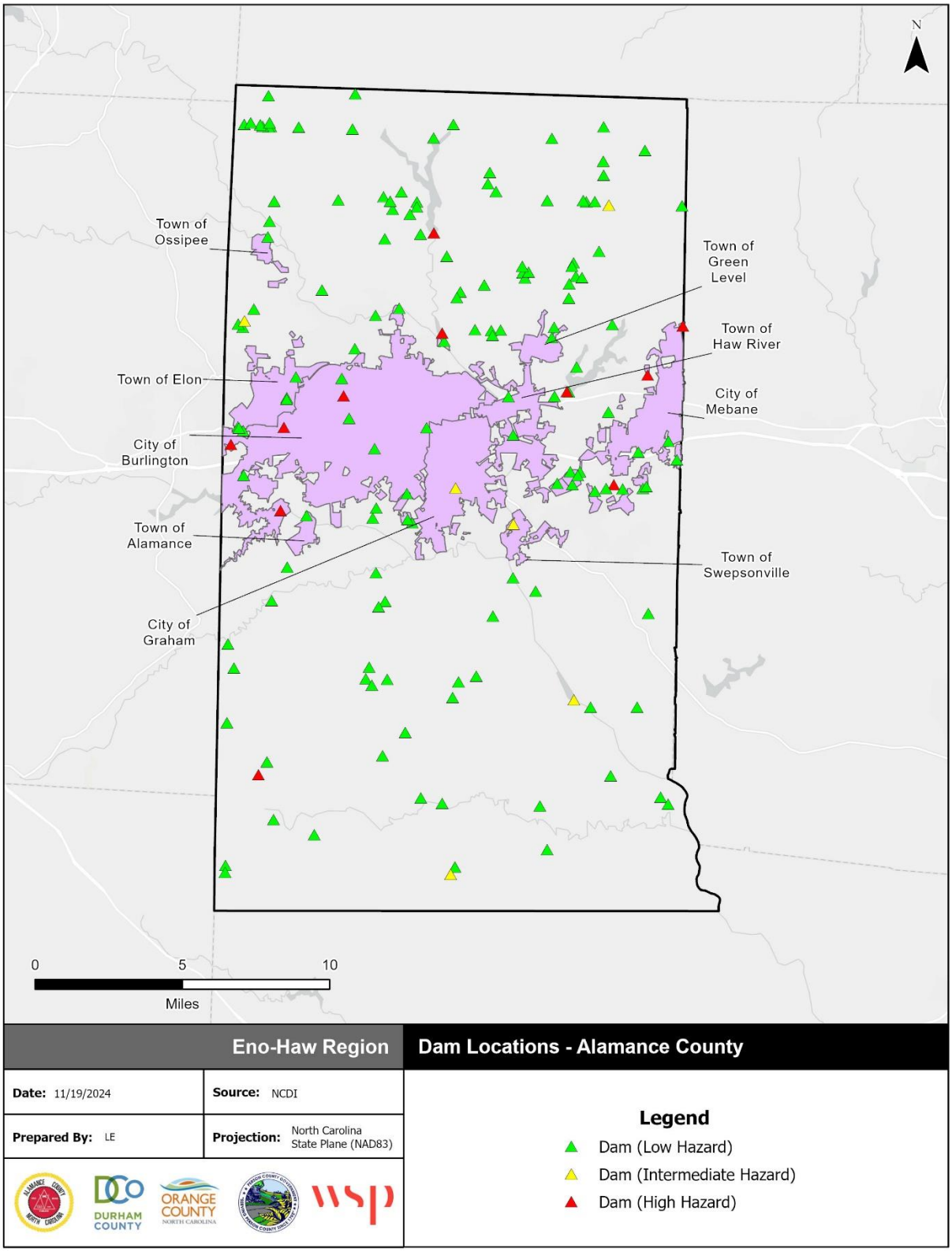
LOCATION

The North Carolina Dam Inventory, maintained by North Carolina Department of Environmental Quality, provides a detailed inventory of all dams in the state. As of November 2024, there are 398 dams in the Eno-Haw region, 158 in Alamance County, 118 in Durham County, 76 in Orange County, and 46 in Person County. Of the 398, 287 are rated low hazard, 25 are rated intermediate hazard, and 86 are rated high hazard. Figure 4.5 through Figure 4.8 show the location of all dams in the Eno-Haw Region by county. Table 4.14 through Table 4.17 list all dams with high hazard potential in the region by county.

Data on the inundation area for each of the identified high hazard dams in the region was not available. It is assumed that the area that would be impacted by the failure of any individual dam in the region is negligible relative to the planning area.

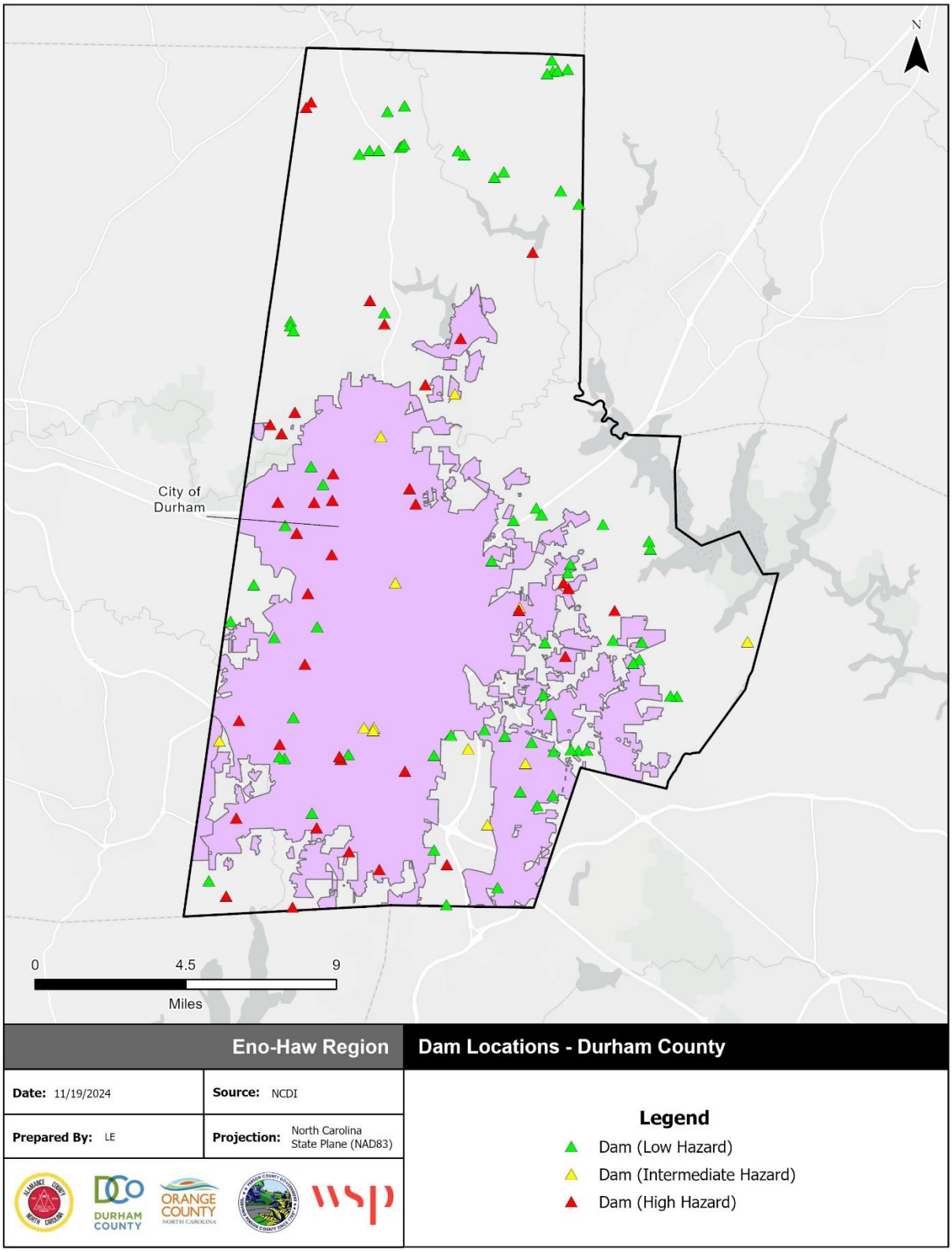
Spatial Extent: 1 – Negligible

Figure 4.5 – Dam Locations in Alamance County



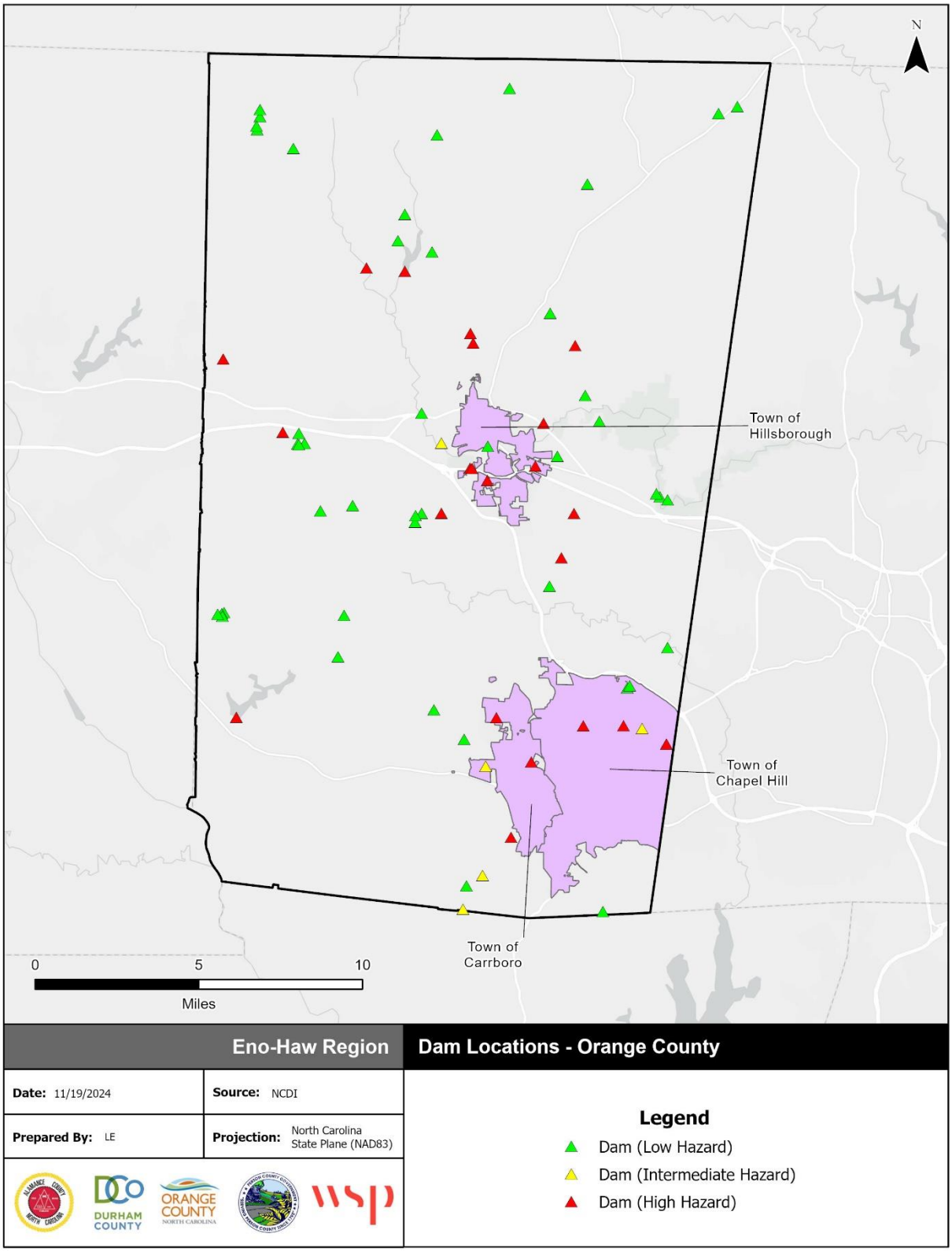
Source: North Carolina Dam Inventory, November 2024

Figure 4.6 – Dam Locations in Durham County



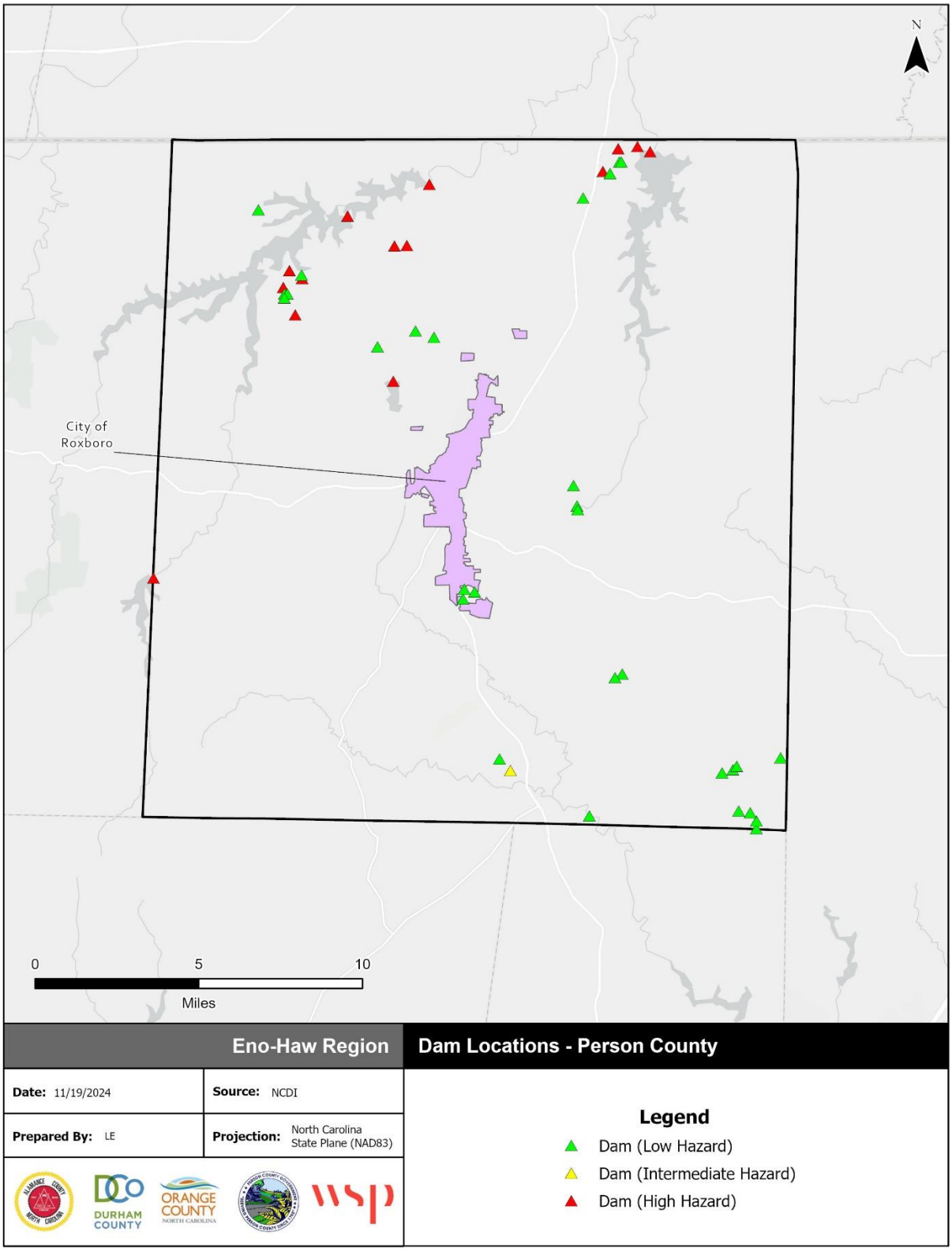
Source: North Carolina Dam Inventory, November 2024

Figure 4.7 – Dam Location in Orange County



Source: North Carolina Dam Inventory, November 2024

Figure 4.8 – Dam Location in Person County



Source: North Carolina Dam Inventory, November 2024

Table 4.14 – High Hazard Dams in Alamance County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Town
Back Creek Reservoir Dam	NC04873	Fair	10645	Haw River
Forest Lake Dam	NC00748	Fair	235	Mebane
Hudgins Dam	NC05541	Not Rated	10	
Lake Cammack Dam	NC00739	Fair	36000	Burlington
Lake Mackintosh Dam	NC04954	Fair	30825	Alamance
McEwen Estate Dam	NC01734	Fair	142	Alamance
Meadowood Lake Dam	NC06834	Fair	60	Melville
Mill Creek Subdivision Dam	NC05718	Fair	7	Mebane
Old Stoney Creek Dam	NC00762	Fair	3600	Hopedale
Somerton Lake Dam	NC05203	Fair	47	Burlington
Tate Dam	NC01737	Fair	56	Burlington
Timber Ridge Lake Dam	NC00742	Fair	288	Saxapahaw

Source: North Carolina Dam Inventory, November 2024

Table 4.15 – High Hazard Dams in Durham County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Town
Bailey Lake Dam	NC01032	Fair	80	Falls
Bay Meadows Lake Dam	NC01046	Fair	96	Farrington
Boles Lake Dam	NC05046	Satisfactory	60	
Chamberlynne Dam #4	NC06444	Satisfactory		
Chamberlynne Subdivision Dam #3	NC06443	Satisfactory		
Cole Lake Dam	NC01049	Fair	81	Durham
Colvard Farms Dam	NC06613			
Crystal Lake Dam	NC01021	Satisfactory	100	Durham
Dairy Pond Dam	NC02270	Satisfactory	31	
Discovery Lake Dam	NC01666	Satisfactory	336	Haywood
Duke Water Harvesting Pond Dam	NC06146	Satisfactory	70	
Eden Lake Dam	NC01043	Poor	140	Falls
Forest at Duke Dam	NC06117	Satisfactory		
Gentz Dam	NC07014			
Georgiade Dam	NC02273	Satisfactory	12	Durham
Grove Park Dam	NC02323	Fair	302	
Hock Dam	NC05112	Satisfactory	8	Braggtown
Lake Elton Dam	NC01037	Fair	155	Parkwood
Lake Michie Dam	NC01027	Satisfactory	18660	Redwood
Lake Swannanoa Dam	NC06420	Fair		
Lake Vista Dam	NC01051	Satisfactory	69	Durham
Lakehurst SD Dam	NC01039	Satisfactory	145	Farrington
Little River Dam	NC05143	Satisfactory	18000	Falls
N. Durham Quarry East Dam	NC05165	Satisfactory	134	Braggtown

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Town
N. Durham Quarry West Dam	NC05166	Satisfactory	83	Braggtown
Newcomb Lake Dam	NC01023	Satisfactory	94	Durham
Oxford Commons Dam	NC02324	Satisfactory	24	Braggtown
Parkwood Lake Dam	NC01038	Satisfactory	318	
Patterson Place Dam	NC05819	Satisfactory	82	
Poe Dam	NC06934			
Ridgefield Subdivision SWDP Dam #14	NC05629	Satisfactory	6	
Sykes Lake Dam	NC01028	Fair	100	Durham
Tcheng Dam	NC06964	Fair		
The Streets at Southpoint Mall Dam	NC05653	Satisfactory	51	
Thompson Lake Dam	NC01047	Fair	60	Farrington
Twin Lake Dam #2	NC05216	Fair	78	Oak Grove
Williams Terminal Reservoir Dam	NC06139	Satisfactory		
Willowhaven Lake Dam #2	NC01050	Fair	58	Durham

Source: North Carolina Dam Inventory, November 2024

Table 4.16 – High Hazard Dams in Orange County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Town
Blackburn Lake Dam	NC00776	Fair	55	Hillsborough
Cane Creek Resevoir Dam	NC00779	Satisfactory	19079	
Colony Lake Dam	NC03671	Fair	48	
Eastwood Lake Dam	NC00781	Fair	330	
Flint Ridge Dam	NC03663	Fair	22	
Haithcock Heirs Dam	NC06505	Poor		
Hillsborough Water Supply Dam	NC05793	Satisfactory	24061	Hillsborough
Hines Pond Dam	NC03666	Fair		
Hogan Farms Dam	NC00770	Satisfactory	160	Chapel Hill
Lake Ellen Dam	NC01537	Fair	81	
Lake Michael Dam	NC00771	Fair	1100	Haw River
Lake Orange Dam	NC00773	Satisfactory	1640	Hillsborough
Meadowlands Dam	NC03669	Fair	45	
Occoneechee Lower Dam	NC05777	Satisfactory	5	
Occoneechee Upper Dam	NC05776	Satisfactory		
Randy Fox Dam	NC05715	Satisfactory	68	Hillsborough
Spring Valley Dam	NC04994	Poor	22	
Strayhorn Dam #2	NC04999	Fair	98	
Strayhorn Farm Dam	NC03670	Fair	80	Eno
University Lake Dam	NC00782	Fair	4836	Carrboro
Wilkins Dam	NC06504	Fair		

Source: North Carolina Dam Inventory, November 2024

Table 4.17 – High Hazard Dams in Person County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Town
Jimmie Bowes Dam #2	NC06983			
Jimmie Bowes Transmission Line Dam	NC06016	Fair		
Lake Hyco Dam	NC00656	Fair	160000	McGehees Mill
Mayo Active Ash Basin Dam	NC06003	Fair	1921	
Mayo FGD Settling Basin Dam	NC06207	Satisfactory	52	
Mayo Lake Dam	NC06002	Satisfactory	142000	
Mayo Retention Basin Dam	NC06208	Satisfactory	86	
Roxboro Afterbay Dam	NC00666	Fair	27000	Denniston
Roxboro East Ash Basin Dam	NC05973	Satisfactory	3468	
Roxboro Holding Basin Dam	NC06205	Satisfactory	35	
Roxboro Municipal Lake Dam	NC00658	Fair	4125	Olive Hill
Roxboro Retention Basin Dam	NC06206	Satisfactory	128	
Roxboro West Ash Basin Dam	NC06006	Fair	5567	
Roxboro West Ash Basin Rock Filter Dam	NC06007	Fair	5567	
South Hyco Lake Dam	NC03689	Fair	9400	

Source: North Carolina Dam Inventory, November 2024

EXTENT

Each state has definitions and methods to determine the hazard potential of a dam. In North Carolina, dams are regulated by the state if they are 25 feet or more in height and impound 50 acre-feet or more. Dams and impoundments smaller than that may fall under state regulation if it is determined that failure of the dam could result in loss of human life or significant damage to property. The height of a dam is from the highest point on the crest of the dam to the lowest point on the downstream toe, and the storage capacity is the volume impounded at the elevation of the highest point on the crest of the dam.

Dam Safety Program engineers determine the "hazard potential" of a dam, meaning the probable damage that would occur if the structure failed, in terms of loss of human life and economic loss or environmental damage. Dams are assigned one of three classes based on the nature of their hazard potential:

- Class A (Low Hazard) includes dams located where failure may damage uninhabited low value non-residential buildings, agricultural land, or low volume roads.
- Class B (Intermediate Hazard) includes dams located where failure may damage highways or secondary railroads, cause interruption of use or service of public utilities, cause minor damage to isolated homes, or cause minor damage to commercial and industrial buildings. Damage to these structures will be considered minor only when they are located in backwater areas not subjected to the direct path of the breach flood wave; and they will experience no more than 1.5 feet of flood rise due to breaching above the lowest ground elevation adjacent to the outside foundation walls or no more than 1.5 feet of flood rise due to breaching above the lowest floor elevation of the structure.
- Class C (High Hazard) includes dams located 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.

Table 4.18 – Dam Hazard Classifications

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

*Probable loss of human life due to breached roadway or bridge on or below the dam

Source: NCDEQ

Based on classification criteria, a high hazard dam failure could cause death and/or injury as well as severe property damage and economic impacts within the affected area. Therefore, though the affected area would be negligible in size relative to the entire planning area, the potential impact of a high hazard dam failure is critical.

Impact: 3 – Critical

HISTORICAL OCCURRENCES

The previous Eno-Haw plan, the 2023 North Carolina State Hazard Mitigation Plan, FEMA records, and recent news reports were reviewed, but no records of historical dam failures occurrences in or affecting the planning area were found.

PROBABILITY OF FUTURE OCCURRENCE

Given the significant presence of high hazard dams in the Eno-Haw Region, failure of a dam is possible. Dam failure has not occurred in the region, however historical events alone do not provide an adequate estimate of potential future occurrence. With heavy rain events becoming more frequent and intense, conditions conducive to dam failure may occur more frequently as well.

Probability: 2 – Possible

CLIMATE CHANGE

Studies have been conducted to investigate the impact of climate change scenarios on dam safety. The safety of dams for the future climate can be based on an evaluation of changes in design floods and the freeboard available to accommodate an increase in flood levels. The results from the studies indicate that the design floods with the corresponding outflow floods and flood water levels will increase in the future, and this increase will affect the safety of the dams in the future. Studies concluded that the total hydrological failure probability of a dam will increase in the future climate and that the extent and depth of flood waters will increase by the future dam break scenario.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Dam inundation areas were not available for the identified dams; therefore, a quantitative vulnerability assessment could not be completed. Vulnerability discussed below is based on anecdotal evidence and theoretical understanding of potential risks.

PEOPLE

A person's immediate vulnerability to a dam failure is directly associated with the person's distance downstream of the dam as well as proximity to the stream carrying the floodwater from the failure. For dams that have an Emergency Action Plan (EAP), the vulnerability of loss of life for persons in their homes or on their property may be mitigated by following the EAP evacuation procedures; however, the displaced persons may still incur sheltering costs. For persons located on the river (e.g. for recreation) the vulnerability of loss of life is significant.

People are also vulnerable to the loss of the uses of the lake upstream of a dam following failure. Several uses are minor, such as aesthetics or recreational use. However, some lakes serve as drinking water supplies and their loss could disrupt the drinking water supply and present a public health problem.

PROPERTY

Vulnerability of the built environment includes damage to the dam itself and any man-made feature located within the inundation area caused by the dam failure. Downstream of the dam, vulnerability includes potential damage to homes, personal property, commercial buildings and property, and government owned buildings and property; destruction of bridge or culvert crossings; weakening of bridge supports through scour; and damage or destruction of public or private infrastructure that cross the stream such as water and sewer lines, gas lines and power lines. Water dependent structures on the lake upstream of the dam, such as docks/piers, floating structures or water intake structures, may be damaged by the rapid reduction in water level during the failure.

ENVIRONMENT

Aquatic species within the lake will either be displaced or destroyed. The velocity of the flood wave will likely destroy riparian and instream vegetation and destroy wetland function. The flood wave will likely cause erosion within and adjacent to the stream. Deposition of eroded deposits may choke instream habitat or disrupt riparian areas. Sediments within the lake bottom and any low oxygen water from within the lake will be dispersed, potentially causing fish kills or releasing heavy metals found in the lake sediment layers.

CONSEQUENCE ANALYSIS

Table 4.19 summarizes the potential negative consequences of dam failure.

Table 4.19 – Consequence Analysis – Dam Failure

Category	Consequences
Public	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas.
Responders	Localized impact expected to limit damage to personnel in the inundation area at the time of the incident.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities may postpone delivery of some services. Regulatory waivers may be needed locally. Fulfillment of some contracts may be difficult. Impact may reduce deliveries.
Property, Facilities and Infrastructure	Localized impact to facilities and infrastructure in the inundation area of the incident. Some severe damage possible.

Category	Consequences
Environment	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas. Consequences include erosion, water quality degradation, wildlife displacement or destruction, and habitat destruction.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damage and length of investigation.
Public Confidence in the Jurisdiction's Governance	Localized impact expected to primarily adversely affect only the dam owner and local entities.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes dam failure hazard risk by jurisdiction. Warning time and duration are inherent to the hazard and remain constant across jurisdictions. Spatial extent of any dam failure will be negligible relative to the planning area. Jurisdictions that have high hazard dams within their boundaries or are the nearest downstream location to a high hazard dam were assigned a probability rating of possible and an impact score of critical. Jurisdictions with no high hazard dams or upstream threats were assigned a probability rating of unlikely and an impact rating of limited.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Alamance County	**2**	**3**	**1**	**4**	**3**	**2.4**	**M**
Burlington	2	3	1	4	3	2.4	M
Graham	1	2	1	4	3	1.8	L
Mebane	2	3	1	4	3	2.4	M
Elon	2	3	1	4	3	2.4	M
Green Level	1	2	1	4	3	1.8	L
Haw River	2	3	1	4	3	2.4	M
Ossipee	1	2	1	4	3	1.8	L
Swepsonville	1	2	1	4	3	1.8	L
Alamance	2	3	1	4	3	2.4	M
Durham County	**2**	**3**	**1**	**4**	**3**	**2.4**	**M**
Durham	2	3	1	4	3	2.4	M
Orange County	**2**	**3**	**1**	**4**	**3**	**2.4**	**M**
Carrboro	2	3	1	4	3	2.4	M
Chapel Hill	2	3	1	4	3	2.4	M
Hillsborough	2	3	1	4	3	2.4	M
Person County	**2**	**3**	**1**	**4**	**3**	**2.4**	**M**
Roxboro	1	2	1	4	3	1.8	L

4.5.2 DROUGHT

HAZARD BACKGROUND

Drought is a deficiency in precipitation over an extended period. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. The duration of a drought varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. Studying the paleoclimate record is often helpful in identifying when long-lasting droughts have occurred. Common types of drought are detailed below in Table 4.20.

Table 4.20 – Types of Drought

Type	Details
Meteorological Drought	Meteorological Drought is based on the degree of dryness (rainfall deficit) and the length of the dry period.
Agricultural Drought	Agricultural Drought is based on the impacts to agriculture by factors such as rainfall deficits, soil water deficits, reduced ground water, or reservoir levels needed for irrigation.
Hydrological Drought	Hydrological Drought is based on the impact of rainfall deficits on the water supply such as stream flow, reservoir and lake levels, and ground water table decline.
Socioeconomic Drought	Socioeconomic drought is based on the impact of drought conditions (meteorological, agricultural, or hydrological drought) on supply and demand of some economic goods. Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related deficit in water supply.

The wide variety of disciplines affected by drought, its diverse geographical and temporal distribution, and the many scales drought operates on make it difficult to develop both a definition to describe drought and an index to measure it. Many quantitative measures of drought have been developed in the United States, depending on the discipline affected, the region being considered, and the particular application. Several indices developed by Wayne Palmer, as well as the Standardized Precipitation Index, are useful for describing the many scales of drought.

The U.S. Drought Monitor provides a summary of drought conditions across the United States and Puerto Rico. Often described as a blend of art and science, the Drought Monitor map is updated weekly by combining a variety of data-based drought indices and indicators and local expert input into a single composite drought indicator.

The **Palmer Drought Severity Index** (PDSI) devised in 1965, was the first drought indicator to assess moisture status comprehensively. It uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and is considered most effective for unirrigated cropland. It primarily reflects long-term drought and has been used extensively to initiate drought relief. It is more complex than the Standardized Precipitation Index (SPI) and the Drought Monitor.

The **Standardized Precipitation Index** (SPI) is a way of measuring drought that is different from the Palmer Drought Severity Index (PDSI). Like the PDSI, this index is negative for drought, and positive for wet conditions. But the SPI is a probability index that considers only precipitation, while Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration) and loss (runoff).

The State of North Carolina has a Drought Assessment and Response Plan as an Annex to its Emergency Operations Plan. This plan provides the framework to coordinate statewide response to a drought incident.

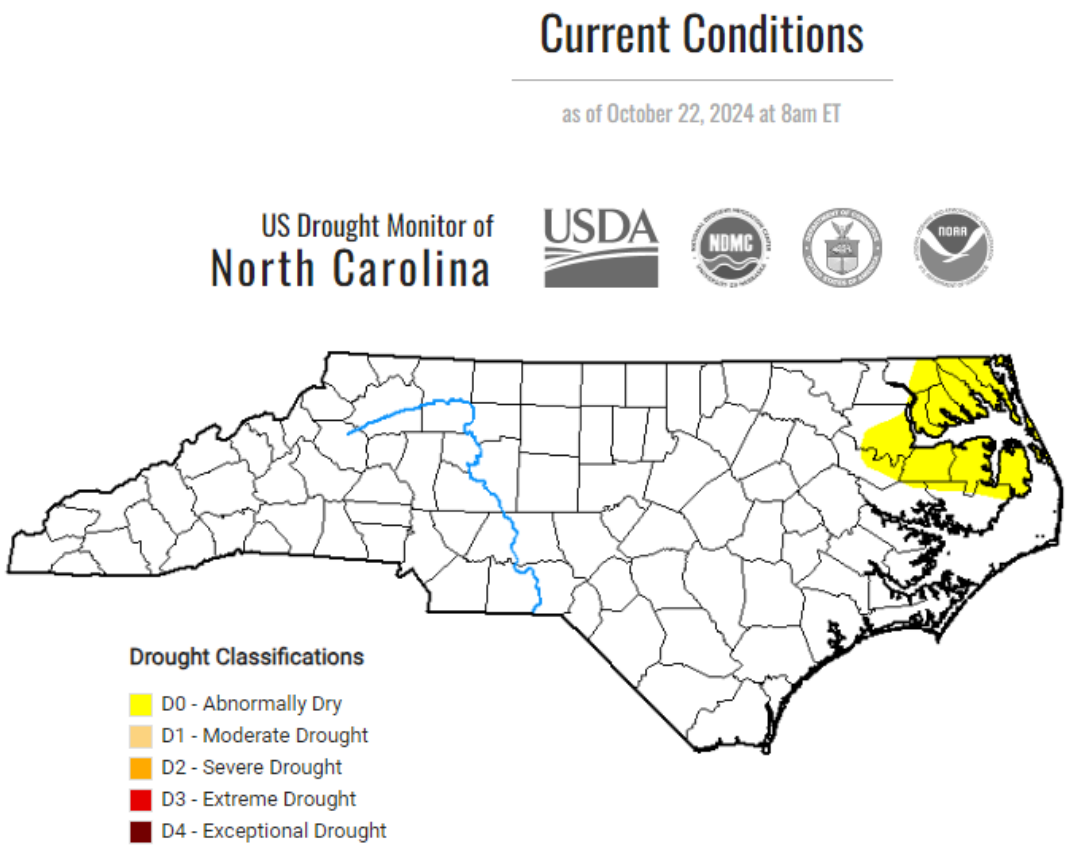
Warning Time: 1 – More than 24 hours

Duration: 4 – More than one week

LOCATION

Drought is a regional hazard that can cover the entire planning area, and in some cases the entire state. Figure 4.9 below notes the U.S. Drought Monitor's drought ratings for North Carolina as of October 22, 2024; as of that date, the Eno-Haw region was experiencing no impacts of drought.

Figure 4.9 – US Drought Monitor for Week of October 22, 2024



Source: U.S. Drought Monitor of North Carolina

Spatial Extent: 4 – Large

EXTENT

Drought extent can be defined in terms of intensity, using the U.S. Drought Monitor scale. The Drought Monitor Scale measures drought episodes with input from the Palmer Drought Severity Index, the Standardized Precipitation Index, the Keetch-Byram Drought Index, soil moisture indicators, and other inputs as well as information on how drought is affecting people. Table 4.21 details the classifications used by the U.S. Drought Monitor. A category of D2 (severe) or higher on the U.S. Drought Monitor Scale can typically result in crop or pasture losses, water shortages, and the need to institute water restrictions.

Table 4.21 – US Drought Monitor Classifications

Category	Description	Possible Impacts	Ranges				
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: US Drought Monitor

From late 2007 through mid-2008, North Carolina experienced the worst drought in state history. During this time, portions of all four Eno-Haw Region counties experienced exceptional drought conditions.

Impact: 2 – Limited

HISTORICAL OCCURRENCES

U.S. Drought Monitor records drought intensity weekly throughout the country. The North Carolina Department of Environmental Quality (NCDEQ) Division of Water Resources maintains records of Drought Monitor data for the state as far back as January 2000. Table 4.22 presents the number of weeks that each county in the region spent in drought by intensity over the period from 2000 through 2023, for which the Drought Monitor has records for 1,252 weeks.

Table 4.22 – Weeks in Drought, 2000-2023

County	Weeks in Drought						% of time in Severe Drought or Worse
	Total	D0	D1	D2	D3	D4	
Alamance	628	311	185	73	26	33	10.5%
Durham	596	312	168	61	24	31	9.3%
Orange	622	325	176	63	26	32	9.7%
Person	612	309	180	68	26	29	9.8%

Source: NCDEQ Division of Water Resources, Drought Monitor History

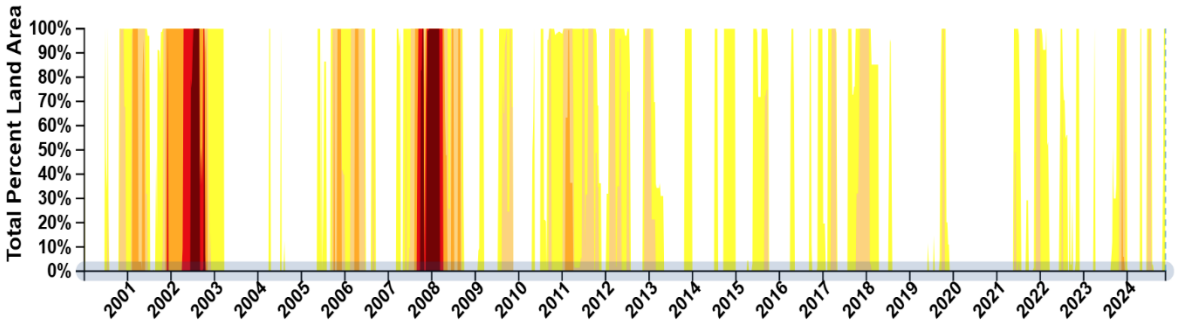
Error! Reference source not found. through Figure 4.13 – US Drought Monitor Historical Trends – Person County 2000-2024

shows the historical periods where each county was considered in some level of drought condition. The color key shown in Table 4.21 indicates the intensity of the drought.

ALAMANCE COUNTY

Between 2000 and 2023, Alamance County was in some level of drought 50% of the time.

Figure 4.10 – US Drought Monitor Historical Trends – Alamance County 2000-2024

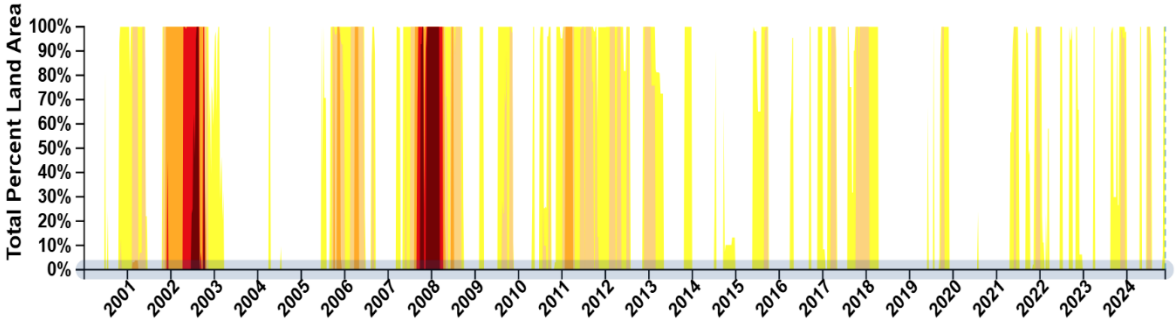


Source: U.S. Drought Monitor

DURHAM COUNTY

Between 2000 and 2023, Durham County was in some level of drought 48% of the time.

Figure 4.11 – US Drought Monitor Historical Trends – Durham County 2000-2024

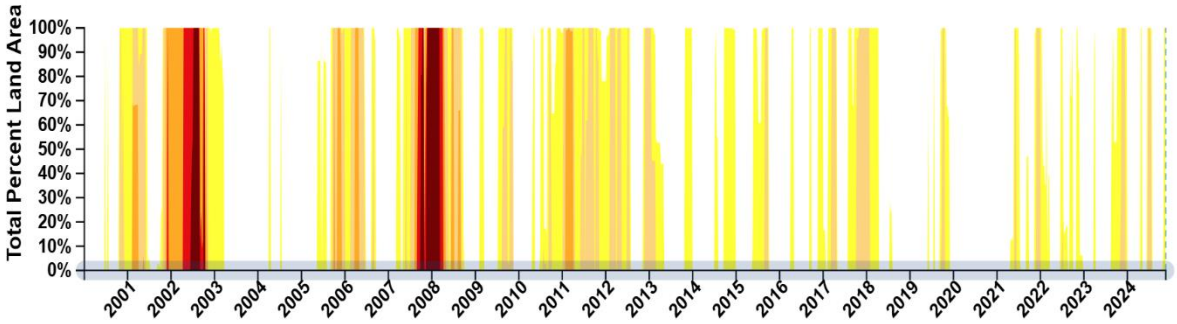


Source: U.S. Drought Monitor

ORANGE COUNTY

Between 2000 and 2023, Orange County was in some level of drought 50% of the time.

Figure 4.12 – US Drought Monitor Historical Trends – Orange County 2000-2024

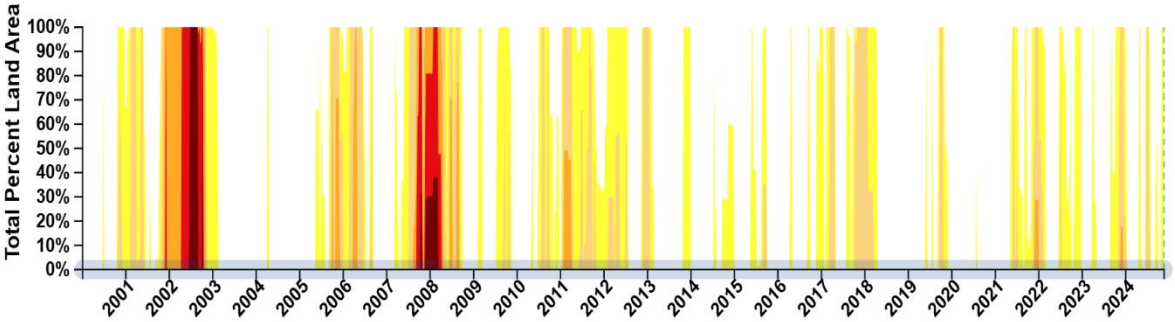


Source: U.S. Drought Monitor

PERSON COUNTY

Between 2000 and 2018, Person County was in some level of drought 49% of the time.

Figure 4.13 – US Drought Monitor Historical Trends – Person County 2000-2024



Source: U.S. Drought Monitor

The National Drought Mitigation Center (NDMC), located at the University of Nebraska in Lincoln, provides a clearinghouse for information on the effects of drought, based on reports from media, observers, impact records, and other sources.

According to the National Drought Mitigation Center's Drought Impact Reporter, during the 10-year period from January 2009 through December 2023, 377 drought impacts were noted for the State of North Carolina, of which 23 were reported to affect the Eno-Haw region. Table 4.23 summarizes the number of impacts reported by category and the years impacts were reported for each category. Note that the Drought Impact Reporter assigns multiple categories to each impact.

Table 4.23 – Drought Impacts Reported for Eno-Haw Counties, January 2009 through December 2023

Category	Impacts	Years Reported
Agriculture	2	2010, 2012
Fire	6	2011, 2019, 2021
Plants & Wildlife	9	2014, 2017
Relief, Response & Restrictions	11	2010, 2011, 2012, 2017, 2019, 2021
Water Supply & Quality	8	2011, 2012, 2014, 2015, 2017

Source: Drought Impact Reporter, http://droughtreporter.unl.edu

PROBABILITY OF FUTURE OCCURRENCE

Over the 24-year (1,252 week) period from 2000 through 2023, the Eno-Haw Region averaged 614.5 weeks of drought conditions ranging from abnormally dry to exceptional drought. This equates to a 49 percent chance of drought in any given week. Of this time, an average of approximately 123 weeks were categorized as a severe (D2) drought or greater; which equates to a 10 percent chance of severe drought in any given week.

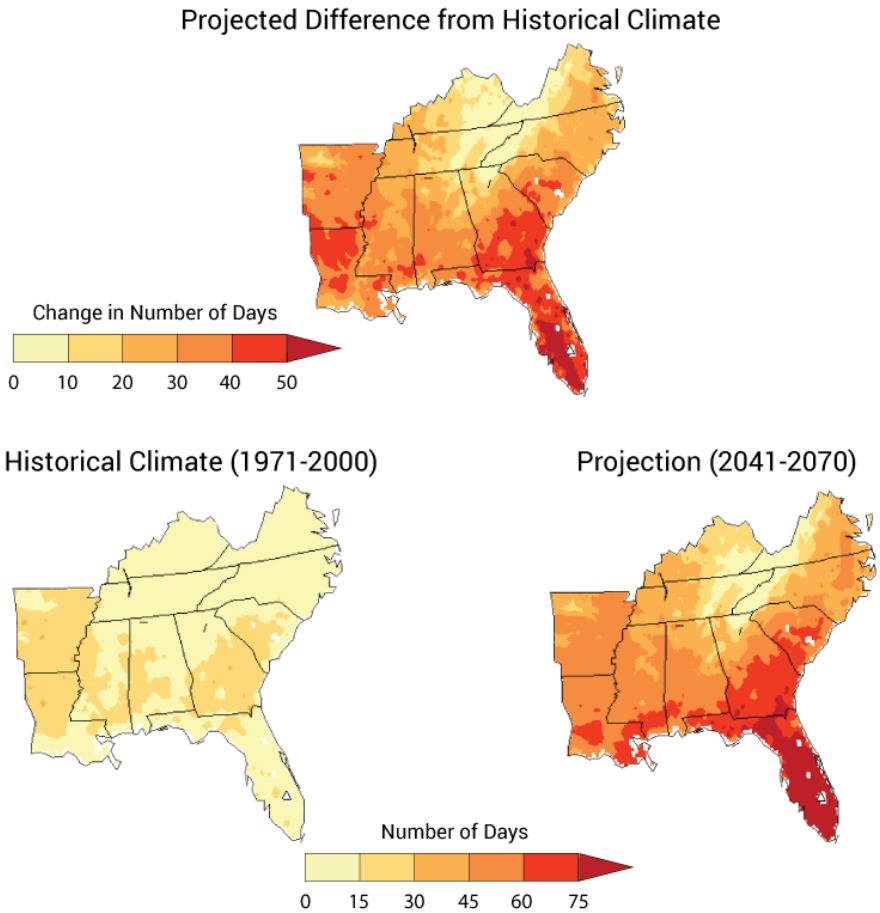
Probability: 3 – Likely

CLIMATE CHANGE

Research shows that average temperatures will continue to rise in the Southeast United States and globally, directly affecting the region. Per the Fourth National Climate Assessment, "climate change is expected to intensify the hydrologic cycle and increase the frequency and severity of extreme events like

drought and heavy rainfall."[1] Rising temperatures may exacerbate this trend, and extreme temperatures are projected to increase even more than average temperatures. The number of days over 95°F is expected to increase by between 20 and 30 days annually, as shown in Figure 4.14.

Figure 4.14 – Projected Change in Number of Days Over 95˚F



Source: NOAA NCDC from 2014 National Climate Assessment

The Fifth National Climate Assessment upholds the climate trends reported in the Fourth Assessment and presents additional patterns in the Southeast that exacerbate climate risk and impacts. These patterns include population growth, high proportion of the population with health issues or underlying health conditions, and a large, climate-dependent agricultural sector.[2]

The Triangle Regional Resilience Assessment notes that the number of days with extreme temperatures has been increasing in the Triangle, climbing from an average of 18 days over 92°F per year from 1948 to 2012 to a peak of 48 days over 92°F in 2010. The region overall is expected to see longer, more intense periods of drought.

[1] https://nca2018.globalchange.gov/chapter/19/
[2] https://nca2023.globalchange.gov/chapter/22/

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Vulnerability to drought in the Eno-Haw region is based on historical occurrences of drought in the region and generalized concerns regarding potential drought consequences. Agricultural vulnerability was estimated using data from the 2022 Census of Agriculture and a review of past claims related to drought.

PEOPLE

Drought can affect people's physical and mental health. For those economically dependent on a reliable water supply, drought may cause anxiety or depression about economic losses, reduced incomes, and other employment impacts. Conflicts may arise over water shortages. People may be forced to pay more for water, food, and utilities affected by increased water costs.

Drought may also cause health problems due to poorer water quality from lower water levels. If accompanied by extreme heat, drought can cause higher incidents of heat stroke and loss of human life.

PROPERTY

Drought is unlikely to cause damages to the built environment. However, in areas with shrinking and expansive soils, drought may lead to structural damages. Drought may cause severe property loss for the agricultural industry in terms of crop and livestock losses. The USDA's Risk Management Agency (RMA) maintains a database of all paid crop insurance claims. Between 2007-2023, the sum of claims paid for crop damage as a result of drought in the Eno-Haw region was $29,411,545, over 62 percent of these losses were paid out in Person County. The region averaged $1,730,090 in losses every year. Losses were greatest in 2007 for all counties except for Alamance, where losses were greatest in 2011.

Table 4.24 – Crop Losses Resulting from Drought, 2007-2023, Alamance County

Year	Indemnity Amount			
	Alamance County	Durham County	Orange County	Person County
2007	$793,653	$160,081	$654,315.00	$2,395,778
2008	$273,753	$151,673	$189,012.00	$1,837,537
2009	$561,311	$25,294	$126,118.00	$1,045,095
2010	$636,395	$67,285	$340,313.00	$1,621,155
2011	$1,028,993	$155,180	$339,680.00	$1,262,455
2012	$179,029	$52,974	$266,205.00	$669,129
2013	-	-	-	$50,604
2014	$296,622	$17,874	$129,503.35	$389,822
2015	$507,006	$34,739	$89,972.40	$1,181,568
2016	$384,782	$24,683	$82,729.71	$1,712,168
2018	$121,092	$3,494	$21,524	$60,635
2019	$505,219	$153,442	$571,467	$2,353,847
2020	$63,161	$30,823	$120,076	$658,917
2021	$220,837	$38,638	$47,730	$1,425,099
2022	$729,034	$34,191	$89,661	$615,510
2023	$450,684	$17,704	$231,880	$1,112,393
Total	**$6,751,571**	**$968,075**	**$3,300,186**	**$18,391,713**

Source: USDA Risk Management Agency

ENVIRONMENT

Drought can affect local wildlife by shrinking food supplies and damaging habitats. Sometimes this damage is only temporary, and other times it is irreversible. Wildlife may face increased disease rates due to limited access to food and water. Increased stress on endangered species could cause extinction.

Drought conditions can also provide a substantial increase in wildfire risk. As plants and trees die from a lack of precipitation, increased insect infestations, and diseases—all of which are associated with drought—they become fuel for wildfire. Long periods of drought can result in more intense wildfires, which bring additional consequences for the economy, the environment, and society. Drought may also increase likelihood of wind and water erosion of soils.

CONSEQUENCE ANALYSIS

Table 4.25 summarizes the potential negative consequences of drought.

Table 4.25 – Consequence Analysis - Drought

Category	Consequences
Public	Can cause anxiety or depression about economic losses, conflicts over water shortages, reduced incomes, fewer recreational activities, higher incidents of heat stroke, and fatality.
Responders	Impacts to responders are unlikely. Exceptional drought conditions may impact the amount of water immediately available to respond to wildfires.
Continuity of Operations (including Continued Delivery of Services)	Drought would have minimal impacts on continuity of operations due to the relatively long warning time that would allow for plans to be made to maintain continuity of operations.
Property, Facilities and Infrastructure	Drought has the potential to affect water supply for residential, commercial, institutional, industrial, and government-owned areas. Drought can reduce water supply in wells and reservoirs. Utilities may be forced to increase rates.
Environment	Environmental impacts include strain on local plant and wildlife; increased probability of erosion and wildfire.
Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs. Businesses that depend on farming may experience secondary impacts. Extreme drought has the potential to impact local businesses in landscaping, recreation and tourism, and public utilities.
Public Confidence in the Jurisdiction's Governance	When drought conditions persist with no relief, local or State governments must often institute water restrictions, which may impact public confidence.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes drought hazard risk by jurisdiction. Drought risk is uniform across the planning area. Warning time, duration, and spatial extent are inherent to the hazard and remain constant across jurisdictions. The majority of damages that result from drought are to crops and other agriculture-related activities as well as water-dependent recreation industries. The magnitude of the impacts is typically greater in unincorporated areas due to greater exposure of agriculture. Alamance, Orange, and Person Counties were assigned an impact rating of "critical" because each has over a quarter of their land area in agriculture, as detailed in Section 4.4.4, so these areas may experience more hardship from water usage limitations and more severe economic impact related to drought. In developed areas, the magnitude

of drought is generally less severe, with lawns and local gardens affected and potential impacts on local water supplies during severe, prolonged drought.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Alamance County	**3**	**3**	**4**	**1**	**4**	**3.1**	**H**
Burlington	3	2	4	1	4	2.8	M
Graham	3	2	4	1	4	2.8	M
Mebane	3	2	4	1	4	2.8	M
Elon	3	2	4	1	4	2.8	M
Green Level	3	2	4	1	4	2.8	M
Haw River	3	2	4	1	4	2.8	M
Ossipee	3	2	4	1	4	2.8	M
Swepsonville	3	2	4	1	4	2.8	M
Alamance	3	2	4	1	4	2.8	M
Durham County	**3**	**2**	**4**	**1**	**4**	**2.8**	**M**
Durham	3	2	4	1	4	2.8	M
Orange County	**3**	**3**	**4**	**1**	**4**	**3.1**	**H**
Carrboro	3	2	4	1	4	2.8	M
Chapel Hill	3	2	4	1	4	2.8	M
Hillsborough	3	2	4	1	4	2.8	M
Person County	**3**	**3**	**4**	**1**	**4**	**3.1**	**H**
Roxboro	3	2	4	1	4	2.8	M

4.5.3 EARTHQUAKE

HAZARD BACKGROUND

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

Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

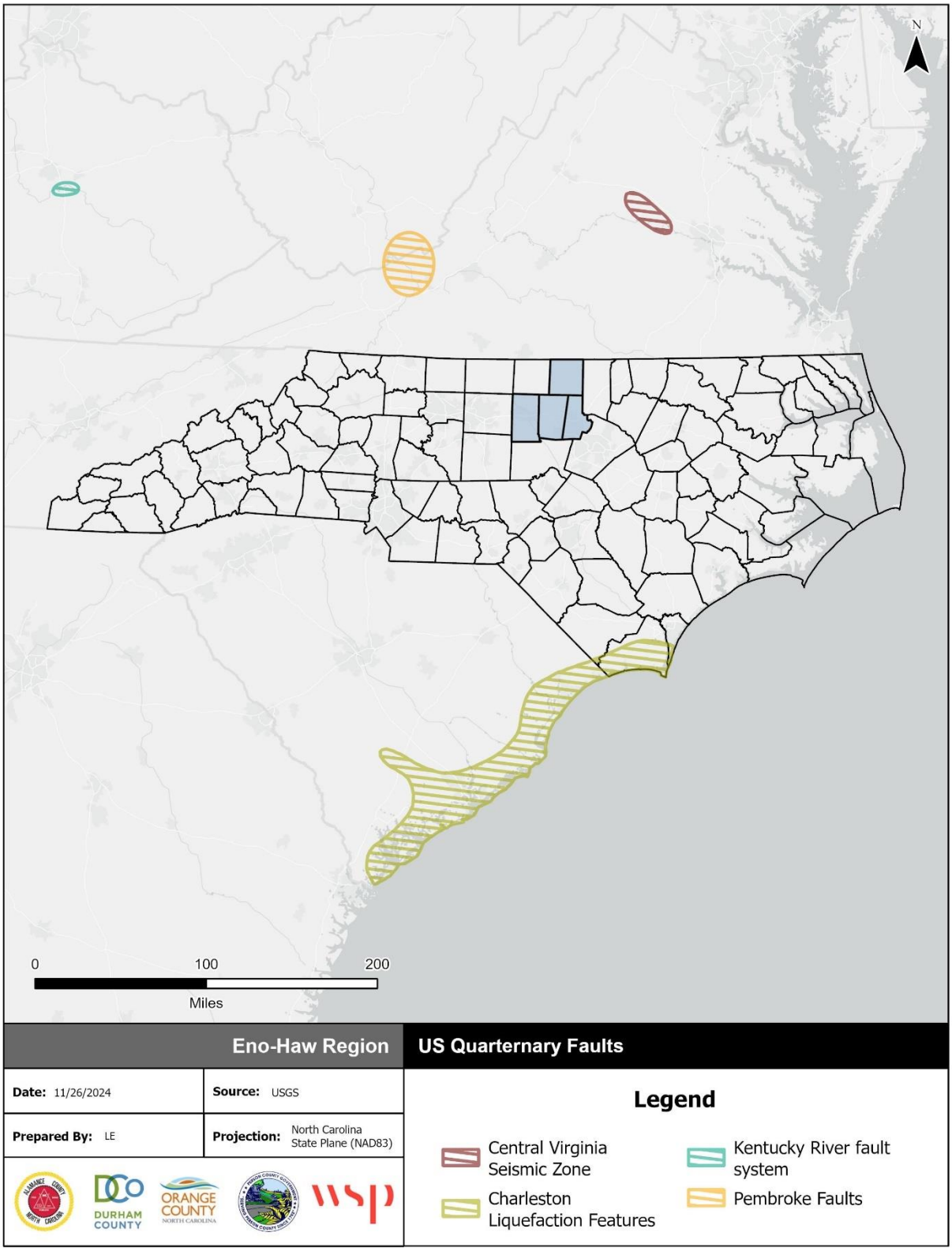
LOCATION

Figure 4.15 shows the Quaternary faults that could present an earthquake hazard for the Eno-Haw region based on data from the USGS Earthquake Hazards Program.

All of North Carolina is subject to earthquakes, with the western and southern region most vulnerable to a damaging earthquake. The Charleston Fault in South Carolina and New Madrid Fault in Tennessee affect the state. Both faults have generated earthquakes measuring greater than 8.0 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines in eastern Tennessee and throughout North Carolina that could produce less severe shaking.

Spatial Extent: 4 – Large

Figure 4.15 – US Quaternary Faults



Source: USGS Earthquake Hazards Program

EXTENT

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. A detailed description of the Richter Scale is given in Table 4.26. Although the Richter scale is used by the news media when reporting the intensity of earthquakes and is the scale most familiar to the public, the scale currently used by the scientific community in the United States is called the Modified Mercalli Intensity (MMI) scale. The MMI scale is an arbitrary ranking based on observed effects. Source: 2023 North Carolina State Hazard Mitigation Plan

Table 4.27 shows descriptions for levels of earthquake intensity on the MMI scale compared to the Richter scale. Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4.26 – Richter Scale

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

Source: 2023 North Carolina State Hazard Mitigation Plan

Table 4.27 – Modified Mercalli Intensity (MMI) Scale

MMI	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt by a few persons at rest, especially on upper floors of buildings.
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.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
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.
VII	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.

MMI	Shaking	Description/Damage
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.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: USGS Earthquake Hazards Program

As reported in the 2020 Eno-Haw Regional Hazard Mitigation Plan, the largest earthquake to occur within 30 miles of Durham was a 2.7 magnitude in 1978.

Impact: 1 – Minor

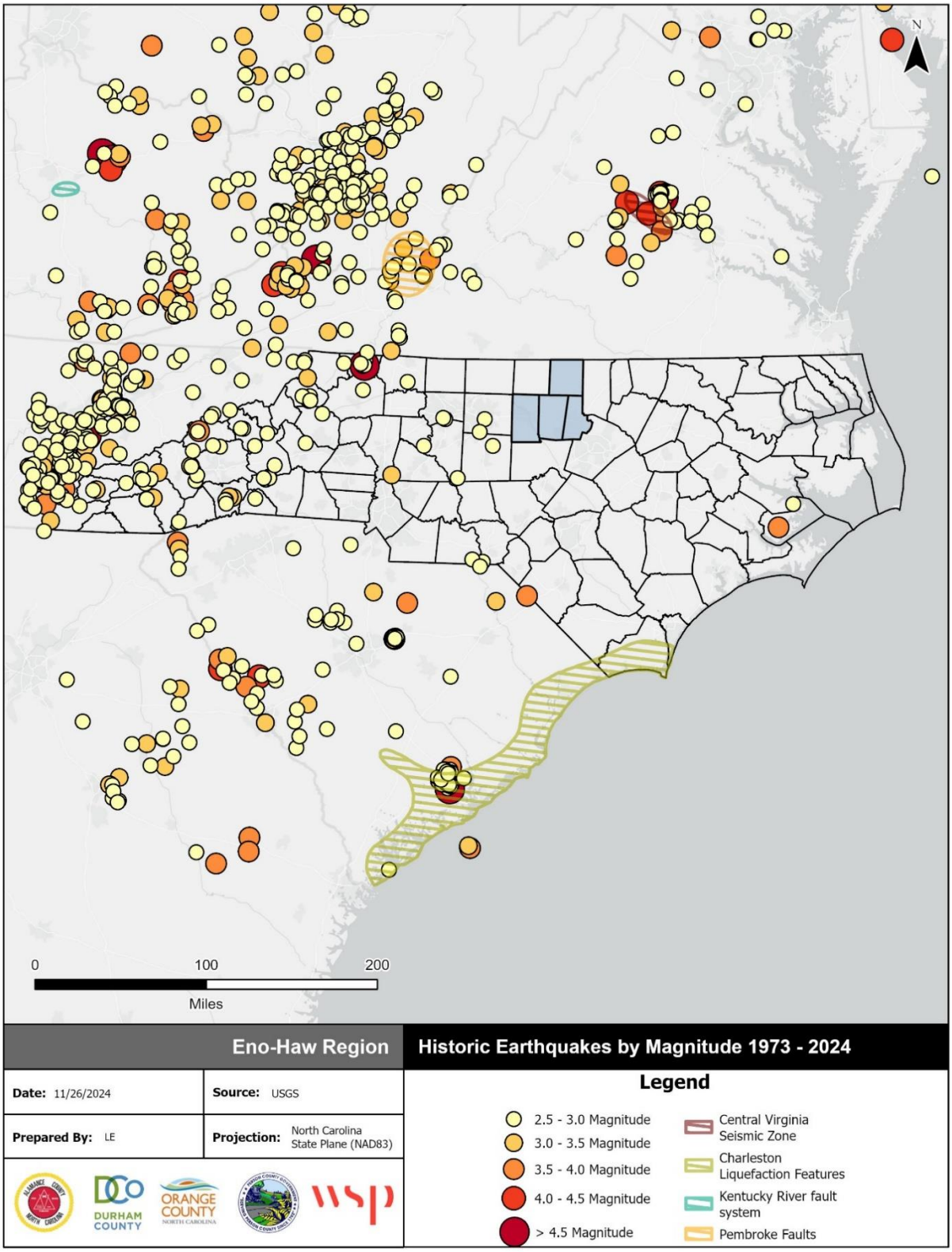
HISTORICAL OCCURRENCES

The USGS Earthquake Hazards Program maintains a database of all historical earthquakes of a magnitude 2.5 and greater. These events are illustrated in Figure 4.16, which shows historical earthquakes by magnitude in relation to North Carolina and the Quaternary Faults identified by USGS. This includes events from 1973 to 2023.

This map documents all earthquakes that have occurred within North Carolina; however, given the long distances across which earthquake impacts can be felt, these events do not encompass all earthquakes that have affected North Carolina. The USGS Earthquake Hazards Program compiles data on a variety of earthquake metrics, including felt impact. According to USGS records, there has been one earthquake with a felt impact in the Eno Haw Region since 1973. This event was a 5.1 magnitude earthquake in August 2020 that occurred in Sparta, North Carolina, and a weak to light shaking was felt in Alamance, Durham, and Orange Counties with an estimated MMI of II to III. No counties in the planning region reported any impacts.

The HMPC also indicated that despite not being reported in the USGS database of felt impact, the August 2011 5.8 magnitude earthquake in Virginia was also felt as weak shaking in the Eno Haw Region.

Figure 4.16 – Historical Earthquakes by Magnitude, 1973-2023



Source: USGS Earthquakes Hazard Program

PROBABILITY OF FUTURE OCCURRENCE

Ground motion is the movement of the earth's surface due to earthquakes or explosions. It is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source and travels through the earth and along its surface. Ground motion is amplified when surface waves of unconsolidated materials bounce off of or are refracted by adjacent solid bedrock. The probability of ground motion is depicted in USGS earthquake hazard maps by showing, via contour values, the earthquake ground motions (of a particular frequency) that have a common given probability of being exceeded in 50 years.

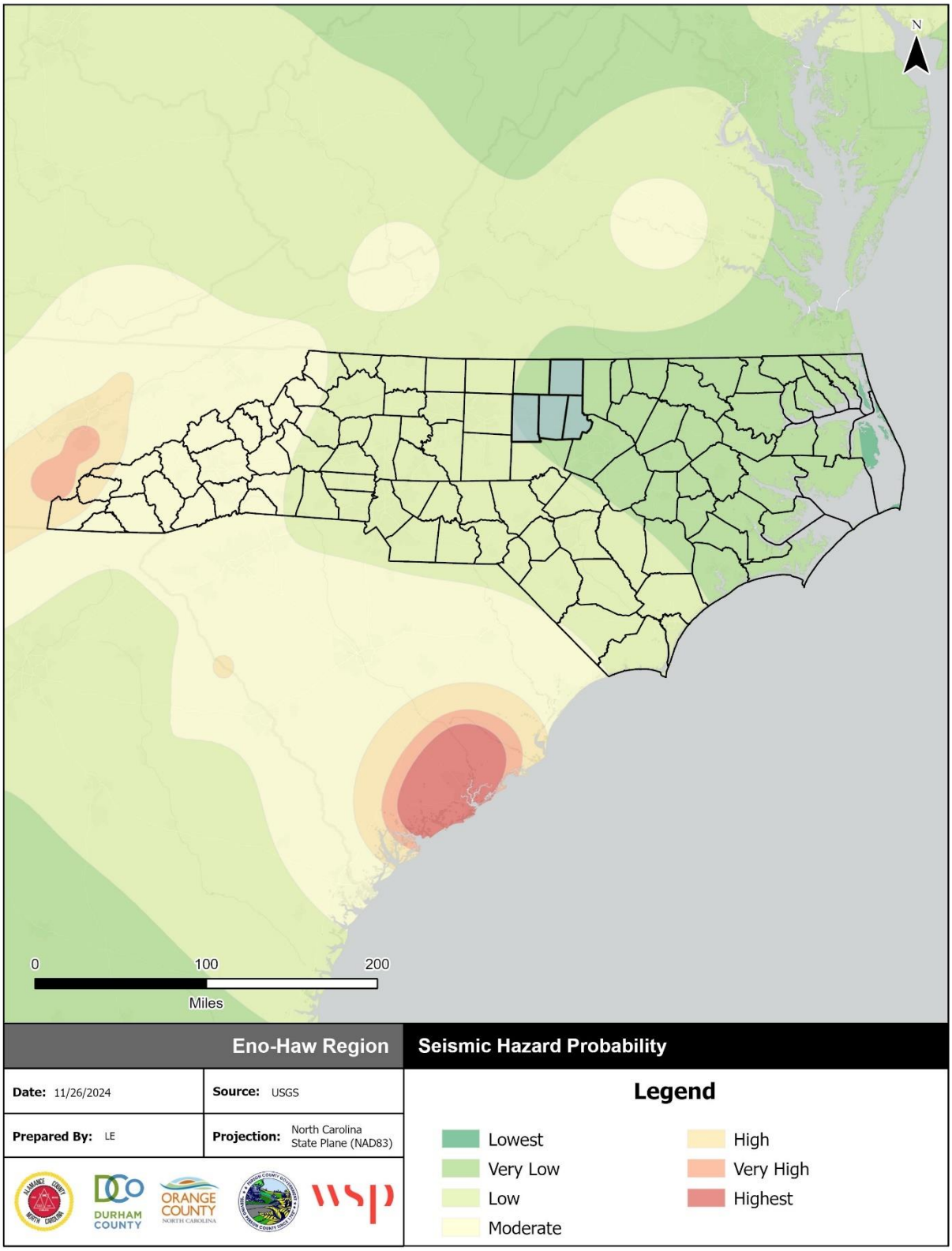
Figure 4.17 reflects the seismic hazard for the Eno-Haw Region based on the national USGS map of peak acceleration with two percent probability of exceedance in 50 years, which USGS simplifies into risk ratings from "very low" to "highest". To produce these estimates, the ground motions being considered at a given location are those from all future possible earthquake magnitudes at all possible distances from that location. The ground motion coming from a particular magnitude and distance is assigned an annual probability equal to the annual probability of occurrence of the causative magnitude and distance. The method assumes a reasonable future catalog of earthquakes, based upon historical earthquake locations and geological information on the recurrence rate of fault ruptures. When all the possible earthquakes and magnitudes have been considered, a ground motion value is determined such that the annual rate of its being exceeded has a certain value. Therefore, for the given probability of exceedance, two percent, the locations shaken more frequently will have larger ground motions.

As shown in the map below, the majority of the Eno-Haw Region is located within the medium green zones which represent "very low" seismic hazard risk. The southwest corner of Alamance County is the only location that is within the lighter green zone which represents "low" seismic hazard risk.

Based on this data, it can be reasonably assumed that an earthquake event affecting the Eno-Haw Region is unlikely.

Probability: 1 – Unlikely

Figure 4.17 – Seismic Hazard Information for North Carolina



Source: USGS Earthquake Hazards Program

CLIMATE CHANGE

Scientists are beginning to believe there may be a connection between climate change and earthquakes. Changing ice caps and sea-level redistribute weight over fault lines, which could potentially have an influence on earthquake occurrences. However, currently no studies quantify the relationship to a high level of detail, so recent earthquakes should not be linked with climate change. While not conclusive, early research suggest that more intense earthquakes and tsunamis may eventually be added to the adverse consequences that are caused by climate change.

VULNERABILITY ASSESSMENT

PEOPLE

Earthquake events in the Eno-Haw Region are unlikely to produce more than mild ground shaking; therefore, injury or death is unlikely. Objects falling from shelves generally pose the greatest threat to safety.

Table 4.28 details the population estimated to be at risk from a 250-year earthquake, according to the NCEM IRISK database.

Table 4.28 – Estimated Population Impacted by 250-Year Earthquake

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Alamance County									
Unincorporated Alamance County	57,799	34,957	60%	9,835	5,948	60%	3,308	2,001	60%
City of Burlington	63,032	29,996	48%	10,440	4,968	48%	3,975	1,892	48%
City of Graham	18,650	8,669	46%	3,356	1,560	46%	1,288	599	47%
City of Mebane	17,079	6,425	38%	2,206	830	38%	977	368	38%
Town of Elon	9,355	5,078	54%	1,524	827	54%	331	180	54%
Town of Green Level	1,541	913	59%	273	162	59%	104	62	60%
Town of Haw River	5,843	3,150	54%	979	528	54%	395	213	54%
Town of Ossipee	434	139	32%	64	21	33%	23	7	30%
Town of Swepsonville	558	264	47%	102	48	47%	38	18	47%
Village of Alamance	704	399	57%	143	81	57%	25	14	56%
Subtotal Alamance	**174,995**	**89,990**	**51%**	**28,922**	**14973**	**52%**	**10,464**	**5,354**	**51%**
Durham County									
Unincorporated Durham County	92,917	12,310	13%	15,332	2,031	13%	5,294	701	13%
City of Durham	235,187	22,688	10%	27,521	2,655	10%	15,501	1,495	10%
Subtotal Durham	**328,104**	**34,998**	**11%**	**42,853**	**4,686**	**11%**	**20,795**	**2,196**	**11%**
Orange County									
Unincorporated Orange County	61,819	17,130	28%	10,806	2,994	28%	3,164	877	28%
Town of Carrboro	18,405	2,637	14%	2,281	327	14%	671	96	14%
Town of Chapel Hill	63,329	8,416	13%	7,428	987	13%	2,477	329	13%
Town of Hillsborough	6,252	966	15%	1,118	173	15%	406	63	16%
Subtotal Orange	**149,805**	**29,149**	**19%**	**21,633**	**4,481**	**21%**	**6,718**	**1,365**	**20%**

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Person County									
Unincorporated Person County	29,696	9,449	32%	5,674	1,805	32%	1,641	522	32%
City of Roxboro	10,172	2,431	24%	2,211	528	24%	447	107	24%
Subtotal Person	**39,868**	**11,880**	**30%**	**7,885**	**2,333**	**30%**	**2,088**	**629**	**30%**
Total	**692,772**	**166,017**	**24%**	**101,293**	**26,473**	**26%**	**40,065**	**9,544**	**24%**

Source: NCEM Risk Management Tool

PROPERTY

In a severe earthquake event, buildings can be damaged by the shaking itself or by the ground beneath them settling to a different level than it was before the earthquake (subsidence). Buildings can even sink into the ground if soil liquefaction occurs. If a structure (a building, road, etc.) is built across a fault, the ground displacement during an earthquake could seriously damage that structure.

Earthquakes can also cause damages to infrastructure, resulting in secondary hazards. Damages to dams or levees could cause failures and subsequent flooding. Fires can be started by broken gas lines and power lines. Fires can be a serious problem, especially if the water lines that feed the fire hydrants have been damaged as well.

The Eno-Haw Region has not been impacted by an earthquake with more than a moderate intensity, so damage to the built environment is unlikely. Table 4.29 and Table 4.30 detail the estimated buildings impacted from a 250-year earthquake event and a 500-year earthquake event, respectively.

Table 4.29 – Estimated Buildings Impacted by 250-Year Earthquake Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	15,675	53%	$81,369	3,408	11%	$72,933	154	1%	$14,963	19,237	65%	$169,265
City of Burlington	24,403	10,281	42%	$88,047	2,373	10%	$401,369	208	1%	$31,455	12,862	53%	$520,871
City of Graham	7,269	3,056	42%	$22,658	525	7%	$63,096	131	2%	$15,077	3,712	51%	$100,830
City of Mebane	5,835	1,996	34%	$14,336	458	8%	$110,301	38	1%	$7,626	2,492	43%	$132,263
Town of Elon	2,760	1,321	48%	$15,155	142	5%	$19,588	160	6%	$18,005	1,623	59%	$52,748
Town of Green Level	1,177	626	53%	$2,188	109	9%	$3,923	9	1%	$231	744	63%	$6,342
Town of Haw River	2,352	1,153	49%	$4,899	167	7%	$18,756	18	1%	$1,864	1,338	57%	$25,519
Town of Ossipee	330	96	29%	$446	21	6%	$1,134	4	1%	$357	121	37%	$1,938
Town of Swepsonville	573	257	45%	$1,912	24	4%	$8,573	4	1%	$482	285	50%	$10,967
Village of Alamance	798	405	51%	$3,650	66	8%	$4,202	16	2%	$1,600	487	61%	$9,452
Subtotal Alamance	**75,147**	**34,866**	**46%**	**$234,660**	**7,293**	**10%**	**$703,875**	**742**	**1%**	**$91,660**	**42,901**	**57%**	**$1,030,195**
Durham County													
Unincorporated Durham County	75,585	6,343	8%	$163,195	5,902	8%	$772,831	1,541	2%	$220,927	13,786	18%	$1,156,953
City of Durham	21,037	2,350	11%	$29,799	2,798	13%	$289,131	209	1%	$36,429	5,357	25%	$355,358
Subtotal Durham	**96,622**	**8,693**	**9%**	**$192,994**	**8,700**	**9%**	**$1,061,962**	**1,750**	**2%**	**257,356**	**19,143**	**20%**	**$1,512,311**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Orange County													
Unincorporated Orange County	24,533	5,981	24%	$42,913	2,592	11%	$92,811	211	1%	$39,310	8,784	36%	$175,034
Town of Carrboro	5,782	782	14%	$25,423	257	4%	$26,444	42	1%	$8,758	1,081	19%	$60,625
Town of Chapel Hill	15,108	1,817	12%	$75,264	558	4%	$135,488	500	3%	$101,672	2,875	19%	$312,424
Town of Hillsborough	3,883	518	13%	$6,208	352	9%	$46,427	105	3%	$16,571	975	25%	$69,206
Subtotal Orange	**49,306**	**9,098**	**18%**	**$149,808**	**3,759**	**8%**	**$301,170**	**858**	**2%**	**$166,311**	**13,715**	**28%**	**$617,289**
Person County													
Unincorporated Person County	17,714	4,736	27%	$18,274	2,598	15%	$40,544	124	1%	$22,359	7,458	42%	$81,177
City of Roxboro	6,617	1,371	21%	$9,591	701	11%	$114,968	125	2%	$24,517	2,197	33%	$149,076
Subtotal Person	**24,331**	**6,107**	**25%**	**$27,865**	**3,299**	**14%**	**$155,512**	**249**	**1%**	**$46,876**	**9,655**	**40%**	**$230,253**
Total	**245,406**	**58,764**	**24%**	**$605,327**	**23,051**	**9%**	**$2,222,519**	**3,599**	**1%**	**$562,203**	**85,414**	**35%**	**$3,390,048**

Source: NCEM Risk Management Tool

Table 4.30 – Estimated Buildings Impacted by 500-Year Earthquake Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87%	$1,487,743	3,425	12%	$699,048	283	1%	$167,849	29,619	100%	$2,354,640
City of Burlington	24,403	21,618	89%	$1,535,403	2,401	10%	$3,129,356	320	1%	$318,481	24,339	100%	$4,983,240
City of Graham	7,269	6,575	90%	$430,981	530	7%	$489,890	155	2%	$141,266	7,260	100%	$1,062,138
City of Mebane	5,835	5,303	91%	$335,334	465	8%	$898,971	64	1%	$78,658	5,832	100%	$1,312,963
Town of Elon	2,760	2,437	88%	$224,678	147	5%	$206,677	174	6%	$147,561	2,758	100%	$578,917
Town of Green Level	1,177	1,057	90%	$44,879	109	9%	$30,507	10	1%	$2,943	1,176	100%	$78,329
Town of Haw River	2,352	2,139	91%	$98,913	168	7%	$147,559	31	1%	$18,450	2,338	99%	$264,922
Town of Ossipee	330	299	91%	$11,303	21	6%	$9,436	7	2%	$2,891	327	99%	$23,629
Town of Swepsonville	573	543	95%	$33,133	24	4%	$56,274	5	1%	$4,672	572	100%	$94,079
Village of Alamance	798	714	89%	$53,029	66	8%	$32,592	17	2%	$12,437	797	100%	$98,058
Subtotal Alamance	**75,147**	**66,596**	**89%**	**$4,255,396**	**7,356**	**10%**	**$5,700,310**	**1,066**	**1%**	**$895,208**	**75,018**	**100%**	**$10,850,915**
Durham County													
Unincorporated Durham County	21,037	17,972	85%	$695,624	2,818	13%	$2,451,095	229	1%	$301,951	21,019	100%	$3,448,671
City of Durham	75,585	67,750	90%	$4,031,329	6,045	8%	$7,377,868	1,672	2%	$2,076,582	75,467	100%	$13,485,779
Subtotal Durham	**96,622**	**85,722**	**89%**	**$4,726,953**	**8,863**	**9%**	**$9,828,963**	**1,901**	**2%**	**$2,378,533**	**96,486**	**100%**	**$16,934,450**
Orange County													
Unincorporated Orange County	24,533	21,624	88%	$1,262,476	2,657	11%	$850,353	246	1%	$389,570	24,527	100%	$2,502,398
Town of Carrboro	5,782	5,464	95%	$587,987	261	5%	$254,468	46	1%	$95,233	5,771	100%	$937,689

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Chapel Hill	15,108	13,923	92%	$1,740,040	615	4%	$1,212,434	529	4%	$1,020,279	15,067	100%	$3,972,753
Town of Hillsborough	3,883	3,408	88%	$166,724	358	9%	$414,627	111	3%	$186,994	3,877	100%	$768,345
Subtotal Orange	**49,306**	**44,419**	**90%**	**$3,757,227**	**3,891**	**8%**	**$2,731,882**	**932**	**2%**	**$1,692,076**	**49,242**	**100%**	**$8,181,185**
Person County													
Unincorporated Person County	17,714	14,893	84%	$509,166	2,613	15%	$356,556	156	1%	$211,555	17,662	100%	$1,077,277
City of Roxboro	6,617	5,754	87%	$208,672	710	11%	$841,518	144	2%	$210,153	6,608	100%	$1,260,343
Subtotal Person	**24,331**	**20,647**	**85%**	**$717,838**	**3,323**	**14%**	**$1,198,074**	**300**	**1%**	**$421,708**	**24,270**	**100%**	**$2,337,620**
Total	**245,406**	**217,384**	**89%**	**$13,457,414**	**23,433**	**10%**	**$19,459,229**	**4,199**	**2%**	**$5,387,525**	**245,016**	**100%**	**$38,304,170**

Source: NCEM Risk Management Tool

ENVIRONMENT

An earthquake is unlikely to cause substantial impacts to the natural environment in the Eno-Haw Region. Impacts to the built environment (e.g. ruptured gas line) could damage the surrounding environment. However, this type of damage is unlikely based on historical occurrences.

CONSEQUENCE ANALYSIS

Table 4.31 summarizes the potential negative consequences of earthquake.

Table 4.31 – Consequence Analysis - Earthquake

Category	Consequences
Public	Impact expected to be severe for people who are unprotected or unable to take shelter; moderate to light impacts are expected for those who are protected.
Responders	Responders may be required to enter unstable structures or compromised infrastructure. Adverse impacts are expected to be severe for unprotected personnel and moderate to light for protected personnel.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel in the area of the incident may require relocation of operations and lines of succession execution. Disruption of lines of communication and destruction of facilities may extensively postpone delivery of services.
Property, Facilities and Infrastructure	Damage to facilities and infrastructure in the area of the incident may be extensive for facilities, people, infrastructure, and HazMat.
Environment	May cause extensive damage, creating denial or delays in the use of some areas. Remediation may be needed.
Economic Condition of the Jurisdiction	Local economy and finances expected to be adversely affected, possibly for an extended period of time.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes earthquake hazard risk by jurisdiction. Earthquake risk is uniform across the planning area; there is no variation in risk by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	1	1	4	4	1	1.9	L

4.5.4 EXCESSIVE HEAT

HAZARD BACKGROUND

Per information provided by Ready.gov, in most of the United States extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. As temperatures rise, our bodies naturally cool down by sweating. In extreme heat, the body must work extra hard to maintain a normal temperature and sweating might not be enough to cool down. When this happens, a person's body temperature rises faster than it can cool itself. Additionally, when the humidity is high, as is common during extreme heat events in North Carolina, evaporative cooling through sweating becomes less effective. Heat-related illnesses occur when the body overheats from exposure to high temperatures and in severe cases can cause damage to the brain and other vital organs[3]. Heat-related illnesses can also arise from moderate to vigorous physical activity in hot situations.

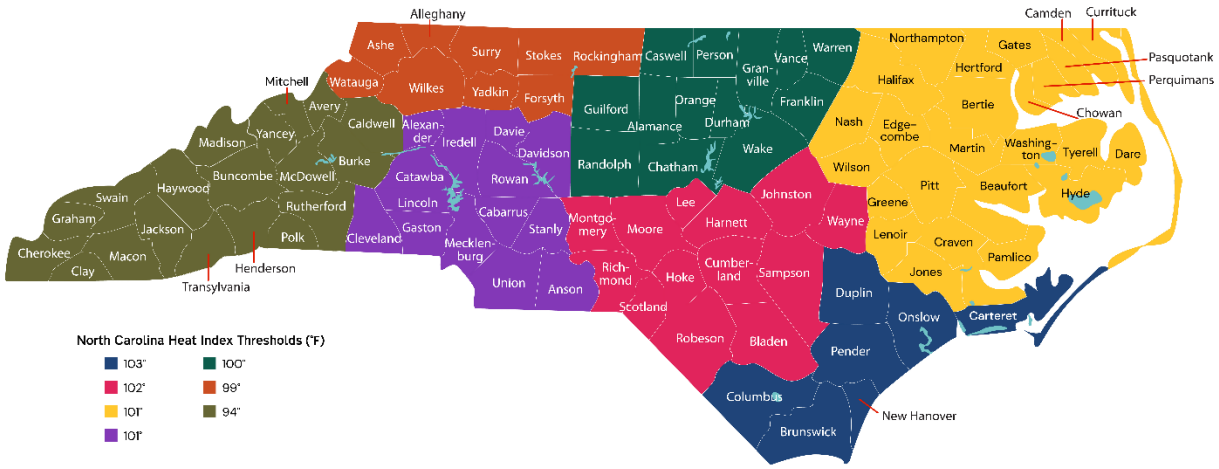
Extreme heat often results in the highest annual number of deaths among all weather-related disasters. On average, the number of extreme heat days has been increasing each year, putting residents at a higher risk of heat-related illnesses. In 2023, more people in the United States died of heat-related illness than any year on record[4]. Per Ready.gov, older adults, children, and people with certain illnesses and chronic conditions are at greater risk from extreme heat; and humidity increases the feeling of heat.

The National Weather Service (NWS) uses the heat index, also known as apparent temperature, to determine when to issue health alerts. The heat index is a measure of how hot it really feels when the relative humidity is considered along with the actual air temperature. In most areas of the country, the NWS 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[5,6].

In North Carolina, the Department of Health and Human Services (DHHS) uses regional temperature thresholds to activate its Heat Health Alert System. 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. DHHS 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 Eno-Haw Region, the heat index threshold is 100°F, as shown in Figure 4.18.

[3] www.cdc.gov/disasters/extremeheat/heat_guide.html.
[4] https://apnews.com/article/record-heat-deadly-climate-change-humidity-south-11de21a526e1cbe7e306c47c2f12438d
[5] https://www.weather.gov/safety/heat-index
[6] https://www.weather.gov/safety/heat-ww

Figure 4.18 – North Carolina Heat Index Thresholds



Source: https://climate.ncsu.edu/heat_toolkit/thresholds/

The most dangerous place to be during an extreme heat incident is in a permanent home, with little or no air conditioning. Those at greatest risk for heat-related illness include people 65 years of age and older, young children, people with chronic health problems such as heart disease, people who are obese, people who are socially isolated, and people who are on certain medications, such as tranquilizers, antidepressants, sleeping pills, or drugs for Parkinson's disease. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather or are not acclimated to hot weather. Table 4.32 lists typical symptoms and health impacts of exposure to heat.

Table 4.32 – Typical Health Impacts of Extreme Heat

Heat Index (HI)	Disorder
80-90° F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105° F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

The National Weather Service has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F) and the night time minimum Heat Index is 75°F or above for two or more consecutive days. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

Impacts of extreme heat are not only focused on human health, as prolonged heat exposure can have devastating impacts on infrastructure as well. Prolonged high heat exposure increases the risk of pavement deterioration, as well as railroad warping or buckling. High heat also puts a strain on energy systems and consumption, as air conditioners are run at a higher rate and for longer; extreme heat can also reduce transmission capacity over electric systems.

Warning Time: 1 – More than 24 hours

Duration: 3 – Less than one week

LOCATION

The entire planning area is susceptible to high temperatures and incidents of excessive heat.

Spatial Extent: 4 – Large

EXTENT

The extent of extreme heat can be defined by the maximum apparent temperature reached. Apparent temperature is a function of ambient air temperature and relative humidity and is reported as the heat index. The National Weather Service Forecast Office in Raleigh sets the following criteria for heat advisory and excessive heat warning:

- **Heat Advisory** – Heat Index of 105°F to 109°F for 2 hours or more. Can also be issued for lower values 100°F to 104°F for heat lasting several consecutive days
- **Excessive Heat Watch** – Potential for heat index values of 110°F or hotter within 24 to 48 hours. Also issued during prolonged heat waves when the heat index is near 110°F
- **Excessive Heat Warning** – Heat Index of 110°F or greater for any duration

Table 4.33 notes the highest temperature on record for each county in the Eno-Haw Region.

Table 4.33 – Highest Temperature by County

County	Temperature	Location	Date
Alamance	105˚F	Burlington Fire Station #5	06/27/1954
Durham	107˚F	Lake Michie	06/30/1959
Orange	107˚F	Chapel Hill 2W	07/19/1902
Person	104˚F	Roxboro 7 ESE	07/14/1966

Source: North Carolina Climate Office

Impact: 3 – Critical

HISTORICAL OCCURRENCES

According to the National Oceanic and Atmospheric Administration (NOAA), 2019 was North Carolina's hottest year on record; that record stretches back to 1895. NCEI records indicate two incidents of heat or excessive heat for the Eno-Haw Region counties. The first event occurred in Alamance, Durham, and Person counties from July 22-23, 1998, and maximum temperatures combined with dew points in the 78-to-80-degree range with little wind to give heat index values around 110 degrees each afternoon. The second occurred in Person County in July 2005 and resulted in the death of a farm worker who had left the farm at 11:30 AM. The heat index was 103°F by 11:00 AM.

The HMPC also noted an additional instance of extreme heat on July 20, 2019, when much of the region was under a heat advisory, with heat indexes reaching up to 110°F. In response to this advisory, many outdoor events were cancelled. Orange County extended the hours of cooling centers throughout the weekend and provided transportation to and from these centers.

Heat index records maintained by the North Carolina Climate Office indicate that the Region regularly experiences heat index temperatures above 100°F. Table 4.34 counts of heat index values by threshold recorded during a 25-year-period from 1999-2023 at the Raleigh-Durham International Airport weather station (KRDU), used as an indicator for the Eno-Haw Region overall. Counts are provided as the number

of days each year where the heat index reached or exceeded 100°F. According to this data, the Region averages approximately 17.6 days per year with heat index values above 100°F.

Table 4.34 – Historical Heat Index Counts Raleigh-Durham Airport (KRDU), 1999-2018

Year	Heat Index Value				Total
	100-104˚F	105-109˚F	110-114˚F	≥115˚F	
1999	15	9	2	0	26
2000	8	2	0	0	10
2001	3	5	1	0	9
2002	6	6	0	0	18
2003	9	2	0	0	11
2004	4	0	0	0	4
2005	20	3	1	0	24
2006	11	6	0	0	17
2007	15	3	3	0	21
2008	11	0	0	0	11
2009	9	0	0	0	9
2010	20	4	3	0	27
2011	16	5	0	0	21
2012	12	6	4	0	22
2013	2	0	0	0	2
2014	5	0	0	0	5
2015	15	2	0	0	17
2016	20	7	0	0	27
2017	14	5	0	0	19
2018	95	8	0	0	22
2019	14	2	0	0	16
2020	16	4	0	0	20
2021	16	5	0	0	21
2022	18	13	1	0	32
2023	21	4	3	0	28
Sum	**395**	**101**	**18**	**0**	**439**
Average	**15.8**	**4**	**0.7**	**9**	**17.6**

Source: North Carolina Climate Office, Heat Index Climatology Tool

PROBABILITY OF FUTURE OCCURRENCE

Data was gathered from the North Carolina State Climate Office's Heat Index Climatology Tool using the Raleigh-Durham International Airport weather station as an approximation for the Eno-Haw Region. Based on 25 years of available data, the Region averages 17.6 days/year with heat index temperatures above 100°F.

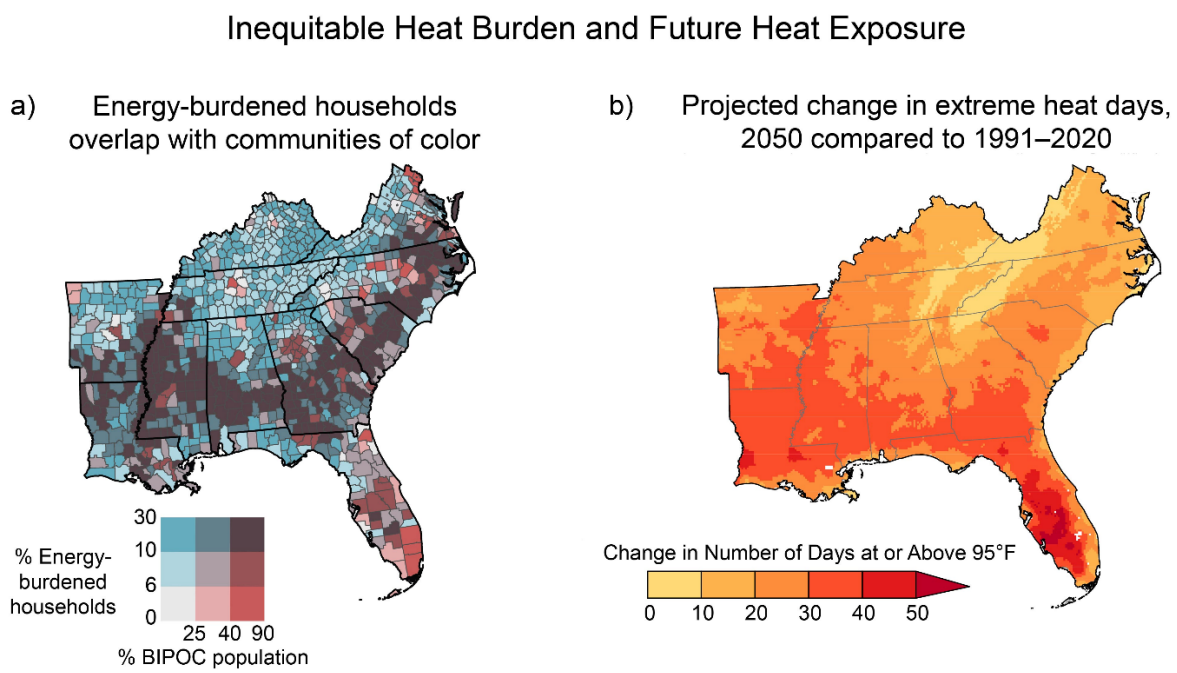
Probability: 4 – Highly Likely

CLIMATE CHANGE

Research shows that average temperatures will continue to rise in the Southeast United States and globally, directly affecting the Eno-Haw Region. Per the Fifth National Climate Assessment, "The number of extreme warm days (above 95°F) is expected to continue increasing with every increment of global warming" and that "heatwaves in the Southeast are happening more frequently and are occurring

during a longer heat season, with some cities also showing increasing trends in their duration and intensity." Additional heat stresses can be attributed to the urban heat island effect which can increase the temperature of those living in urban environments compared to rural areas. The number of days over 95°F in the Eno-Haw Region is expected to increase by between 10 and 30 days annually, as shown in Figure 4.19.

Figure 4.19 – Projected Changes in Annual Number of Very Hot Days in North Carolina



Source: USGCRP, 2023: Fifth National Climate Assessment

Historical data and climate projections provided by the State Climate Office of North Carolina on the North Carolina Resilience Exchange website provide estimates specific to the Eno-Haw Region counties. This data indicates that extreme heat days in the region could more than quadruple, and days with nighttime temperatures above 70°F are expected to more than triple. These projections are summarized in Table 4.35 and Table 4.36 below.

Table 4.35 – Extreme Heat Projections, Days per Year with Maximum Temperatures Over 95˚F

County	Historical	Best Case Scenario	Worst Case Scenario
Alamance	10	31	44
Durham	9	32	45
Orange	8	28	41
Person	8	26	38

Source: North Carolina Resilience Exchange Climate Projections and Observations

Table 4.36 – Extreme Heat Projections, Nights per Year with Minimum Temperatures Over 70˚F

County	Historical	Best Case Scenario	Worst Case Scenario
Alamance	22	53	70
Durham	22	53	70
Orange	17	47	64
Person	14	38	54

Source: North Carolina Resilience Exchange Climate Projections and Observations

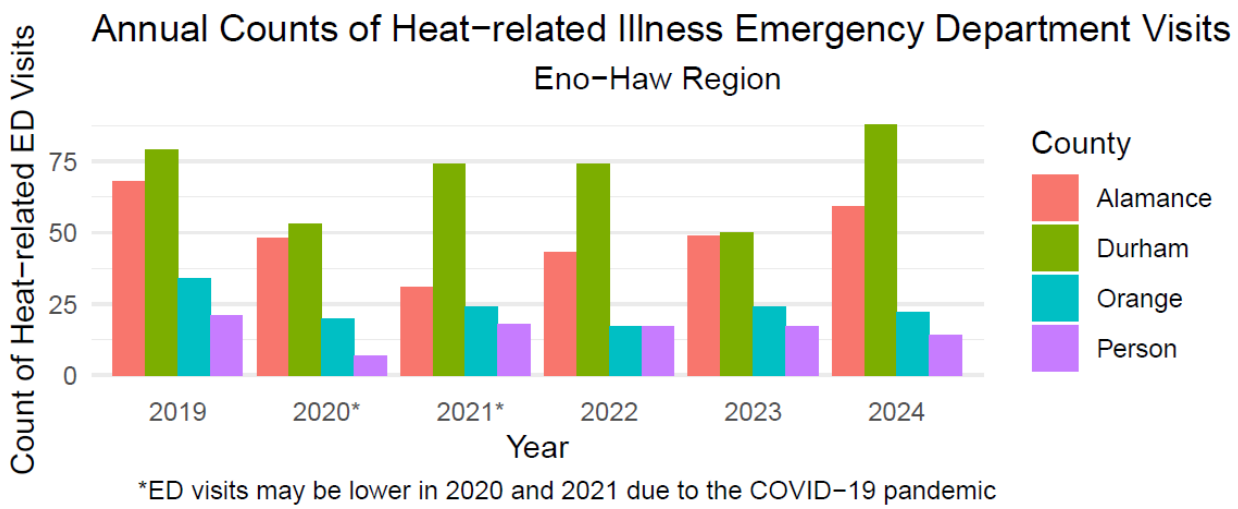
VULNERABILITY ASSESSMENT

PEOPLE

Extreme heat can cause heat stroke and even loss of human life. The elderly and the very young are most at risk to the effects of heat. People who are isolated are also more vulnerable to extreme heat. Socially vulnerable populations in areas with a high percentage of developed land and a small tree canopy are most vulnerable to negative health effects related to extreme heat, per the Triangle Regional Resilience Assessment.

Emergency department visits for heat related illnesses notably increase when heat index temperatures exceed 100°F. Figure 4.20 shows the annual count of emergency department visits for heat-related illness in the Eno-Haw region, using public health syndromic surveillance system data from NC DETECT. The annual count of emergency department visits for heat-related illness in Alamance County ranged from 31 visits in 2021 to 68 visits in 2019. The annual count of emergency department visits for heat-related illness in Durham County ranged from 50 in 2023 to 88 in 2024. The annual count of emergency department visits for heat related illness in Orange County ranged from 17 in 2022 to 34 in 2019. The annual count of emergency department visits for heat related illness in Person County ranged from 7 in 2020 to 21 in 2019.

Figure 4.20 – Annual Heat-Related Illness Emergency Department Visits by County



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

PROPERTY

Extreme heat is unlikely to cause significant damages to the built environment. However, road surfaces can be damaged as asphalt softens, and concrete sections may buckle under expansion caused by heat. Train rails may also distort or buckle under the stress of head induced expansion. Power transmission lines may sag from expansion and if contact is made with vegetation the line may short out causing power outages. Additional power demand for cooling also increases power line temperature adding to heat impacts.

Extreme heat can cause significant agricultural losses. Between 2007-2023, the sum of claims paid for crop damage due to heat in the Eno-Haw Region was $5,260,645 or an average of $309,449 in losses

every year. Table 4.37 summarizes the crop losses due to drought reported in the RMA system by county. Person County accounted for the majority of these claims.

Table 4.37– Crop Losses Resulting from Heat, 2007-2023 in Eno-Haw Region

Year	Alamance County	Durham County	Orange County	Person County	Total
	Indemnity Amount				
2007	$180,394.00	$17,846	$97,777	$626,860	$922,877
2008	$46,654.00	$1,595	$0	$16,465	$64,714
2009	$1,394.00	-	-	-	$1,394
2010	$146,589.00	$20,840	$8,778	$587,866	$764,073
2011	$53,110.00	$23,462	$11,799	$72,161	$160,532
2012	$77,791.00	$17,846	$175,374	$444,871	$715,882
2013	-	-	-	-	-
2014	-	-	-	$10,022	$10,022
2015	$25,063	-	-	$1,646	$26,709
2016	$33,828	-	-	$661,980	$695,808
2017	$33,696	-	-	$65,386	$99,082
2018	$9,120	-	$1,315	$1,632	$12,067
2019	$7,537	$9,856	$27,738	$118,722	$163,853
2020	$1,202	-	-	$30,266	$30,266
2021	-	-	$5,124	$98,533	$103,657
2022	$267,757	-	$65,804	$290,212	$623,773
2023	$140,986	$3,601	$88,491	$631,656	$864,734
Total	**$1,025,121**	**$95,046**	**$482,200**	**$3,658,278**	**$5,260,645**

Source: USDA Risk Management Agency

ENVIRONMENT

Wild animals are vulnerable to heat disorders similar to humans, including mortality. Vegetation growth will be stunted or plants may be killed if temperatures rise above their tolerance extremes.

CONSEQUENCE ANALYSIS

Table 4.38 summarizes the potential negative consequences of extreme heat.

Table 4.38 – Consequence Analysis – Extreme Heat

Category	Consequences
Public	Extreme heat may cause illness and/or death.
Responders	Consequences may be greater for responders if their work requires exertion and/or wearing heavy protective gear.
Continuity of Operations (including Continued Delivery of Services)	Continuity of operations is not expected to be impacted by extreme heat because warning time for these events is long.
Property, Facilities and Infrastructure	Minor impacts may occur, including possible damages to road surfaces and power lines.
Environment	Environmental impacts include strain on local plant and wildlife, including potential for illness or death.

Category	Consequences
Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs.
Public Confidence in the Jurisdiction's Governance	Extreme heat is unlikely to impact public confidence.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes extreme heat hazard risk by jurisdiction. Extreme heat risk does not vary significantly by jurisdiction. More heavily urbanized areas may experience greater localized temperature extremes due to the urban heat island effect and therefore greater heat risk, but less developed areas may have a greater percentage of individuals working outside and therefore greater exposure to heat. Extreme heat risk is uniform across the planning area; there is no variation in risk by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	4	3	4	1	3	3.3	H

4.5.5 FLOODING

HAZARD BACKGROUND

Flooding is defined by the rising and overflowing of water onto normally dry land. As defined by FEMA, a flood is a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties. Flooding can result from an overflow of inland waters or an unusual accumulation or runoff of surface waters from any source.

Flooding is the most frequent and costly of all natural hazards in the United States and has caused more than 10,000 death(s) since 1900. Approximately 90 percent of presidentially declared disasters result from flood-related natural hazard events. Taken as a whole, more frequent, localized flooding problems that do not meet federal disaster declaration thresholds ultimately cause the majority of damages across the United States.

SOURCES AND TYPES OF FLOODING

The Eno-Haw Region can experience riverine flooding, flash flooding, and localized stormwater flooding. Each of these types of flooding are described below, based on data from Flood Insurance Study (FIS) reports, Flood Insurance Rate Maps (FIRMs), NOAA, and the HMPC.

RIVERINE FLOODING

The primary riverine flooding sources in the Eno-Haw Region are as follows, per each county's effective Flood Insurance Study:

- **Alamance County**: Cane Creek (South) Tributary, Eastside Creek, Michaels Branch, Steelhouse Branch, Willowbrook Creek
- **Durham County**: The County is more prone to flooding by small streams than flooding by a major river. The principal flood problems occur on the smaller tributaries, where, due to urban development pressures, there has been commercial and residential construction in the floodplains of these tributaries. However, local flooding from the Eno River has also occurred.
- **Orange County**: Eno River, North and South Forks Little River, New Hope Creek, Morgan Creek, Bolin Creek, and other streams.
- **Person County**: Flat River, the North Flat River, the South Flat River, Marlowes Creek and smaller creeks and tributaries.

These rivers and their tributaries are susceptible to overflowing their banks during and following excessive precipitation events. Though less common, riverine flood events (such as the "1%-annual-chance flood") will cause significantly more damage and economic disruption for the area than incidences of localized stormwater flooding.

FLASH FLOODING

A flash flood occurs when water levels rise at an extremely fast rate as a result of intense rainfall over a brief period, possibly from slow-moving intense thunderstorms and sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Ice jam flooding is a form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow. This creates a natural dam, often causing flooding within minutes of the dam formation. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the National Flood Insurance Program (NFIP) and can also happen in areas not associated with floodplains.

Flash flood hazards caused by surface water runoff are most common in urbanized areas, where greater population density generally equates to more impervious surface (e.g., pavement and buildings) which increases the amount of surface water generated.

Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, and destroy buildings and bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

LOCALIZED STORMWATER FLOODING

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle increased storm runoff. Sewers may back up, yards can be inundated, and homes, businesses and vehicles can be flooded. Drainage and sewer systems not designed to carry the capacity currently needed to handle increased storm runoff can cause water to back into basements and damage mechanical systems. These impacts can create serious public health and safety concerns.

Localized flooding may be caused by the following issues:

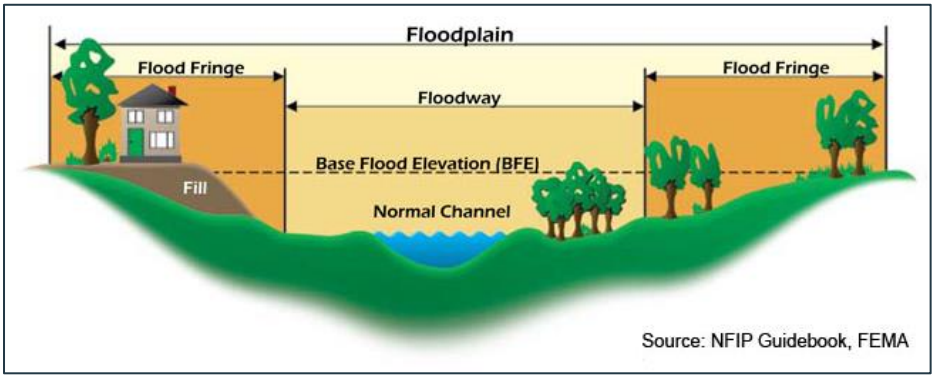
- **Inadequate Capacity –** An undersized/under capacity pipe system can cause water to back-up behind a structure which can lead to areas of ponded water and/or overtopping of banks.
- **Clogged Inlets** – Debris covering the asphalt apron and the top of grate at catch basin inlets may contribute to an inadequate flow of stormwater into the system. Debris within the basin itself may also reduce the efficiency of the system by reducing the carrying capacity.
- **Blocked Drainage Outfalls** – Debris blockage or structural damage at drainage outfalls may prevent the system from discharging runoff, which may lead to a back-up of stormwater within the system.
- **Improper Grade** – Poorly graded asphalt around catch basin inlets may prevent stormwater from entering the catch basin as designed. Areas of settled asphalt may create low spots within the roadway that allow for areas of ponded water.

FLOODING AND FLOODPLAINS

A floodplain, as shown in Figure 4.21, is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

Floodplain boundaries are designated and routinely updated through cooperation between local governments, states and the FEMA. Flood Insurance Study (FIS) findings are shown on Flood Insurance Rate Maps (FIRMs) and describe various flood hazard zones based on flood height exceedance return periods. Flood hazard zone designations depend on local conditions and map issue dates, but all will show the 100-year or base flood elevation (1-percent annual chance flood), as well as some areas of the 500-year floodplain (0.2-percent annual chance flood).

Figure 4.21 – Characteristics of a Floodplain



In its common usage, the floodplain most often refers to that area that is inundated by the "100-year flood," which is the flood that has a 1% chance in any given year of being equaled or exceeded. The "500-year flood" is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year.

The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The 1%-annual-chance flood, which is the minimum standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Participation in the NFIP allows for the federal government to make flood insurance available within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will likely occur, they are in many ways often the most predictable and manageable hazard.

Warning Time: 3 – 6 to 12 hour

Duration: 3 – Less than 1 week

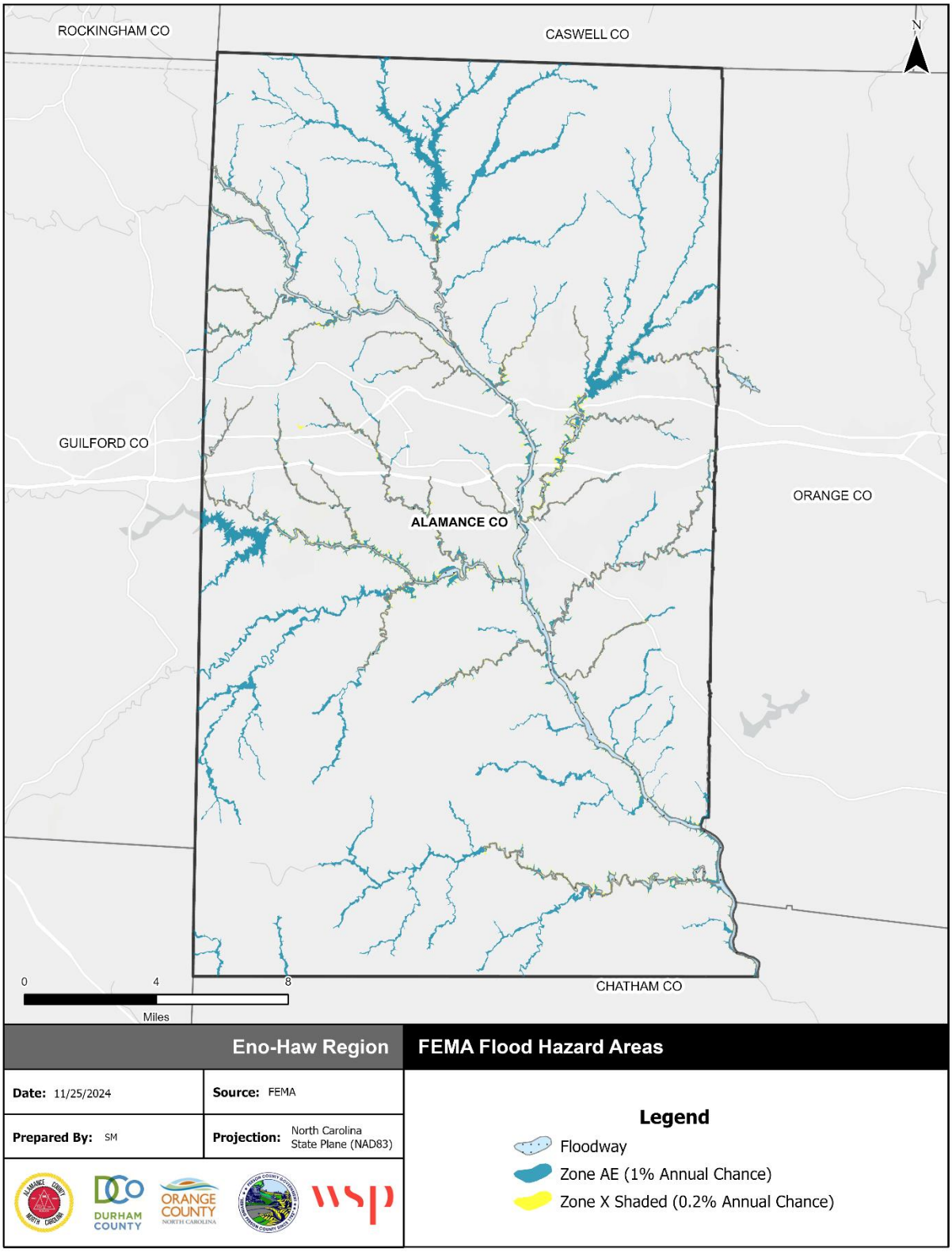
LOCATION

Regulated floodplains are illustrated on FIRMs, which are the official maps for a community on which FEMA has delineated both the Special Flood Hazard Areas (SFHAs) and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 1-percent-annual-chance flood event. Figure 4.22 through Figure 4.25 reflect the effective mapped flood insurance zones for the Eno-Haw Region by county.

Less than 10 percent of the region overall falls within the 1% annual chance floodplain. However, flooding can occur anywhere and is not limited to the mapped floodplain.

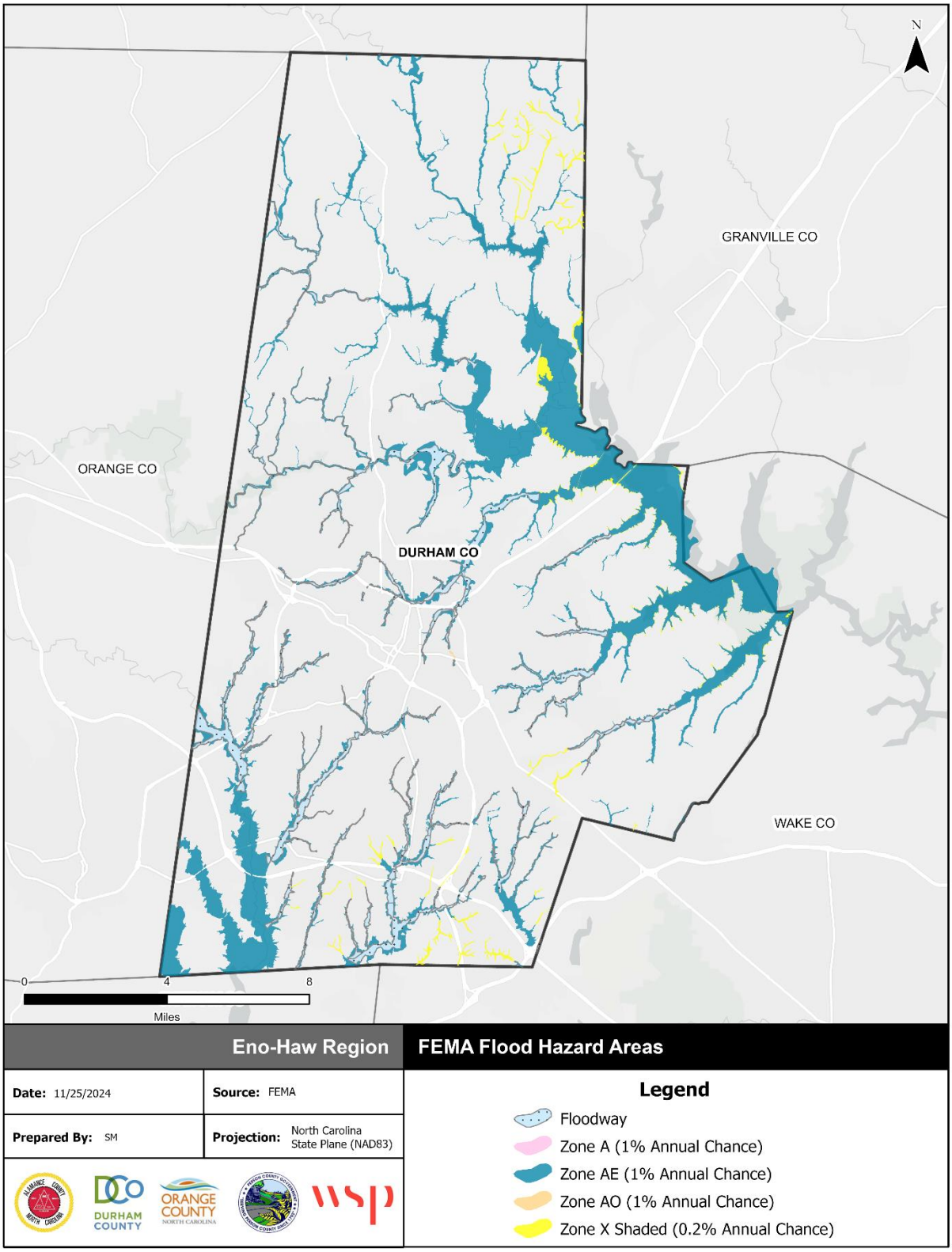
Spatial Extent: 2 – Small

Figure 4.22 – FEMA Flood Hazard Areas in Alamance County



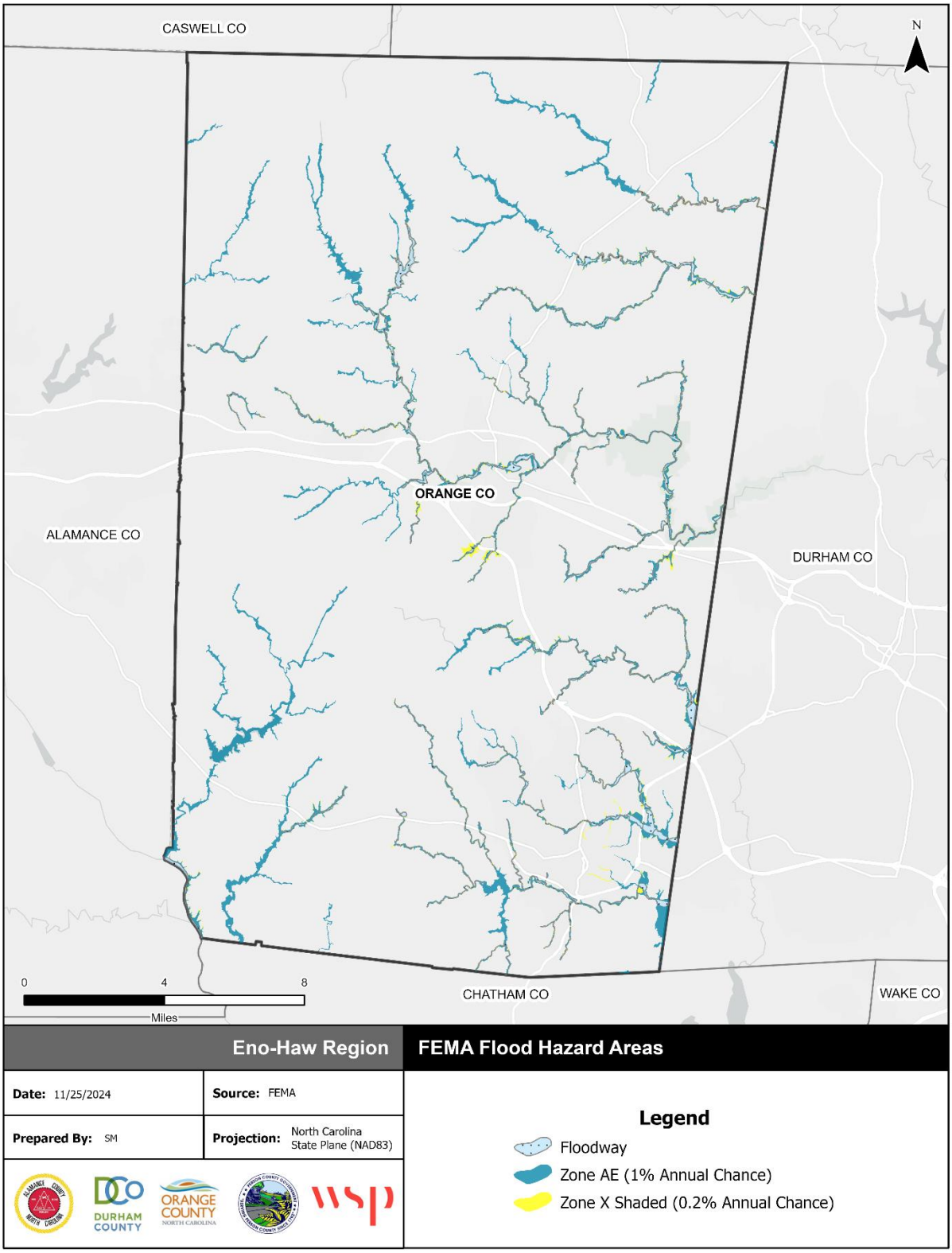
Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

Figure 4.23 – FEMA Flood Hazard Areas in Durham County



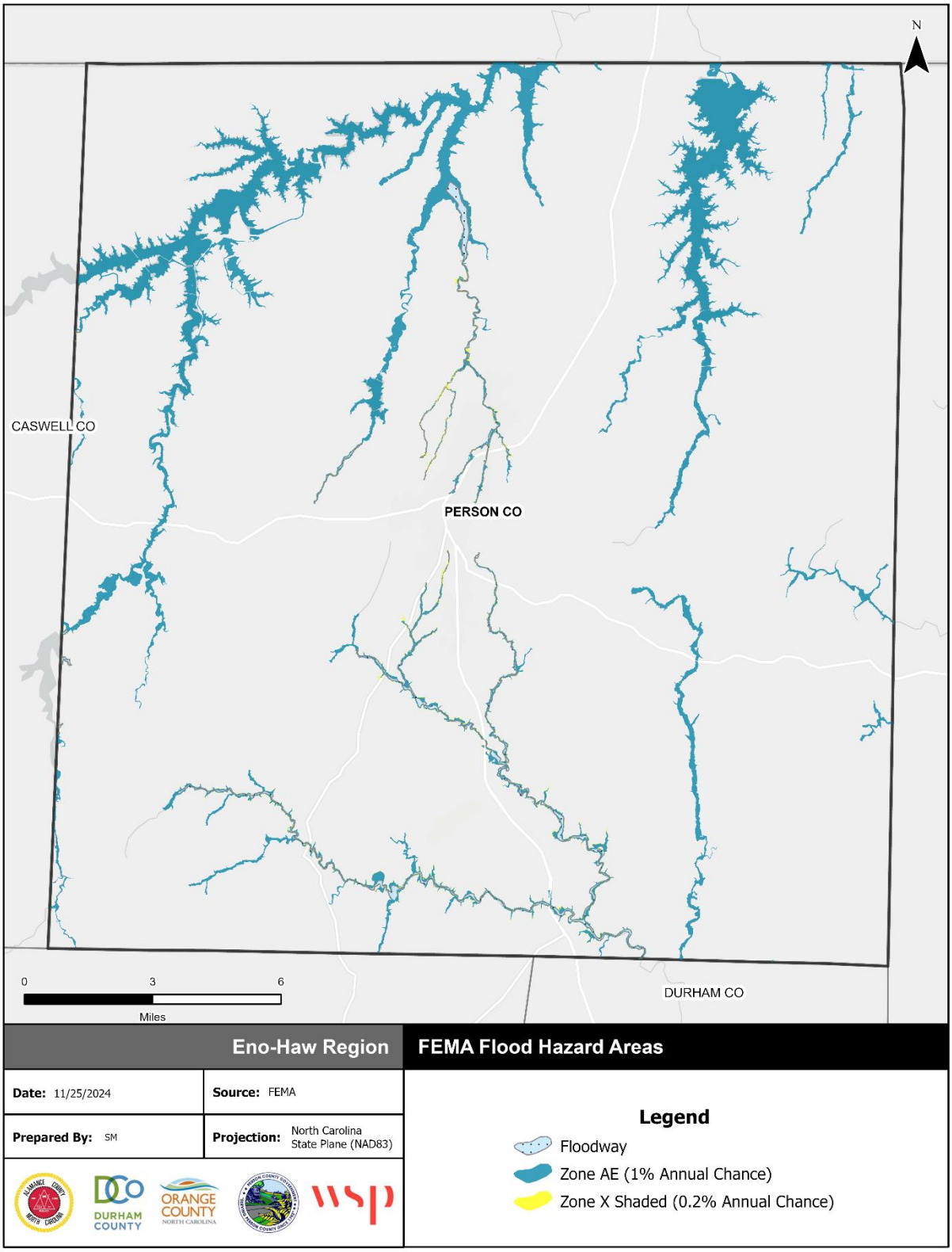
Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

Figure 4.24 – FEMA Flood Hazard Areas in Orange County



Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

Figure 4.25 – FEMA Flood Hazard Areas in Person County



Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

EXTENT

Flood extent can be defined by the amount of land in the floodplain and the potential magnitude of flooding as measured by flood height and velocity. FEMA Flood Insurance Studies define the approximate extent and probability of flooding by flood events of a magnitude which are expected to be equaled or exceeded once on the average during a specific time period, or recurrence interval.

Flood prone areas were identified within Eno-Haw Region using the Effective FIRMs, with most recent updates and/or revisions dated November 17, 2017 for Alamance, October 19, 2018 for Orange County, July 19, 2022 for Durham County, and December 6, 2019 for Person County. Table 4.39 summarizes the flood insurance zones identified by the Digital FIRM (DFIRM).

Table 4.39 – Mapped Flood Insurance Zones within the Eno-Haw Region

Zone	Description
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
AE	AE Zones, also within the 100-year flood limits, are defined with BFEs that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. The AE Zone generally extends from the landward VE zone limit to the limits of the 100-year flood from coastal sources, or until it reaches the confluence with riverine flood sources. The AE Zones also depict the SFHA due to riverine flood sources, but instead of being subdivided into separate zones of differing BFEs with possible wave effects added, they represent the flood profile determined by hydrologic and hydraulic investigations and have no wave effects. The Coastal AE Zone is differentiated from the AE Zone by the Limit of Moderate Wave Action (LiMWA) and includes areas susceptible to wave action between 1.5 to 3 feet.
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.
0.2% Annual Chance (shaded Zone X)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (unshaded)	Minimal risk areas outside the 1-percent and 0.2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. Zone X (unshaded) is used on new and revised maps in place of Zone C.

Source: FEMA

Table 4.40 provides a summary by county of the Region's total area by flood zone on the effective DFIRM. Only about eight percent of the Region falls within the SFHA. Durham County has the greatest proportion of total area in the SFHA, at just over 14 percent, while Orange County has the smallest relative SFHA at just 4.6 percent of the county's total area.

While the 1-percent-annual-chance flood is the basis for floodplain management under the NFIP, that does not mean that properties outside the SFHA are not at risk of flooding. Floods of other magnitudes may occur. The remainder of the planning areas is subject to moderate and low flood risk.

Impact: 3 – Critical

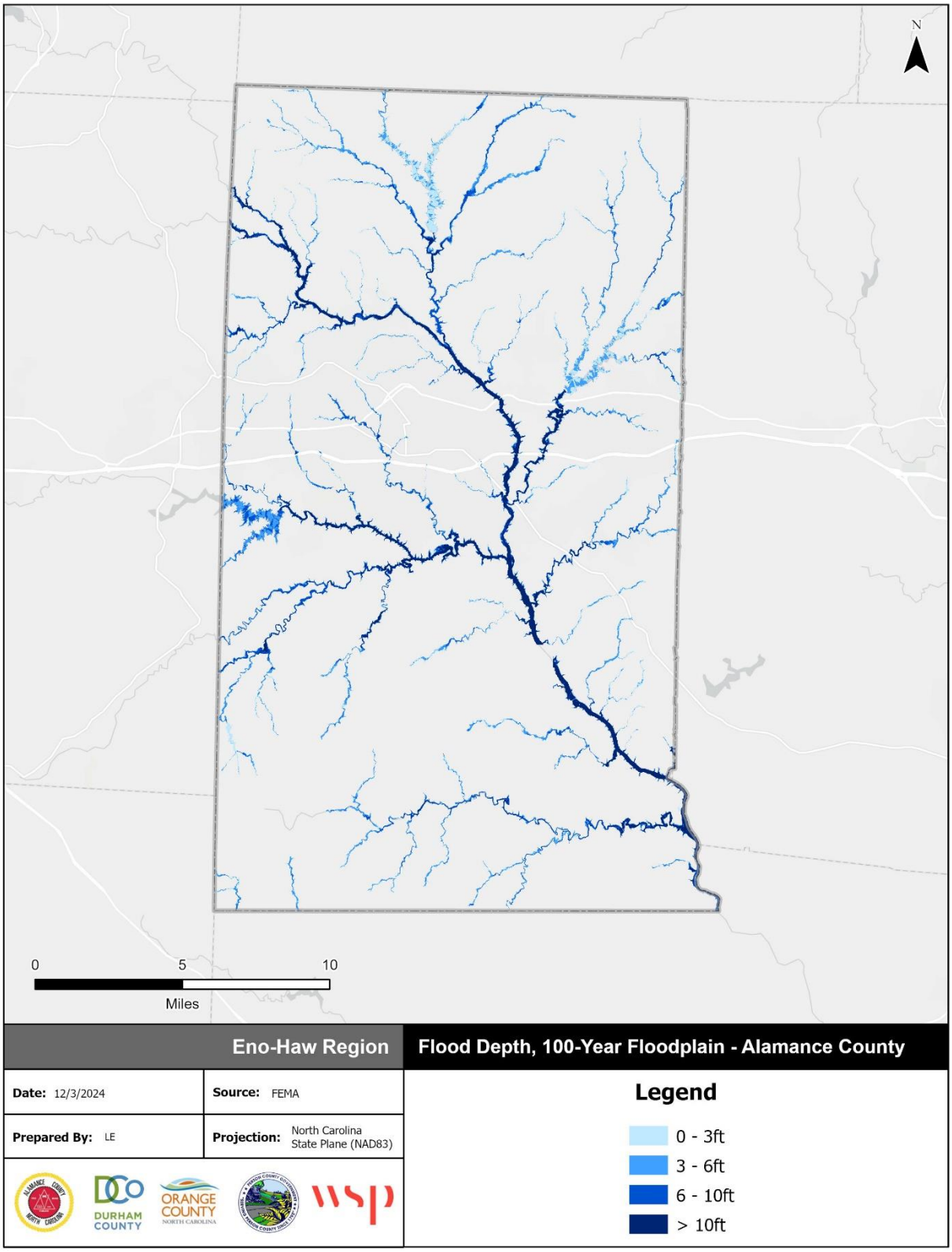
Table 4.40 – Flood Zone Acreage in the Eno-Haw Region

Flood Zone	Acreage	Percent of Total (%)
Alamance		
Zone A	--	--
Zone AE	19,155.4	6.9%
Zone AO	--	--
Zone X (500-year)	1,208.1	0.4%
Zone X Unshaded	258,569.6	92.7%
Subtotal	**278,933.1**	**100.0%**
Durham		
Zone A	--	--
Zone AE	27,833.4	14.7%
Zone AO	8.2	0.0%
Zone X (500-year)	1,567.1	0.8%
Zone X Unshaded	159,900.2	84.5%
Subtotal	**189,308.9**	**100.0%**
Orange		
Zone A	--	--
Zone AE	11,625.1	4.6%
Zone AO	--	--
Zone X (500-year)	871.8	0.3%
Zone X Unshaded	242,919.3	95.1%
Subtotal	**255,416.2**	**100.0%**
Person		
Zone A	--	--
Zone AE	15,842.5	6.1%
Zone AO	--	--
Zone X (500-year)	297.1	0.1%
Zone X Unshaded	242,439.8	93.8%
Subtotal	**258,579.5**	**100.0%**
Total	**982,237.7**	**100.0%**

Source: FEMA Effective DFIRM

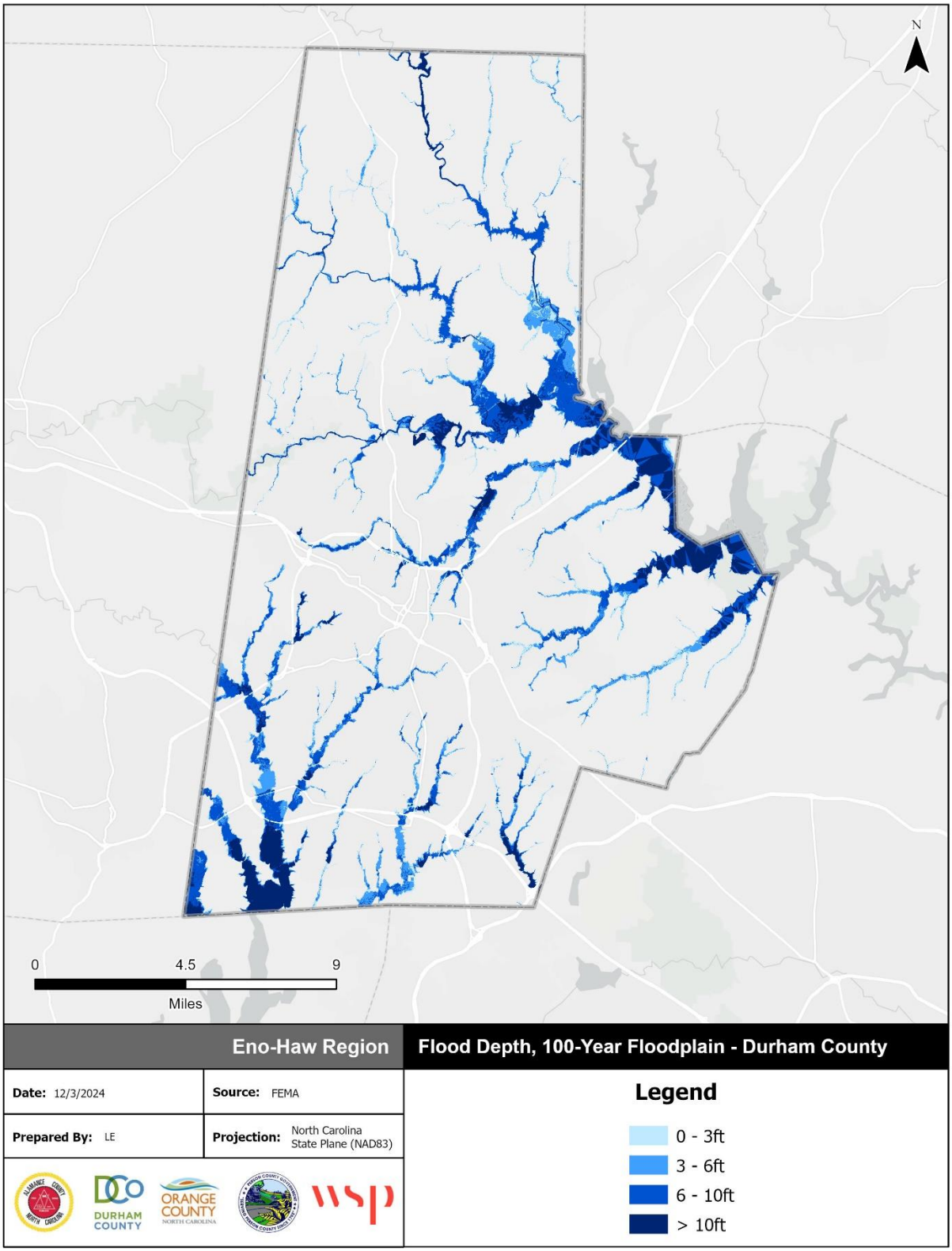
Figure 4.26 through Figure 4.29 show the depth of flooding estimated to occur from a 1% annual chance flood by county.

Figure 4.26 – Flood Depth, 100-Year Floodplain, Alamance



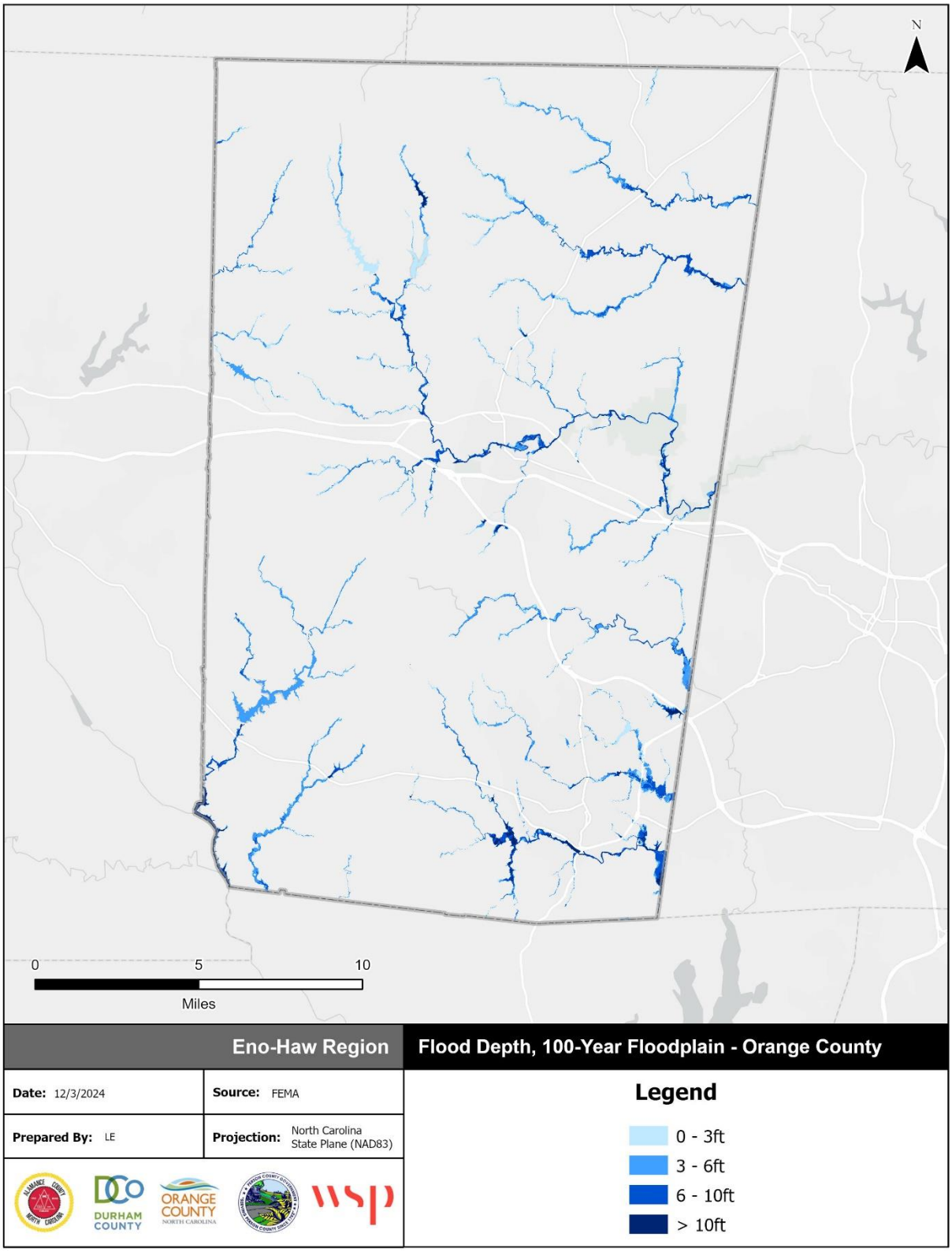
Source: FEMA Effective DFIRM

Figure 4.27 – Flood Depth, 100-Year Floodplain, Durham County



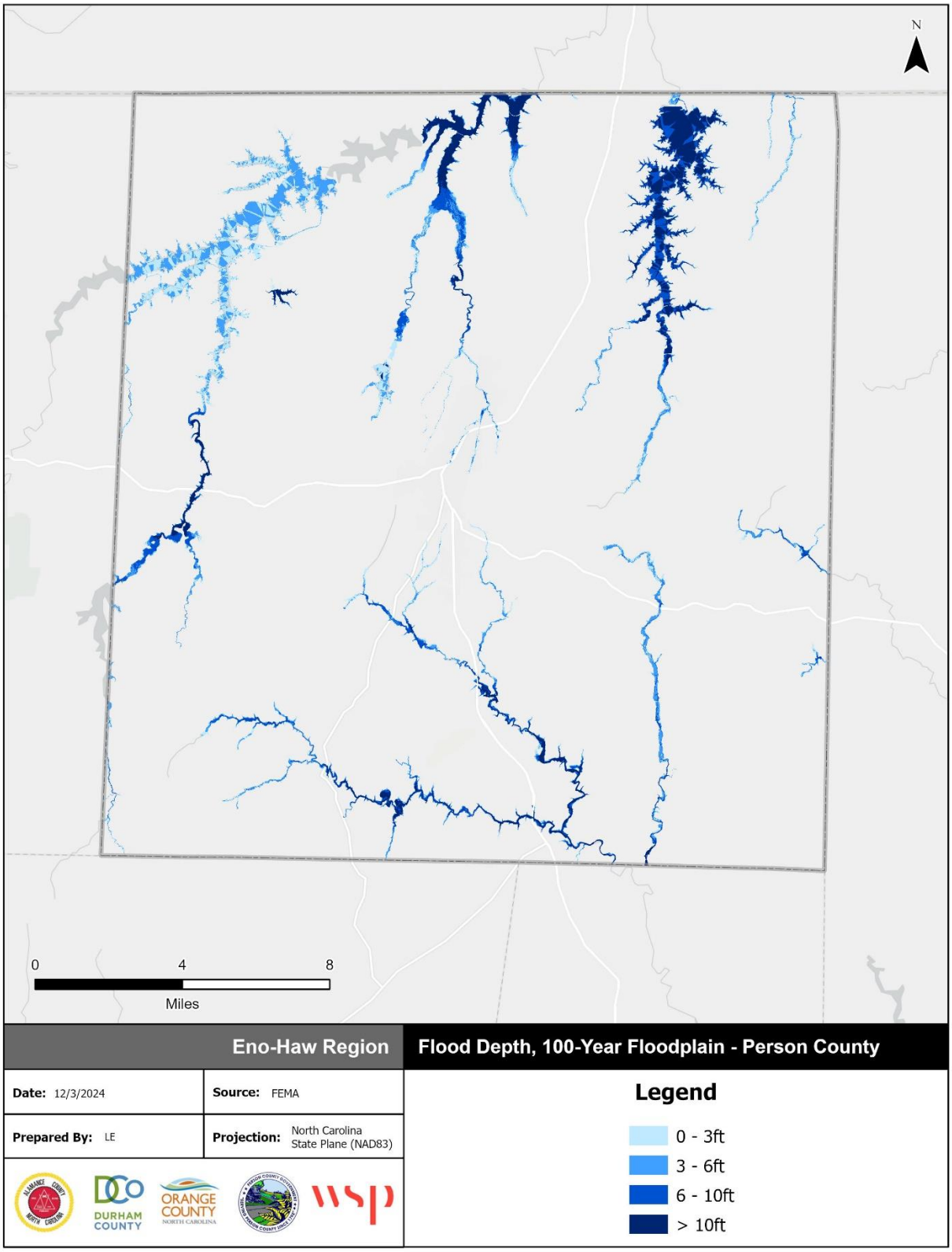
Source: FEMA Effective DFIRM

Figure 4.28 – Flood Depth, 100-Year Floodplain, Orange County



Source: FEMA Effective DFIRM

Figure 4.29 – Flood Depth, 100-Year Floodplain, Person County



Source: FEMA Effective DFIRM

HISTORICAL OCCURRENCES

According to NCEI Storm Events Database records, 180 flood-related events were reported during the 25-year period from 1999 through 2023, across 89 separate days. These events caused $52,374,500 in property damages, and $15,000,000 in crop damages.

Table 4.41 summaries these historical occurrences of flooding by county and event type. It should be noted that only those historical occurrences listed in the NCEI database are shown here and that other, unrecorded or unreported events may have occurred within the planning area during this timeframe.

Table 4.41 – NCEI Records of Flooding, 1999-2023

Type	Event Count	Deaths/ Injuries	Reported Property Damage	Reported Crop Damage
Alamance				
Flash Flood	33	0/0	$2,110,000	$0
Flood	5	0/0	$1,070,000	$5,000,000
Durham				
Flash Flood	67	0/0	$440,000	$0
Flood	4	0/0	$11,050,000	$5,000,000
Orange				
Flash Flood	44	0/0	$10,934,500	$0
Flood	4	0/0	$26,400,000	$5,000,000
Person				
Flash Flood	18	0/0	$310,000	$0
Flood	1	0/0	$0	$0
Region Total				
Flash Flood	162	0/0	$13,794,500	$0
Flood	14	0/0	$38,520,000	$15,000,000
Total	**176**	**0/0**	**$52,314,500**	**$15,000,000**

Source: NCEI

Table 4.42 provides a summary of this historical information by location. Many of the events attributed to the county are countywide or cover large portions of the county. Similarly, though some events have associated starting locations identified, the event may have covered a larger area including multiple jurisdictions. Still, this list provides an indication of areas that may be particularly flood prone.

Table 4.42 – Summary of Historical Flood Occurrences by Location, 1999-2023

Location	Event Count	Deaths/Injuries	Property Damage	Crop Damage
Alamance County				
Altamahaw	2	0/0	$0	$0
Burlington	8	0/0	$0	$0
Countywide	5	0/0	$0	$0
Elon College	4	0/0	$0	$0
Glen Raven	2	0/0	$115,000	$0
Graham	3	0/0	$30,000	$0
Just Xrds	1	0/0	$500,000	$0
Mebane	2	0/0	$1,400,000	$0
Pleasant Grove	1	0/0	$50,000	$0

Location	Event Count	Deaths/Injuries	Property Damage	Crop Damage
Saxapahaw	2	0/0	$0	$0
Snow Camp	5	0/0	$1,070,000	$5,000,000
Swepsonville	2	0/0	$0	$0
Union Ridge	1	0/0	$15,000	$0
Subtotal Alamance	**38**	**0/0**	**$3,180,000**	**$5,000,000**
Durham County				
Bahama	4	0/0	$100,000	$0
Braggtown	3	0/0	$2,500	$0
Countywide	8	0/0	$0	$0
Durham	13	0/0	$40,000	$0
East Durham	1	0/0	$0	$0
Fairntosh	1	0/0	$0	$0
Few	3	0/0	$15,000	$0
Genlee	1	0/0	$11,050,000	$5,000,000
Gorman	3	0/0	$20,000	$0
Hayes	2	0/0	$0	$0
Hope Valley	14	0/0	$112,500	$0
Huckleberry Spring	4	0/0	$100,000	$0
Lowes Grove	1	0/0	$0	$0
Oak Grove	2	0/0	$0	$0
Orange Factory	2	0/0	$0	$0
Quail Roost	3	0/0	$0	$0
Rougemont	2	0/0	$50,000	$0
Weaver	2	0/0	$0	$0
West Durham	2	0/0	$0	$0
Subtotal Durham	**71**	**0/0**	**$11,490,000**	**$5,000,000**
Orange County				
Blackwood	2	0/0	$150,000	$0
Buckhorn	1	0/0	$0	$0
Calvander	2	0/0	$3,000	$0
Carr	1	0/0	$0	$0
Carrboro	1	0/0	$10,000	$0
Chapel Hill	13	0/0	$6,905,000	$0
Chapel Hill Williams Area	9	0/0	$3,601,500	$0
Countywide	3	0/0	$0	$0
Efland	2	0/0	$250,000	$0
Glenn	1	0/0	$10,000	$0
Hillsborough	4	0/0	$0	$0
Miles	2	0/0	$0	$0
North Portion	1	0/0	$0	$0
Occoneechee	1	0/0	$0	$0
Teer	4	0/0	$26,400,000	$5,000,000
West Hillsborough	1	0/0	$5,000	$0
Subtotal Orange	**48**	**0/0**	**$37,334,500**	**$5,000,000**

Location	Event Count	Deaths/Injuries	Property Damage	Crop Damage
Person County				
Cavel	1	0/0	$0	$0
Countywide	2	0/0	$0	$0
Cunningham	2	0/0	$0	$0
Dennys Store	1	0/0	$0	$0
Gentrys Store	1	0/0	$0	$0
Gordonton	1	0/0	$50,000	$0
Helena	1	0/0	$0	$0
Hurdle Mills	2	0/0	$0	$0
Longs Store	1	0/0	$250,000	$0
Paynes Tavern	1	0/0	$0	$0
Roxboro	6	0/0	$10,000	$0
Subtotal Person	**19**	**0/0**	**$310,000**	**$0**
Region Total	**176**	**0/0**	**$52,314,500**	**$15,00,000**

Source: NCEI

The following event narratives are provided in the NCEI Storm Events Database and illustrate the impacts of flood events on the Region:

July 23, 2000 – Flooding of streets and buildings was reported countywide, especially in Chapel Hill and Carrboro. The Eastgate Shopping center was damaged, as well as several apartments and homes. A bridge was washed out on Piney Mountain Rd.

July 13, 2003 – Extensive flooding caused evacuations. 30 homes and 6 businesses sustained flood damage, and the wastewater treatment plant was damaged. About a dozen cars were underwater. Highways 70 and 119 were closed along with many other roads.

June 30, 2013 – Heavy rain (4-5 inches) resulted in extensive flooding in the city of Chapel Hill. The first floor of the Town Hall flooded and may be closed for up to a year for repairs. Franklin Street saw widespread flooding, with water above the windows of cars in several locations and some businesses also being impacted. Several buildings on the University of North Carolina had water in them, including the bottom floor of Granville Tower. Another area of the city that experienced flooding was the East Gate Shopping Center, where water entered several businesses and stranded many cars in the parking lot. One hard hit residential area was along Estes Drive near Highway 15-501, where the Camelot Village Condominiums experienced extensive flooding. In fact, 76 out of 116 units flooded. Another residential area that experienced flooding was the Airport Gardens Public Housing Neighborhood, where 18 out of the 26 units flooded. Due to the flooding, the Orange County qualified for state and federal aid. Several areas of Carrboro experienced flooding, including the Rocky Brook Mobile Home Park on Greensboro Street, where residents had to be evacuated due to high water. In fact, 20 out of 31 homes were eventually condemned.

September 17, 2018 – Torrential rainfall of 6 to 10 inches caused widespread flooding across the region, which caused flooding along the Eno and Haw Rivers and other creeks and streams throughout the region. Additionally, water held in Jordan Lake from rainfall in its headwaters resulted in flooding along the lake into far southeast portions of Orange and Durham counties. Flooding damaged approximately 276 structures throughout Orange County, destroying 1 structure and resulting in $26.4 million in property damage. Flooding damaged approximately 638 structures throughout Durham County, destroying 4 structures and resulting in $11.05 million in property damage. Flooding damaged approximately 202 structures throughout Alamance County, resulting in over $1.07 million in property damage. Numerous

roads were closed due to flooding. Numerous homes and businesses were flooded as well. While final losses on crops are not yet tallied, estimates around $5 million or more are possible.

PROBABILITY OF FUTURE OCCURRENCE

By definition, SFHAs are those areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. Properties located in the SFHA have a 26 percent chance of flooding over the life of a 30-year mortgage. The Shaded X Zone indicates areas that are estimated to be inundated by the flood event having a 0.2-percent chance of being equaled or exceeded in any given year. The SFHA and the Shaded X zone indicate areas of high and moderate risk according to FEMA guidelines; however, this does not mean that flood risk is limited to these areas. There is also potential for other magnitudes of flood events to impact these and other areas in the region.

While exposure to flood hazards varies across jurisdictions, all jurisdictions have at least some area of land in FEMA flood hazard areas. Additionally, flash floods and stormwater flooding can occur outside of mapped SFHAs and historical records indicate that these events are very common in the Region, with an average of 6.5 flash flood events reported annually over the last 25 years. Climate change projections suggest flooding will become more likely in the future due to increases in days with heavy rain. The probability of flooding is considered likely regionwide. Based on historical records of flooding coupled with projections for increased heavy rain, probability of flooding is considered highly likely in Durham City and County, Orange County, and Chapel Hill.

Probability: 3 – Likely

CLIMATE CHANGE

Per the Fourth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. Additionally, increases in precipitation totals are expected in the Southeast. Therefore, with more rainfall falling in more intense incidents, the region may experience more frequent flash flooding. Increased flooding may also result from more intense tropical cyclone; researchers have noted the occurrence of more intense storms bringing greater rainfall totals, a trend that is expected to continue as ocean and air temperatures rise.

The 2023 North Carolina Hazard Mitigation Plan, changing climate and weather patterns, environmental conditions, and urban and rural development may affect the frequency and intensity of flooding. Historical data and climate projections provided by the State Climate Office of North Carolina on the North Carolina Resilience Exchange website indicate that days with extreme precipitation (2 inches or more of precipitation) are expected to increase in the region. These projections are summarized in Table 4.43 below.

Table 4.43 – Heavy Rain Projections, Days per Decade with Precipitation of 2 or More Inches

County	Historical	Best Case Scenario	Worst Case Scenario
Alamance	12	15	17
Durham	9	13	14
Orange	12	16	18
Person	11	15	17

Source: North Carolina Resilience Exchange Climate Projections and Observations

This increased likelihood of extreme precipitation events due to climate change will result in greater risks of flash flooding and impacts from stormwater runoff.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Population and property at risk to flooding was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool.

As a subset of the building vulnerability analysis, exposure of pre-FIRM structures was also estimated. Table 4.44 below provides the NFIP entry date for each participating jurisdiction, which was used to determine which buildings were constructed pre-FIRM. Pre-FIRM structures are those built prior to the community's first FIRM and thus before the adoption of flood protection building standards. These structures are therefore assumed to be at greater risk to the flood hazard.

To estimate the number of pre-FIRM structures in each community using year-built data, if the NFIP entry date for a given community was between January and June, buildings constructed the same year as the entry date were considered to be post-FIRM (e.g., if the NFIP entry date is 02/01/1991, buildings constructed in 1990 and before were considered pre-FIRM. Buildings constructed from 1991 to the present were counted as post-FIRM.). If the NFIP entry date was between July and December, then the following year was applied for the year-built cut-off (e.g., if the NFIP entry date was 12/18/2007, buildings constructed in the year 2007 and before were counted as pre-FIRM, 2008 and newer were post-FIRM).

Table 4.44 – NFIP Entry Dates

Jurisdiction	NFIP Entry Date
Alamance County	
Alamance County (Unincorporated)	12/1/1981
Alamance	12/17/1987
Burlington	4/1/1981
Elon	6/5/1989
Graham	11/19/1980
Green Level	12/22/1998
Haw River	11/5/1980
Mebane	11/5/1980
Ossipee	Non-participating
Swepsonville	12/1/1981
Durham County	
Durham County (Unincorporated)	2/15/1979
Durham	1/3/1979
Orange County	
Orange County (Unincorporated)	3/6/1981
Carrboro	6/25/1976
Chapel Hill	4/17/1978
Hillsborough	5/15/1980
Person County	
Person County (Unincorporated)	9/14/1990
Roxboro	3/25/1991

Source: Federal Emergency Management Agency

Effective FEMA DFIRM data was used for the flood hazard areas. Flood zones used in the analysis consist of Zone AE (1-percent-annual-chance flood), Zone AE Floodway, and the 0.2-percent-annual-chance flood hazard area.

PEOPLE

Certain health hazards are common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or where their wastes are stored can contribute polluted waters to the receiving streams. Debris also poses a risk both during and after a flood. During a flood, debris carried by floodwaters can cause physical injury from impact. During the recovery process, people may often need to clear debris out of their properties but may encounter dangers such as sharp materials or rusty nails that pose a risk of tetanus. People must be aware of these dangers prior to a flood so that they understand the risks and take necessary precautions before, during, and after a flood.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as E.coli and other disease causing agents.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If a local water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one‘s home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Floods can also result in fatalities. Though there are no deaths or injuries as a result of flood reported for the Region in NCEI records, these impacts can occur. Individuals face particularly high risk when driving through flooded streets.

Table 4.45 to Table 4.48 details the population at risk from 25, 50, 100, and 500-year flood events according to data from the NCEM IRISK database. Note that development and population growth have occurred since the original analysis for the IRISK dataset was performed, therefore actual population at risk is likely higher.

Table 4.45 – Population Impacted by 25-Year Flood Event

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	%		Number	%		Number	%
Alamance									
Alamance County (Unincorporated Area)	57,799	76	0	9,835	13	0	3,308	4	0
City Of Burlington	63,032	483	1	10,440	80	1	3,975	30	1
City Of Graham	18,650	144	1	3,356	26	1	1,288	10	1
City Of Mebane	17,079	32	0%	2,206	4	0%	977	2	0%
Town Of Elon	9,355	61	1%	1,524	10	1%	331	2	1%
Town Of Green Level	1,541	0	0%	273	0	0%	104	0	0%
Town Of Haw River	5,843	22	0%	979	4	0%	395	1	0%
Town Of Ossipee	434	0	0%	64	0	0%	23	0	0%
Town Of Swepsonville	558	0	0%	102	0	0%	38	0	0%
Village Of Alamance	704	0	0%	143	0	0%	25	0	0%
Subtotal Alamance	**174,995**	**818**	**0%**	**28,922**	**137**	**0%**	**10,464**	**49**	**0%**
Durham									
Durham County (Unincorporated Area)	92,917	671	1%	15,332	111	1%	5,294	38	1%
City Of Durham	235,187	1,489	1%	27,521	174	1%	15,501	98	1%
Subtotal Durham	**328,104**	**2,160**	**1%**	**42,853**	**285**	**1%**	**20,795**	**136**	**1%**
Orange									
Orange County (Unincorporated Area)	61,819	60	0%	10,806	10	0%	3,164	3	0%
Town Of Carrboro	18,405	162	1%	2,281	20	1%	671	6	1%
Town Of Hillsborough	6,252	4	0%	1,118	1	0%	406	0	0%
Town Of Chapel Hill	63,329	763	1%	7,428	89	1%	2,477	30	1%
Subtotal Orange	**149,805**	**989**	**1%**	**21,633**	**120**	**1%**	**6,718**	**39**	**1%**
Person									
Person County (Unincorporated Area)	29,696	8	0%	5,674	2	0%	1,641	0	0%
City Of Roxboro	10,172	26	0%	2,211	6	0%	447	1	0%
Subtotal Person	**39,868**	**34**	**0%**	**7,885**	**8**	**0%**	**2,088**	**1**	**0%**
Region Total	**692,772**	**4,001**	**1%**	**101,293**	**550**	**1%**	**40,065**	**225**	**1%**

Source: NCEM Risk Management Tool

Table 4.46 – Population Impacted by 50-Year Flood Event

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	%		Number	%		Number	%
Alamance									
Alamance County (Unincorporated Area)	57,799	100	0%	9,835	17	0%	3,308	6	0%
City Of Burlington	63,032	535	1%	10,440	89	1%	3,975	34	1%
City Of Graham	18,650	195	1%	3,356	35	1%	1,288	13	1%
City Of Mebane	17,079	45	0%	2,206	6	0%	977	3	0%
Town Of Elon	9,355	69	1%	1,524	11	1%	331	2	1%
Town Of Green Level	1,541	0	0%	273	0	0%	104	0	0%
Town Of Haw River	5,843	30	1%	979	5	1%	395	2	1%
Town Of Ossipee	434	0	0%	64	0	0%	23	0	0%
Town Of Swepsonville	558	0	0%	102	0	0%	38	0	0%
Village Of Alamance	704	1	0%	143	0	0%	25	0	0%
Subtotal Alamance	**174,995**	**975**	**1%**	**28,922**	**163**	**1%**	**10,464**	**60**	**1%**
Durham									
Durham County (Unincorporated Area)	92,917	769	1%	15,332	127	1%	5,294	44	1%
City Of Durham	235,187	1,883	1%	27,521	220	1%	15,501	124	1%
Subtotal Durham	**328,104**	**2,652**	**1%**	**42,853**	**347**	**1%**	**20,795**	**168**	**1%**
Orange									
Orange County (Unincorporated Area)	61,819	80	0%	10,806	14	0%	3,164	4	0%
Town Of Carrboro	18,405	165	1%	2,281	20	1%	671	6	1%
Town Of Hillsborough	6,252	5	0%	1,118	1	0%	406	0	0%
Town Of Chapel Hill	63,329	862	1%	7,428	101	1%	2,477	34	1%
Subtotal Orange	**149,805**	**1,112**	**1%**	**21,633**	**136**	**1%**	**6,718**	**44**	**1%**
Person									
Person County (Unincorporated Area)	29,696	8	0%	5,674	2	0%	1,641	0	0%
City Of Roxboro	10,172	28	0%	2,211	6	0%	447	1	0%
Subtotal Person	**39,868**	**36**	**0%**	**7,885**	**8**	**0%**	**2,088**	**1**	**0%**
Region Total	**692,772**	**4,775**	**1%**	**101,293**	**654**	**1%**	**40,065**	**273**	**1%**

Source: NCEM Risk Management Tool

Table 4.47 – Population Impacted by 100-Year River Flooding

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	%		Number	%		Number	%
Alamance									
Alamance County (Unincorporated Area)	57,799	123	0%	9,835	21	0%	3,308	7	0%
City Of Burlington	63,032	584	1%	10,440	97	1%	3,975	37	1%
City Of Graham	18,650	249	1%	3,356	45	1%	1,288	17	1%
City Of Mebane	17,079	51	0%	2,206	7	0%	977	3	0%
Town Of Elon	9,355	80	1%	1,524	13	1%	331	3	1%
Town Of Green Level	1,541	0	0%	273	0	0%	104	0	0%
Town Of Haw River	5,843	52	1%	979	9	1%	395	4	1%
Town Of Ossipee	434	0	0%	64	0	0%	23	0	0%
Town Of Swepsonville	558	0	0%	102	0	0%	38	0	0%
Village Of Alamance	704	1	0%	143	0	0%	25	0	0%
Subtotal Alamance	**174,995**	**1,140**	**1%**	**28,922**	**192**	**1%**	**10,464**	**71**	**1%**
Durham									
Durham County (Unincorporated Area)	92,917	908	1%	15,332	150	1%	5,294	52	1%
City Of Durham	235,187	2,314	1%	27,521	271	1%	15,501	153	1%
Subtotal Durham	**328,104**	**3,222**	**1%**	**42,853**	**421**	**1%**	**20,795**	**205**	**1%**
Orange									
Orange County (Unincorporated Area)	61,819	109	0%	10,806	19	0%	3,164	6	0%
Town Of Carrboro	18,405	175	1%	2,281	22	1%	671	6	1%
Town Of Hillsborough	6,252	7	0%	1,118	1	0%	406	0	0%
Town Of Chapel Hill	63,329	957	2%	7,428	112	2%	2,477	37	1%
Subtotal Orange	**149,805**	**1,248**	**1%**	**21,633**	**154**	**1%**	**6,718**	**49**	**1%**
Person									
Person County (Unincorporated Area)	29,696	10	0%	5,674	2	0%	1,641	1	0%
City Of Roxboro	10,172	32	0%	2,211	7	0%	447	1	0%
Subtotal Person	**39,868**	**42**	**0%**	**7,885**	**9**	**0%**	**2,088**	**2**	**0%**
Region Total	**692,772**	**5,652**	**1%**	**101293**	**776**	**1%**	**40065**	**327**	**1%**

Source: NCEM Risk Management Tool

Table 4.48 – Population Impacted by the 500-Year River Flooding

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	%		Number	%		Number	%
Alamance									
Alamance County (Unincorporated Area)	57,799	201	0%	9,835	34	0%	3,308	11	0%
City Of Burlington	63,032	712	1%	10,440	118	1%	3,975	45	1%
City Of Graham	18,650	399	2%	3,356	72	2%	1,288	28	2%
City Of Mebane	17,079	61	0%	2,206	8	0%	977	3	0%
Town Of Elon	9,355	95	1%	1,524	16	1%	331	3	1%
Town Of Green Level	1,541	0	0%	273	0	0%	104	0	0%
Town Of Haw River	5,843	98	2%	979	16	2%	395	7	2%
Town Of Ossipee	434	0	0%	64	0	0%	23	0	0%
Town Of Swepsonville	558	0	0%	102	0	0%	38	0	0%
Village Of Alamance	704	1	0%	143	0	0%	25	0	0%
Subtotal Alamance	**174,995**	**1,567**	**1%**	**28922**	**264**	**1%**	**10464**	**97**	**1%**
Durham									
Durham County (Unincorporated Area)	92,917	1,083	1%	15,332	179	1%	5,294	62	1%
City Of Durham	235,187	3,240	1%	27,521	379	1%	15,501	214	1%
Subtotal Durham	**328,104**	**4,323**	**1%**	**42,853**	**558**	**1%**	**20,795**	**276**	**1%**
Orange									
Orange County (Unincorporated Area)	61,819	129	0%	10,806	22	0%	3,164	7	0%
Town Of Carrboro	18,405	212	1%	2,281	26	1%	671	8	1%
Town Of Hillsborough	6,252	13	0%	1,118	2	0%	406	1	0%
Town Of Chapel Hill	63,329	1,115	2%	7,428	131	2%	2,477	44	2%
Subtotal Orange	**149,805**	**1,469**	**1%**	**21,633**	**181**	**1%**	**6,718**	**60**	**1%**
Person									
Person County (Unincorporated Area)	29,696	24	0%	5,674	5	0%	1,641	1	0%
City Of Roxboro	10,172	42	0%	2,211	9	0%	447	2	0%
Subtotal Person	**39,868**	**66**	**0%**	**7885**	**14**	**0%**	**2088**	**3**	**0%**
Region Total	**692,772**	**7,425**	**1%**	**101,293**	**1,017**	**1%**	**40,065**	**436**	**1%**

Source: NCEM Risk Management Tool

PROPERTY

Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed by flood waters.

The 1% annual chance flood event is estimated to impact over 1,700 structures and caused over $37 million in damages. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Mortgage lenders require that owners of properties with federally-backed mortgages located within SFHAs purchase and maintain flood insurance policies on their properties. Consequently, newer and recently purchased properties in the community are typically insured against flooding.

Table 4.49 through Table 4.53 detail buildings at risk of damage during different flood return intervals, according to data from the NCEM IRISK database. As with population vulnerability data, actual property at risk is likely higher due to the amount of development that has occurred since the original analysis for the IRISK dataset was performed.

Table 4.49 – Buildings Impacted by the 10-Year Flood Event

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County															
Unincorporated Alamance County	29,650	10	0	19	0	$21,302	1	0	$1,483	0	0	$0	20	0	$22,784
City of Burlington	24,403	120	0	127	1	$247,394	5	0	$33,811	2	0	$3,053	134	1	$284,258
City of Graham	7,269	10	0	21	0	$57,495	0	0	$0	0	0	$0	21	0	$57,495
City of Mebane	5,835	0	0	8	0	$13,861	0	0	$0	0	0	$0	8	0	$13,861
Town of Elon	2,760	11	0	12	0	$13,982	0	0	$0	0	0	$0	12	0	$13,982
Town of Green Level	1,177	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Town of Haw River	2,352	1	0	4	0	$23,856	0	0	$0	0	0	$0	4	0	$23,856
Town of Ossipee	330	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Town of Swepsonville	573	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Village of Alamance	798	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Subtotal Alamance	**75,147**	**152**	**0**	**191**	**0**	**$377,890**	**6**	**0**	**$35,294**	**2**	**0**	**$3,053**	**199**	**0**	**$416,236**
Durham County															
Unincorporated Durham County	21,037	83	0	210	1	$1,521,506	17	0	$954,742	1	0	$11,160	228	1	$2,487,408
City of Durham	21,037	49	0	107	1	$265,112	5	0	$43,312	1	0	$9,742	113	1	$318,166
Subtotal Durham	**75,585**	**258**	**0**	**341**	**0**	**$1,642,373**	**26**	**0**	**$269,032**	**3**	**0**	**$47,197**	**370**	**0**	**$1,958,603**
Orange County															

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Unincorporated Orange County	24,533	2	0	15	0	$28,062	0	0	$0	0	0	$0	15	0	$28,062
Town of Carrboro	5,782	10	0	46	1	$406,940	0	0	$0	0	0	$0	46	1	$406,940
Town of Chapel Hill	15,108	135	1	129	1	$6,751,916	21	0	$4,278,496	1	0	$186,046	151	1	$11,216,457
Town of Hillsborough	3,883	1	0	1	0	$1,430	0	0	$0	0	0	$0	1	0	$1,430
Subtotal Orange	**49,306**	**148**	**0**	**191**	**0**	**$7,188,348**	**21**	**0**	**$4,278,496**	**1**	**0**	**$186,046**	**213**	**0**	**$11,652,889**
Person County															
Unincorporated Person County	17,714	0	0	2	0	$691	0	0	$0	0	0	$0	2	0	$691
City of Roxboro	6,617	12	0	11	0	$19,417	1	0	$3,138	0	0	$0	12	0	$22,555
Subtotal Person	24,331	12	0	13	0	$20,108	1	0	$3,138	0	0	$0	14	0	$23,246
Total	**245,406**	**619**	**0**	**843**	**0**	**$9,493,831**	**59**	**0**	**$4,629,272**	**7**	**0**	**$246,038**	**909**	**0**	**$14,369,140**

Source: NCEM Risk Management Tool

Table 4.50 – Buildings Impacted by the 25-Year Flood Event

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County															

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Unincorporated Alamance County	29,650	22	0	34	0	$92,279	1	0	$33,299	0	0	$0	35	0	$125,578
City of Burlington	24,403	158	1	166	1	$422,732	11	0	$99,067	2	0	$13,780	179	1	$535,579
City of Graham	7,269	19	0	51	1	$95,699	1	0	$600	0	0	$0	52	1	$96,299
City of Mebane	5,835	0	0	10	0	$37,338	1	0	$277	0	0	$0	11	0	$37,615
Town of Elon	2,760	15	1	16	1	$30,602	0	0	$0	0	0	$0	16	1	$30,602
Town of Green Level	1,177	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Town of Haw River	2,352	7	0	8	0	$49,325	2	0	$3,913	0	0	$0	10	0	$53,238
Town of Ossipee	330	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Town of Swepsonville	573	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Village of Alamance	798	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Subtotal Alamance	**75,147**	**221**	**0**	**285**	**0**	**$727,975**	**16**	**0**	**$137,156**	**2**	**0**	**$13,780**	**303**	**0**	**$878,911**
Durham County															
Unincorporated Durham County	21,037	54	0	130	1	$349,289	10	0	$72,855	1	0	$10,482	141	1	$432,626
City of Durham	75,585	330	0	427	1	$3,414,876	38	0	$751,119	5	0	$118,059	470	1	$4,284,054
Subtotal Durham	**96,622**	**384**	**0**	**557**	**1**	**$3,764,165**	**48**	**0**	**$823,974**	**6**	**0**	**$128,541**	**611**	**1**	**$4,716,680**
Orange County															
Unincorporated Orange County	24,533	4	0	21	0	$60,672	0	0	$0	0	0	$0	21	0	$60,672

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Carrboro	5,782	11	0	48	1	$940,430	0	0	$0	0	0	$0	48	1	$940,430
Town of Chapel Hill	15,108	180	1	169	1	$8,452,005	29	0	$5,214,180	1	0	$238,637	199	1	$13,904,823
Town of Hillsborough	3,883	3	0	2	0	$3,643	1	0	$758	0	0	$0	3	0	$4,401
Subtotal Orange	**49,306**	**198**	**0**	**240**	**0**	**$9,456,750**	**30**	**0**	**$5,214,938**	**1**	**0**	**$238,637**	**271**	**1**	**$14,910,326**
Person County															
Unincorporated Person County	17,714	0	0	4	0	$1,794	0	0	$0	0	0	$0	4	0	$1,794
City of Roxboro	6,617	20	0	15	0	$32,729	4	0	$82,313	1	0	$14,819	20	0	$129,862
Subtotal Person	24,331	20	0	19	0	$34,523	4	0	$82,313	1	0	$14,819	24	0	$131,656
Total	**245,406**	**823**	**0**	**1,101**	**0**	**$13,983,413**	**98**	**0**	**$6,258,381**	**10**	**0**	**$395,777**	**1,209**	**0**	**$20,637,573**

Source: NCEM Risk Management Tool

Table 4.51 – Buildings Impacted by the 50-Year Flood Event

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County															
Unincorporated Alamance County	29,650	30	0	45	0	$195,208	2	0	$45,758	0	0	$0	47	0	$240,966

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
City of Burlington	24,403	175	1	184	1	$534,137	12	0	$130,375	2	0	$16,358	198	1	$680,870
City of Graham	7,269	24	0	69	1	$133,001	1	0	$945	0	0	$0	70	1	$133,946
City of Mebane	5,835	0	0	14	0	$45,313	1	0	$1,108	0	0	$0	15	0	$46,422
Town of Elon	2,760	17	1	18	1	$35,890	0	0	$0	0	0	$0	18	1	$35,890
Town of Green Level	1,177	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Town of Haw River	2,352	9	0	11	0	$56,841	2	0	$14,702	0	0	$0	13	1	$71,543
Town of Ossipee	330	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Town of Swepsonville	573	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Village of Alamance	798	1	0	1	0	$131	0	0	$0	0	0	$0	1	0	$131
Subtotal Alamance	**75,147**	**256**	**0**	**342**	**0**	**$1,000,521**	**18**	**0**	**$192,888**	**2**	**0**	**$16,358**	**362**	**0**	**$1,209,768**
Durham County															
Unincorporated Durham County	21,037	58	0	149	1	$466,829	14	0	$256,748	1	0	$10,817	164	1	$734,394
City of Durham	75,585	408	1	540	1	$5,999,637	48	0	$1,506,953	6	0	$184,703	594	1	$7,691,293
Subtotal Durham	**96,622**	**466**	**0**	**689**	**1**	**6,466,466**	**62**	**0**	**1,763,701**	**7**	**0**	**195,520**	**758**	**1**	**8,425,687**
Orange County															
Unincorporated Orange County	24,533	5	0	28	0	$81,536	2	0	$14,979	0	0	$0	30	0	$96,516
Town of Carrboro	5,782	12	0	49	1	$1,146,563	0	0	$0	0	0	$0	49	1	$1,146,563
Town of Chapel Hill	15,108	204	1	191	1	$9,967,569	30	0	$5,493,547	1	0	$240,917	222	1	$15,702,033

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Hillsborough	3,883	4	0	3	0	$4,082	1	0	$5,767	0	0	$0	4	0	$9,849
Subtotal Orange	**49,306**	**225**	**0**	**271**	**1**	**11,199,750**	**33**	**0**	**5,514,293**	**1**	**0**	**240,917**	**305**	**1**	**16,954,961**
Person County															
Unincorporated Person County	17,714	0	0	4	0	$6,778	0	0	$0	0	0	$0	4	0	$6,778
City of Roxboro	6,617	21	0	16	0	$45,398	4	0	$130,245	1	0	$14,978	21	0	$190,620
Subtotal Person	24,331	21	0	20	0	$52,176	4	0	$130,245	1	0	$14,978	25	0	$197,398
Total	**245,406**	**968**	**0**	**1,322**	**1**	**$18,718,913**	**117**	**0**	**$7,601,127**	**11**	**0**	**$467,773**	**1,450**	**1**	**$26,787,814**

Source: NCEM Risk Management Tool

Table 4.52 – Buildings Impacted by the 100-Year Flood Event

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County															
Unincorporated Alamance County	24,403	192	1%	201	1%	$646,943	15	0%	$167,698	2	0%	$18,193	218	1%	$832,834
City of Burlington	7,269	29	0%	88	1%	$199,197	1	0%	$1,246	0	0%	$0	89	1%	$200,443
City of Graham	5,835	0	0%	16	0%	$53,658	1	0%	$1,960	0	0%	$0	17	0%	$55,618
City of Mebane	2,760	20	1%	21	1%	$40,705	0	0%	$0	0	0%	$0	21	1%	$40,705

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Elon	1,177	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Green Level	2,352	17	1%	19	1%	$110,767	3	0%	$29,139	0	0%	$0	22	1%	$139,907
Town of Haw River	330	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Ossipee	573	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Swepsonville	798	1	0%	1	0%	$339	0	0%	$0	0	0%	$0	1	0%	$339
Village of Alamance	75,147	297	0%	401	1%	$1,415,562	26	0%	$430,724	2	0%	$18,193	429	1%	$1,864,480
Subtotal Alamance	**24,403**	**192**	**1%**	**201**	**1%**	**$646,943**	**15**	**0%**	**$167,698**	**2**	**0%**	**$18,193**	**218**	**1%**	**$832,834**
Durham County															
Unincorporated Durham County	75,585	488	1%	664	1%	$8,907,700	60	0%	$4,991,806	6	0%	$234,395	730	1%	$14,133,902
City of Durham	21,037	66	0%	176	1%	$722,479	15	0%	$781,467	1	0%	$10,910	192	1%	$1,514,856
Subtotal Durham	**96,622**	**554**	**1%**	**840**	**1%**	**9,630,179**	**75**	**0%**	**5,773,273**	**7**	**0%**	**245,305**	**922**	**1%**	**15,648,758**
Orange County															
Unincorporated Orange County	24,533	8	0%	38	0%	$171,926	2	0%	$29,200	0	0%	$0	40	0%	$201,126
Town of Carrboro	5,782	14	0%	52	1%	$1,360,258	0	0%	$0	0	0%	$0	52	1%	$1,360,258
Town of Chapel Hill	15,108	228	2%	212	1%	$10,727,672	34	0%	$6,222,133	1	0%	$247,944	247	2%	$17,197,748
Town of Hillsborough	3,883	5	0%	4	0%	$5,872	1	0%	$9,528	0	0%	$0	5	0%	$15,399
Subtotal Orange	**49,306**	**255**	**1%**	**306**	**1%**	**12,265,728**	**37**	**0%**	**6,260,861**	**1**	**0%**	**247,944**	**344**	**1%**	**18,774,531**

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Person County															
Unincorporated Person County	6,617	35	1%	18	0%	$50,719	15	0%	$701,674	2	0%	$18,403	35	1%	$770,796
City of Roxboro	17,714	0	0%	5	0%	$12,780	0	0%	$0	0	0%	$0	5	0%	$12,780
Subtotal Person	**24,331**	**35**	**0%**	**23**	**0%**	**$63,499**	**15**	**0%**	**$701,674**	**2**	**0%**	**$18,403**	**40**	**0%**	**$783,576**
Total	**245,406**	**1,141**	**0%**	**1,570**	**1%**	**$23,374,968**	**153**	**0%**	**$13,166,532**	**12**	**0%**	**$529,845**	**1,735**	**1%**	**$37,071,345**

Source: NCEM Risk Management Tool

Table 4.53 – Buildings Impacted by the 500-Year Flood Event

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County															
Unincorporated Alamance County	29,650	61	0	90	0	$839,342	12	0	$2,320,024	1	0	$60,089	103	0	$3,219,456
City of Burlington	24,403	229	1	245	1	$1,039,928	24	0	$336,141	2	0	$18,924	271	1	$1,394,992
City of Graham	7,269	44	1	141	2	$758,364	3	0	$693,315	0	0	$0	144	2	$1,451,679
City of Mebane	5,835	1	0	19	0	$74,328	2	0	$25,101	0	0	$0	21	0	$99,429
Town of Elon	2,760	23	1	25	1	$61,430	0	0	$0	0	0	$0	25	1	$61,430
Town of Green Level	1,177	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Haw River	2,352	28	1	36	2	$416,539	6	0	$100,410	0	0	$0	42	2	$516,949
Town of Ossipee	330	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Town of Swepsonville	573	0	0	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Village of Alamance	798	1	0	1	0	$12,544	0	0	$0	0	0	$0	1	0	$12,544
Subtotal Alamance	**75,147**	**387**	**1**	**557**	**1**	**$3,202,475**	**47**	**0**	**$3,474,991**	**3**	**0**	**$79,013**	**607**	**1**	**$6,756,479**
Durham County															
Unincorporated Durham County	21,037	83	0	210	1	$1,521,506	17	0	$954,742	1	0	$11,160	228	1	$2,487,408
City of Durham	75,585	602	1	930	1	$20,889,947	89	0	$15,795,668	11	0	$638,164	1,030	1	$37,323,779
Subtotal Durham	**96,622**	**685**	**1**	**1,140**	**1**	**$22,411,453**	**106**	**0**	**$16,750,410**	**12**	**0**	**$649,324**	**1,258**	**1**	**$39,811,187**
Orange County															
Unincorporated Orange County	24,533	10	0	45	0	$455,176	3	0	$35,554	0	0	$0	48	0	$490,730
Town of Carrboro	5,782	14	0	63	1	$2,036,673	0	0	$0	0	0	$0	63	1	$2,036,673
Town of Chapel Hill	15,108	263	2	247	2	$18,524,996	37	0	$7,092,832	1	0	$250,964	285	2	$25,868,792
Town of Hillsborough	3,883	8	0	7	0	$42,100	1	0	$20,701	0	0	$0	8	0	$62,801
Subtotal Orange	**49,306**	**295**	**1**	**362**	**1**	**$21,058,945**	**41**	**0**	**$7,149,087**	**1**	**0**	**250,964**	**404**	**1**	**$28,458,996**
Person County															
Unincorporated Person County	17,714	5	0	12	0	$87,899	2	0	$1,659	0	0	$0	14	0	$89,557

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
City of Roxboro	6,617	41	1	24	0	$66,451	15	0	$889,571	2	0	$20,456	41	1	$976,478
Subtotal Person	24,331	46	0	36	0	$154,350	17	0	$891,230	2	0	$20,456	55	0	$1,066,035
Total	**245,406**	**1,413**	**1**	**2,095**	**1**	**$46,827,223**	**211**	**0**	**$28,265,718**	**18**	**0**	**$999,757**	**2,324**	**1**	**$76,092,697**

Source: NCEM Risk Management Tool

The damage estimates for the 1% annual chance flood event total $37,071,345, which equates to a loss ratio of less than 1 percent. The loss ratio is the damage estimate divided by the total potential exposure (i.e., total value of all buildings in the planning area), displayed as a percentage of value at risk. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from an event.

Table 4.54 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings across all jurisdictions, by sector for the 100-year flood event. Vulnerability of CIKR as well as High Potential Loss Properties, where applicable, can be found by jurisdiction in each community's annex to this plan.

Table 4.54 – Critical Infrastructure and Key Resources Buildings at Risk to 100-Year Flood by Sector

Sector	Number of Buildings at Risk	Estimated Damages
Banking and Finance	14	$856,924
Commercial Facilities	101	$6,264,532
Communications	1	$282,992
Critical Manufacturing	24	$3,767,331
Energy	0	$0
Food and Agriculture	9	$55,735
Government Facilities	6	$466,889
Healthcare and Public Health	9	$666,111
Transportation Systems	1	$1,335,864
Water	16	$2,836,396
Total	**191**	**$17,875,675**

Source: NCEM Risk Management Tool

REPETITIVE LOSS ANALYSIS

A repetitive loss property is a property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed to examine repetitive losses within the region.

According to 2024 NFIP records from the FEMA Community Information System, there are a total of 88 repetitive loss properties within the Eno-Haw region, which have filed a total of 273 claims. There are 15 properties on the list classified as severe repetitive loss properties. A severe repetitive loss property is classified as such if it has four or more separate claim payments of more than $5,000 each (including building and contents payments) or two or more separate claim payments (building only) where the total of the payments exceeds the current value of the property.

Table 4.55 summarizes repetitive loss properties by jurisdiction as identified by FEMA through the NFIP. These repetitive loss properties include primarily residential as well as some commercial property types, and these property types are representative of all communities in the plan with repetitive losses.

Table 4.55 – Repetitive Loss Properties by Jurisdiction, November 2024

Jurisdiction	RL Property Count	Occupancy Type		Total Losses	% Insured	SRL Count
		Residential	Commercial			
Alamance County	4	4	0	11	0%	2
City of Burlington	5	4	1	19	40%	2
City of Graham	2	2	0	4	50%	0
City of Mebane	0	N/A	N/A	N/A	N/A	N/A

Jurisdiction	RL Property Count	Occupancy Type		Total Losses	% Insured	SRL Count
		Residential	Commercial			
Town of Elon	1	1	0	4	100%	0
Town of Green Level	0	N/A	N/A	N/A	N/A	N/A
Town of Haw River	0	N/A	N/A	N/A	N/A	N/A
Town of Ossipee	0	N/A	N/A	N/A	N/A	N/A
Town of Swepsonville	0	N/A	N/A	N/A	N/A	N/A
Village of Alamance	0	N/A	N/A	N/A	N/A	N/A
City of Durham	35	29	6	88	51%	2
Durham County	3	3	0	11	0%	1
Orange County	1	1	0	2	0%	0
Town of Carrboro	4	4	0	11	75%	0
Town of Chapel Hill	36	33	3	131	69%	8
Town of Hillsborough	0	N/A	N/A	N/A	N/A	N/A
City of Roxboro	0	N/A	N/A	N/A	N/A	N/A
Person County	0	N/A	N/A	N/A	N/A	N/A
Total	**91**	**81**	**10**	**281**	**55%**	**15**

Source: OpenFEMA Dataset: NFIP Multiple Loss Properties
RL = Repetitive Loss; SRL = Severe Repetitive Loss

ENVIRONMENT

During a flood event, chemicals and other hazardous substances may end up contaminating local water bodies. Flooding kills animals and in general disrupts the ecosystem. Snakes and insects may also make their way to the flooded areas. Floods can also cause significant erosion, which can alter streambanks and deposit sediment, changing the flow of streams and rivers and potentially reducing the drainage capacity of those waterbodies.

CONSEQUENCE ANALYSIS

Table 4.56 summarizes the potential detrimental consequences of flood.

Table 4.56 – Consequence Analysis - Flood

Category	Consequences
Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Responders	First responders are at risk when attempting to rescue people from their homes. They are subject to the same health hazards as the public. Flood waters may prevent access to areas in need of response or the flood may prevent access to the critical facilities themselves which may prolong response time. Damage to personnel will generally be localized to those in the flood areas at the time of the incident and is expected to be limited.
Continuity of Operations (including Continued Delivery of Services)	Floods can severely disrupt normal operations, especially when there is a loss of power. Damage to facilities in the affected area may require temporary relocation of some operations. Localized disruption of roads, facilities, and/or utilities caused by incident may postpone delivery of some services.

Category	Consequences
Property, Facilities and Infrastructure	Buildings and infrastructure, including transportation and utility infrastructure, may be damaged or destroyed. Impacts are expected to be localized to the area of the incident. Severe damage is possible.
Environment	Chemicals and other hazardous substances may contaminate local water bodies. Wildlife and livestock deaths possible. The localized impact is expected to be severe for incident areas and moderate to light for other areas affected by the flood or HazMat spills.
Economic Condition of the Jurisdiction	Local economy and finances will be adversely affected, possibly for an extended period of time. During floods (especially flash floods), roads, bridges, farms, houses and automobiles are destroyed. Additionally, the local government must deploy firemen, police and other emergency response personnel and equipment to help the affected area. It may take years for the affected communities to be re-built and business to return to normal.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes flood hazard risk by jurisdiction. Warning time and duration are inherent to the hazard. Spatial extent was assigned according to the amount of area within the SFHA. Probability ratings are based on records of past events.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Alamance County	**3**	**3**	**2**	**3**	**3**	**2.8**	**M**
Burlington	3	3	2	3	3	2.8	M
Graham	3	3	2	3	3	2.8	M
Mebane	3	3	2	3	3	2.8	M
Elon	3	3	2	3	3	2.8	M
Green Level	3	3	2	3	3	2.8	M
Haw River	3	3	3	3	3	3.0	H
Ossipee	3	3	2	3	3	2.8	M
Swepsonville	3	3	3	3	3	3.0	H
Alamance	3	3	2	3	3	2.8	M
Durham County	**4**	**3**	**3**	**3**	**3**	**3.3**	**H**
Durham	4	3	3	3	3	3.3	H
Orange County	**4**	**3**	**2**	**3**	**3**	**3.1**	**H**
Carrboro	3	3	2	3	3	2.8	M
Chapel Hill	4	3	2	3	3	3.1	H
Hillsborough	3	3	2	3	3	2.8	M
Person County	**3**	**3**	**2**	**3**	**3**	**2.8**	**M**
Roxboro	3	3	2	3	3	2.8	M

4.5.6 HURRICANE AND TROPICAL STORM

HAZARD BACKGROUND

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

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.

Warning Time: 1 – More than 24 hours

Duration: 2 – Less than 24 hours

LOCATION

Hurricanes and tropical storms can occur anywhere within the Eno-Haw Region. While coastal areas are most vulnerable to hurricanes, the wind and rain impacts of these storms can be felt hundreds of miles inland.

Spatial Extent: 4 – Large

EXTENT

Hurricane intensity is classified by the Saffir-Simpson Scale (Table 4.57), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

Table 4.57 – Saffir-Simpson Scale

Category	Maximum Sustained Wind Speed (MPH)	Types of Damage
1	74–95	Very dangerous winds will produce some damage; Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96–110	Extremely dangerous winds will cause extensive damage; Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111–129	Devastating damage will occur; Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130–156	Catastrophic damage will occur; Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 +	Catastrophic damage will occur; A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as "major" hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. Table 4.58 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 4.58 – Hurricane Damage Classifications

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

Source: National Hurricane Center; Federal Emergency Management Agency

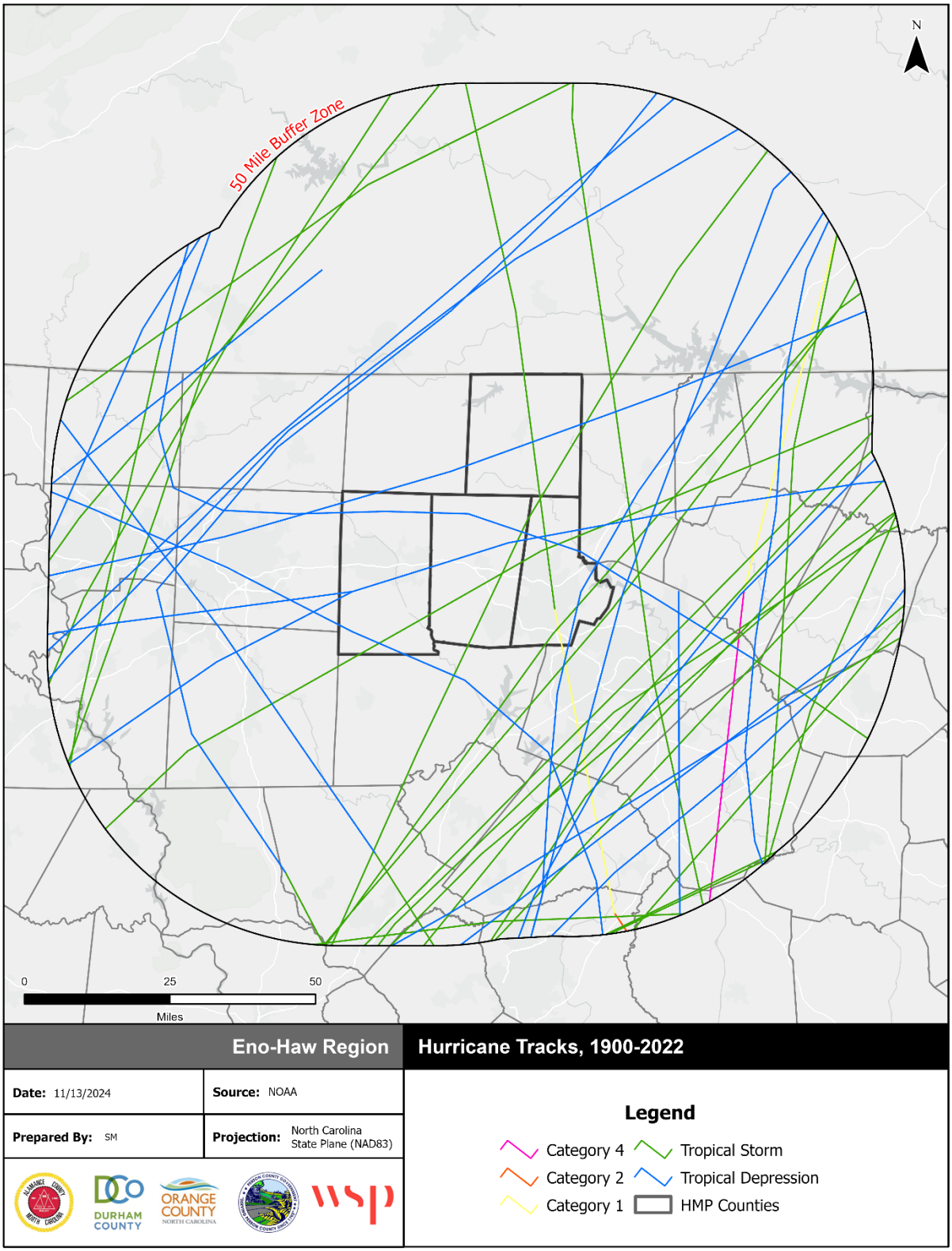
Tropical cyclones weaken relatively quickly after making landfall; therefore, the Eno-Haw Region will not typically experience major hurricane force winds, though these occurrences are possible. The strongest storm on record to pass through the region was Hurricane Fran in 1999, which moved through the Region as a Category 1 storm. However, within 50 miles of the Region Fran was a Category 3 storm. Hurricane Hazel in 1954 passed within 50 miles of the Region as a Category 4 storm.

Impact: 3 – Critical

HISTORICAL OCCURRENCES

According to the Office of Coastal Management's Tropical Cyclone Storm Segments data, which is a subset of the International Best Track Archive for Climate Stewardship (IBTrACS) dataset, 27 hurricanes and tropical storms passed within 50 miles of the Eno-Haw Region between 1900 and 2022. These storms tracks are shown in Figure 4.30. The date, storm name, storm category, and maximum wind speed of each event are detailed in Table 4.59.

Figure 4.30 – Hurricane and Tropical Storm Tracks within 50 Miles of Eno-Haw Region, 1900-2022



Source: NOAA Office of Coastal Management

Table 4.59 – Hurricane and Tropical Storm Tracks within 50 Miles of Eno-Haw Region, 1900-2023

Date	Storm Name	Max Storm Category*	Max Wind Speed (mph)
6/16/1902	Unnamed	Extratropical Storm	46
10/12/1902	Unnamed	Extratropical Storm	40
9/14/1904	Unnamed	Tropical Storm	69
9/23/1907	Unnamed	Extratropical Storm	40
9/3/1913	Unnamed	Tropical Storm	46
8/4/1915	Unnamed	Tropical Storm	46
9/23/1920	Unnamed	Tropical Storm	40
10/2/1929	Unnamed	Extratropical Storm	58
9/6/1935	Unnamed	Tropical Storm	58
8/2/1944	Unnamed	Tropical Storm	69
10/20/1944	Unnamed	Extratropical Storm	58
9/18/1945	Unnamed	Tropical Storm	58
9/1/1952	Able	Tropical Storm	46
10/15/1954	Hazel	Category 4	132
8/17/1955	Diane	Tropical Storm	63
7/10/1959	Cindy	Tropical Storm	40
9/5/1979	David	Tropical Storm	52
7/25/1985	Bob	Tropical Storm	52
9/6/1996	Fran	Category 3	115
9/5/1999	Dennis	Tropical Storm	40
9/6/2008	Hanna	Tropical Storm	69
6/7/2013	Andrea	Tropical Storm	46
10/11/2018	Michael	Tropical Storm	47
10/20/2019	Nestor	Tropical Storm	40
6/21/2021	Claudette	Tropical Storm	40
7/8/2021	Elsa	Tropical Storm	45
10/1/2022	Ian	Tropical Storm	40

*Reports the most intense category that occurred within 50 miles of the Region, not for the storm event overall.
Source: Office of Coastal Management, 2019. https://marinecadastre.gov/data/

The above list of storms is not an exhaustive list of hurricanes that have affected the Region. Several storms, including Hurricane Floyd and Tropical Storm Hermine passed further than 50 miles away from the Region yet had strong enough wind or rain impacts to affect the county. Additionally, several storms have impacted the planning area since 2022. Storms with hurricane and tropical storm force winds that impacted the Eno-Haw Region from 1999 through 2023 are noted in Table 4.60, as identified by NCEI.

Table 4.60 – Recorded Winds in Eno-Haw Region, 1999-2023

Date	Type	Storm	Deaths/ Injuries	Property Damage	Crop Damage
9/4/1999	Hurricane	Hurricane Dennis	0/0	$0	$3,000,000
9/15/1999	Hurricane	Hurricane Floyd	0/0	$3,000,000,000*	$5,000,000,000*
9/18/2003	Hurricane	Hurricane Isabel	0/0	$309,000	$0
9/14/2018	Tropical Storm	Hurricane Florence	0/0	$0	$25,000
10/11/2018	Tropical Storm	Tropical Storm Michael	0/0	$1,700,000	$0

Date	Type	Storm	Deaths/ Injuries	Property Damage	Crop Damage
9/30/2022	Tropical Storm	Hurricane Ian	0/0	$2,500,000	$0
		Total	**0/0**	**$3,004,509,000***	**$5,003,025,000**

Source: NCEI

*Note: Damage estimates provided by NCEI for Hurricane Floyd are for the entire state; however, counties within the Raleigh warning area were thought to have sustained more than half the state total.

Hurricane Dennis (1999) – The Triangle received from 6 to 8 inches of rain with Chapel Hill peaking out at 12 inches. The I-40 corridor of counties also got dumped on with totals in the 6 to 10 inch range. This water caused considerable urban and lowland flooding. Several main stem rivers also went into flood. The winds with the remnants of Dennis were generally not a significant problem. There were many old, larger trees uprooted and widespread limb damage was reported. However, the wind and rain combination caused considerable crop damage.

Hurricane Florence (2018) – A ridge of high pressure over eastern North America stalled Florence's forward motion a few miles off the southeast North Carolina coast on September 13th. Hurricane Florence made landfall near Wrightsville Beach early on September 15 and weakened further as it moved slowly inland. Despite making landfall as a weakened Category 1 hurricane, Florence still produced 40 to 70 mph wind gusts, enough wind speed to uproot trees and cause widespread power outages throughout the Carolinas. As the storm moved inland, from September 15 to 17, heavy rain of 10 to 25 inches caused widespread inland flooding, inundating cities such as Fayetteville, Smithfield, Goldsboro, Durham, and Chapel Hill, and causing major river flooding on main-stem rivers such as the Neuse, Cape Fear, and Little River. Most major roads and highways in the area experienced some flooding, with large stretches of I-40 and I-95 remaining impassable for days after the storm had passed. The storm also spawned tornadoes in several places along its path. There were 3 direct and 6 indirect deaths attributed to the storm with in the Raleigh Weather Forecast Office County Warning Area.

Tropical Storm Michael (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 score of trees, leading to blocked roadways and thousands without power. In the Eno-Haw Region, tropical storm wind gusts downed numerous trees, caused widespread power outages, and produced a variety of damage to homes and structures. At the peak of the storm, total peak outages were around 33,000 customers in Alamance County, 22,000 in Orange County, and 20,000 in Durham County.

Hurricane Ian (2022) - Hurricane Ian made landfall along the South Carolina coast near Georgetown during the early afternoon hours of September 30, 2022. Widespread wind gusts over tropical storm force and heavy rainfall occurred across much of central North Carolina through the afternoon and evening hours. There were numerous reports of wind damage and power outages as a result of the storm. Frequent wind gusts of 40 to 60 mph resulted in scattered to numerous trees and power lines down across the Eno-Haw Region, including some on homes. Numerous customers lost power in the Eno-Haw Region as a result of the tropical storm force wind gusts.

PROBABILITY OF FUTURE OCCURRENCE

Probability: 3 – Likely

In the 25-year period from 1999 through 2023, six hurricanes and tropical storms have impacted the Eno-Haw Region, which equates to a 25 percent annual probability of hurricane winds impacting the county. This probability does not account for impacts from hurricane rains, which may also be severe. Two additional storms passed within 50 miles of the Region during this period; these storms did not have

significant wind impacts but may have brought heavy rains. Overall, the probability of a hurricane or tropical storm impacting the Region is likely.

CLIMATE CHANGE

NOAA reports that extremes will likely cause more frequent, stronger storms in the future due to rising surface temperatures. That is to say, NOAA models predict that while there may be less frequent low-category storm events (Tropical Storms, Category 1 Hurricanes), there will be more high-category storm events (Category 5 and 5 Hurricanes) in the future. This means that there may be fewer hurricanes overall in any given year, but when hurricanes do form, it is more likely that they will become larger storms that can create massive damage.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Property at risk to hurricanes was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool. The vulnerability data displayed below is for wind-related damages. Hurricanes may also cause substantial damages from heavy rains and subsequent flooding, which is addressed in Section 4.5.5 Flood.

PEOPLE

The very young, the elderly and disabled individuals are more vulnerable to harm from hurricanes, as are those who are unable to evacuate for medical reasons, including special-needs patients and those in hospitals and nursing homes. Many of these patients are either oxygen-dependent, insulin-dependent, or in need of intensive or ongoing treatment. For all affected populations, the stress from disasters such as a hurricane can result in immediate and long-term physical and emotional health problems among victims.

People exposed to the elements are also more vulnerable to wind hazards. The availability of sheltered locations, such as buildings constructed using wind-resistant materials and public storm shelters, reduces the exposure of the population. Individuals in mobile home housing are particularly susceptible to wind hazards. According to the 2022 American Community Survey (ACS), 15,817 occupied housing units (5.8%) in the Eno-Haw Region are classified as "mobile homes or other types of housing." Based on an estimated average of 2.4 persons per household from the 2022 ACS, there are approximately 37,960 people in the Region living in mobile homes. Table 4.61 details the number of mobile home units in each jurisdiction.

Table 4.61 – Mobile Home Units in the Eno-Haw Region, 2018-2022

Jurisdiction	Occupied Mobile Home Units	Total Occupied Housing Units	Percent of Occupied Housing
Alamance County	**7,171**	**67,370**	**11%**
Unincorporated Alamance County	5,093	22,227	23%
Alamance (Village)	0	409	0%
Burlington	985	23,883	4%
Elon	36	2,949	1%
Graham	337	7,496	4%
Green Level	355	999	36%
Haw River	248	981	25%
Mebane	31	7,296	0%
Ossipee	45	218	21%

Jurisdiction	Occupied Mobile Home Units	Total Occupied Housing Units	Percent of Occupied Housing
Swepsonville	41	912	4%
Durham County	**1,815**	**135,469**	**1%**
Unincorporated Durham County	967	15,083	6%
Durham (City)	848	120,386	1%
Orange County	**3,659**	**55,534**	**7%**
Unincorporated Orange County	2,360	8,382	35%
Carrboro	83	9,812	1%
Chapel Hill	556	33,982	2%
Hillsborough	60	3,988	2%
Person County	**3,172**	**16,139**	**20%**
Unincorporated Person County	1,989	9,150	22%
Roxboro	1,183	6,689	17%

Source: American Community Survey 2018-2022 5-Year Estimates
Unincorporated area counts are estimated by subtracting incorporated areas from the county total.

PROPERTY

Hurricanes can cause catastrophic damage to coastlines and several hundred miles inland. Hurricanes can produce winds exceeding 157 mph as well as tornadoes and microbursts. Additionally, hurricanes often bring intense rainfall that can result in flash flooding. Floods and flying debris from the excessive winds are often the deadly and most destructive results of hurricanes.

Hurricanes and tropical storms can also cause agricultural damages. For the Eno-Haw Region, USDA RMA reports losses of $3,091,143 from 2007-2023 due to hurricane and cyclone, which equates to an average annual loss of $181,831. It should be noted that over $1.3 million of the reported losses happened in Person County in 2018, likely attributable to Tropical Storm Michael, which comprises a significant portion of the regional total and accounts for the higher average. Table 4.62 summarizes these crop losses reported in the RMA system.

Table 4.62 – Crop Losses Resulting from Hurricane and Cyclone, 2007-2023

County	Total Indemnity Paid	Average Indemnity Amount
Alamance	$679,405	$39,965
Durham	$30,229	$1,778
Orange	$277,020	$16,295
Person	$2,104,489	$123,793
Region Total	**$3,091,143**	**$181,831**

Source: USDA Risk Management Agency

The damage estimates for the 100-year hurricane wind event total $165,370,228, which equates to a loss ratio of less than 1 percent. These damage estimates account for only wind impacts and actual damages would likely be higher due to flooding. Therefore, the Region would likely experience a higher overall loss ratio from the 100-year hurricane event and face difficulty recovering from such an event.

Table 4.63 through Table 4.67 detail the estimated building damages from varying magnitudes of hurricane events.

Table 4.63 – Estimated Buildings Impacted by 25-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	-	25,587	86	$1,517,967	3,425	12	$93,888	283	1	$30,176	29,295	99	$1,642,032
City of Burlington	24,403	21,461	88	$1,510,650	2,401	10	$293,499	320	1	$44,561	24,182	99	$1,848,710
City of Graham	7,269	6,512	90	$381,793	530	7	$38,766	155	2	$17,058	7,197	99	$437,617
City of Mebane	5,835	5,194	89	$374,873	465	8	$117,083	64	1	$14,644	5,723	98	$506,600
Town of Elon	2,760	2,432	88	$208,948	147	5	$23,513	174	6	$17,521	2,753	100	$249,981
Town of Green Level	1,177	1,049	89	$54,664	109	9	$5,043	10	1	$414	1,168	99	$60,121
Town of Haw River	2,352	2,121	90	$122,845	168	7	$8,549	31	1	$2,738	2,320	99	$134,131
Town of Ossipee	330	297	90	$17,195	21	6	$1,204	7	2	$448	325	98	$18,847
Town of Swepsonville	573	526	92	$41,834	24	4	$11,554	5	1	$1,142	555	97	$54,530
Village of Alamance	798	711	89	$41,010	66	8	$1,302	17	2	$1,398	794	99	$43,710
Subtotal Alamance	**75,147**	**65,890**	**88**	**$4,271,779**	**7,356**	**10**	**$594,401**	**1,066**	**1**	**$130,100**	**74,312**	**99**	**$4,996,279**
Durham County													
Unincorporated Durham County	21,037	17,867	85	$1,313,417	2,818	13	$389,716	229	1	$46,795	20,914	99	$1,749,927
City of Durham	75,585	67,011	89	$5,984,982	6,045	8	$1,216,234	1,672	2	$391,960	74,728	99	$7,593,177
Subtotal Durham	**96,622**	**84,878**	**88**	**7,298,399**	**8,863**	**9**	**1,605,950**	**1,901**	**2**	**438,755**	**95,642**	**99**	**9,343,104**
Orange County													
Unincorporated Orange County	24,533	21,439	87	$1,770,536	2,657	11	$171,290	246	1	$103,055	24,342	99	$2,044,881

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Carrboro	5,782	5,450	94	$729,711	261	5	$76,279	46	1	$65,644	5,757	100	$871,634
Town of Chapel Hill	15,108	13,886	92	$2,632,544	615	4	$191,880	529	4	$239,784	15,030	99	$3,064,207
Town of Hillsborough	3,883	3,405	88	$313,667	358	9	$42,195	111	3	$44,105	3,874	100	$399,967
Subtotal Orange	**49,306**	**44,180**	**90**	**5,446,458**	**3,891**	**8**	**481,644**	**932**	**2**	**452,588**	**49,003**	**99**	**$6,380,689**
Person County													
Unincorporated Person County	17,714	14,626	83	$1,380,564	2,613	15	$79,184	156	1	$60,127	17,395	98	$1,519,875
City of Roxboro	6,617	5,742	87	$537,648	710	11	$104,442	144	2	$45,812	6,596	100	$687,902
Subtotal Person	**24,331**	**20,368**	**84**	**$1,918,212**	**3,323**	**14**	**$183,626**	**300**	**1**	**$105,939**	**23,991**	**99**	**$2,207,777**
Total	**245,406**	**215,316**	**88**	**$18,934,848**	**23,433**	**10**	**$2,865,621**	**4,199**	**2**	**$1,127,382**	**242,948**	**99**	**$22,927,849**

Source: NCEM Risk Management Tool

Table 4.64 – Estimated Buildings Impacted by 50-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,610	86	$1,789,093	3,425	12	$130,010	283	1	$38,710	29,318	99	$1,957,812
City of Burlington	24,403	21,461	88	$1,510,650	2,401	10	$293,499	320	1	$44,561	24,182	99	$1,848,710
City of Graham	7,269	6,512	90	$381,793	530	7	$38,766	155	2	$17,058	7,197	99	$437,617
City of Mebane	5,835	5,194	89	$374,873	465	8	$117,083	64	1	$14,644	5,723	98	$506,600
Town of Elon	2,760	2,432	88	$208,948	147	5	$23,513	174	6	$17,521	2,753	100	$249,981
Town of Green Level	1,177	1,049	89	$54,664	109	9	$5,043	10	1	$414	1,168	99	$60,121
Town of Haw River	2,352	2,121	90	$122,845	168	7	$8,549	31	1	$2,738	2,320	99	$134,131

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Ossipee	330	297	90	$17,195	21	6	$1,204	7	2	$448	325	98	$18,847
Town of Swepsonville	573	526	92	$41,834	24	4	$11,554	5	1	$1,142	555	97	$54,530
Village of Alamance	798	711	89	$41,010	66	8	$1,302	17	2	$1,398	794	99	$43,710
Subtotal Alamance	**75,147**	**65,913**	**88**	**$4,542,905**	**7,356**	**10**	**$630,523**	**1,066**	**1**	**$138,634**	**74,335**	**99**	**$5,312,059**
Durham County													
Unincorporated Durham County	21,037	17,966	85	$4,490,007	2,818	13	$1,159,113	229	1	$136,609	21,013	100	$5,785,729
City of Durham	75,585	67,750	90	$21,602,174	6,045	8	$4,311,212	1,672	2	$1,369,246	75,467	100	$27,282,632
Subtotal Durham	**96,622**	**85,716**	**89**	**26,092,181**	**8,863**	**9**	**5,470,325**	**1,901**	**2**	**1,505,855**	**96,480**	**100**	**$33,068,361**
Orange County													
Unincorporated Orange County	24,533	21,602	88	$3,884,109	2,657	11	$364,999	246	1	$172,678	24,505	100	$4,421,786
Town of Carrboro	5,782	5,464	95	$2,558,836	261	5	$341,439	46	1	$288,628	5,771	100	$3,188,903
Town of Chapel Hill	15,108	13,923	92	$8,706,877	615	4	$813,837	529	4	$1,017,989	15,067	100	$10,538,703
Town of Hillsborough	3,883	3,405	88	$424,422	358	9	$76,275	111	3	$46,923	3,874	100	$547,620
Subtotal Orange	**49,306**	**44,394**	**90**	**15,574,244**	**3,891**	**8**	**1,596,550**	**932**	**2**	**1,526,218**	**49,217**	**100**	**$18,697,012**
Person County													
Unincorporated Person County	17,714	14,626	83	$1,380,564	2,613	15	$79,184	156	1	$60,127	17,395	98	$1,519,875
City of Roxboro	6,617	5,742	87	$537,648	710	11	$104,442	144	2	$45,812	6,596	100	$687,902
Subtotal Person	**24,331**	**20,368**	**84**	**$1,918,212**	**3,323**	**14**	**$183,626**	**300**	**1**	**$105,939**	**23,991**	**99**	**$2,207,777**
Total	**245,406**	**216,391**	**88**	**$48,127,542**	**23,433**	**10**	**$7,881,024**	**4,199**	**2**	**$3,276,646**	**244,023**	**99**	**$59,285,209**

Source: NCEM Risk Management Tool

Table 4.65 – Estimated Buildings Impacted by 100-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$6,164,945	3,425	12	$649,398	283	1	$165,030	29,619	100	$6,979,372
City of Burlington	24,403	21,618	89	$5,554,748	2,401	10	$1,113,498	320	1	$212,347	24,339	100	$6,880,594
City of Graham	7,269	6,575	90	$1,440,228	530	7	$152,129	155	2	$82,037	7,260	100	$1,674,394
City of Mebane	5,835	5,303	91	$1,447,690	465	8	$501,876	64	1	$61,488	5,832	100	$2,011,054
Town of Elon	2,760	2,437	88	$760,061	147	5	$137,301	174	6	$75,342	2,758	100	$972,705
Town of Green Level	1,177	1,057	90	$199,307	109	9	$20,684	10	1	$2,574	1,176	100	$222,565
Town of Haw River	2,352	2,139	91	$443,267	168	7	$28,274	31	1	$13,318	2,338	99	$484,860
Town of Ossipee	330	299	91	$60,860	21	6	$7,509	7	2	$1,545	327	99	$69,913
Town of Swepsonville	573	543	95	$147,825	24	4	$52,445	5	1	$2,915	572	100	$203,185
Village of Alamance	798	714	89	$162,532	66	8	$7,570	17	2	$5,725	797	100	$175,827
Subtotal Alamance	**75,147**	**66,596**	**89**	**$16,381,463**	**7,356**	**10**	**$2,670,684**	**1,066**	**1**	**$622,321**	**75,018**	**100**	**$19,674,469**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$10,785,986	2,818	13	$3,554,753	229	1	$342,557	21,019	100	$14,683,296
City of Durham	75,585	67,750	90	$54,561,978	6,045	8	$14,339,389	1,672	2	$4,586,786	75,467	100	$73,488,153
Subtotal Durham	**96,622**	**85,722**	**89**	**65,347,964**	**8,863**	**9**	**17,894,142**	**1,901**	**2**	**4,929,343**	**96,486**	**100**	**$88,171,449**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Orange County													
Unincorporated Orange County	24,533	21,624	88	$10,744,116	2,657	11	$1,183,862	246	1	$568,397	24,527	100	$12,496,375
Town of Carrboro	5,782	5,464	95	$6,312,753	261	5	$1,150,600	46	1	$854,587	5,771	100	$8,317,940
Town of Chapel Hill	15,108	13,923	92	$21,147,062	615	4	$2,991,653	529	4	$3,704,032	15,067	100	$27,842,747
Town of Hillsborough	3,883	3,408	88	$1,046,140	358	9	$155,091	111	3	$138,551	3,877	100	$1,339,782
Subtotal Orange	**49,306**	**44,419**	**90**	**39,250,071**	**3,891**	**8**	**5,481,206**	**932**	**2**	**5,265,567**	**49,242**	**100**	**$49,996,844**
Person County													
Unincorporated Person County	17,714	14,893	84	$4,680,293	2,613	15	$268,918	156	1	$216,901	17,662	100	$5,166,112
City of Roxboro	6,617	5,754	87	$1,770,266	710	11	$412,257	144	2	$178,831	6,608	100	$2,361,354
Subtotal Person	**24,331**	**20,647**	**85**	**$6,450,559**	**3,323**	**14**	**$681,175**	**300**	**1**	**$395,732**	**24,270**	**100**	**$7,527,466**
Total	**245,406**	**217,384**	**89**	**$127,430,057**	**23,433**	**10**	**$26,727,207**	**4,199**	**2**	**$11,212,963**	**245,016**	**100**	**$165,370,228**

Source: NCEM Risk Management Tool

Table 4.66 – Estimated Buildings Impacted by 300-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$33,160,510	3,425	12	$6,483,967	283	1	$1,822,163	29,619	100	$41,466,641
City of Burlington	24,403	21,618	89	$30,834,890	2,401	10	$12,800,367	320	1	$2,679,425	24,339	100	$46,314,682

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
City of Graham	7,269	6,575	90	$8,234,848	530	7	$2,200,394	155	2	$1,140,007	7,260	100	$11,575,249
City of Mebane	5,835	5,303	91	$8,843,654	465	8	$5,169,882	64	1	$660,516	5,832	100	$14,674,052
Town of Elon	2,760	2,437	88	$4,528,752	147	5	$1,698,642	174	6	$998,717	2,758	100	$7,226,111
Town of Green Level	1,177	1,057	90	$1,044,769	109	9	$210,188	10	1	$40,438	1,176	100	$1,295,394
Town of Haw River	2,352	2,139	91	$2,728,522	168	7	$350,117	31	1	$153,101	2,338	99	$3,231,741
Town of Ossipee	330	299	91	$307,230	21	6	$99,388	7	2	$15,674	327	99	$422,292
Town of Swepsonville	573	543	95	$833,748	24	4	$457,462	5	1	$29,685	572	100	$1,320,896
Village of Alamance	798	714	89	$916,534	66	8	$112,489	17	2	$72,462	797	100	$1,101,485
Subtotal Alamance	**75,147**	**66,596**	**89**	**$91,433,457**	**7,356**	**10**	**$29,582,896**	**1,066**	**1**	**$7,612,188**	**75,018**	**100**	**$128,628,543**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$28,690,716	2,818	13	$10,861,573	229	1	$1,079,629	21,019	100	$40,631,918
City of Durham	75,585	67,750	90	$135,919,885	6,045	8	$42,068,159	1,672	2	$13,440,025	75,467	100	$191,428,068
Subtotal Durham	**96,622**	**85,722**	**89**	**164,610,601**	**8,863**	**9**	**52,929,732**	**1,901**	**2**	**14,519,654**	**96,486**	**100**	**$232,059,986**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$36,985,891	2,657	11	$5,170,896	246	1	$2,988,282	24,527	100	$45,145,069
Town of Carrboro	5,782	5,464	95	$16,504,977	261	5	$2,826,506	46	1	$1,705,569	5,771	100	$21,037,051
Town of Chapel Hill	15,108	13,923	92	$52,757,493	615	4	$9,110,764	529	4	$10,467,501	15,067	100	$72,335,758
Town of Hillsborough	3,883	3,408	88	$6,263,186	358	9	$1,860,930	111	3	$989,004	3,877	100	$9,113,119
Subtotal Orange	**49,306**	**44,419**	**90**	**112,511,547**	**3,891**	**8**	**18,969,096**	**932**	**2**	**16,150,356**	**49,242**	**100**	**$147,630,997**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Person County													
Unincorporated Person County	17,714	14,893	84	$25,609,387	2,613	15	$2,017,581	156	1	$1,870,455	17,662	100	$29,497,423
City of Roxboro	6,617	5,754	87	$10,323,182	710	11	$4,616,560	144	2	$1,747,326	6,608	100	$16,687,068
Subtotal Person	**24,331**	**20,647**	**85**	**$35,932,569**	**3,323**	**14**	**$6,634,141**	**300**	**1**	**$3,617,781**	**24,270**	**100**	**$46,184,491**
Total	**245,406**	**217,384**	**89**	**$404,488,174**	**23,433**	**10**	**$108,115,865**	**4,199**	**2**	**$41,899,979**	**245,016**	**100**	**$554,504,017**

Source: NCEM Risk Management Tool

Table 4.67 – Estimated Buildings Impacted by 700-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$33,160,510	3,425	12	$6,483,967	283	1	$1,822,163	29,619	100	$41,466,641
City of Burlington	24,403	21,618	89	$30,834,890	2,401	10	$12,800,367	320	1	$2,679,425	24,339	100	$46,314,682
City of Graham	7,269	6,575	90	$8,234,848	530	7	$2,200,394	155	2	$1,140,007	7,260	100	$11,575,249
City of Mebane	5,835	5,303	91	$8,843,654	465	8	$5,169,882	64	1	$660,516	5,832	100	$14,674,052
Town of Elon	2,760	2,437	88	$4,528,752	147	5	$1,698,642	174	6	$998,717	2,758	100	$7,226,111
Town of Green Level	1,177	1,057	90	$1,044,769	109	9	$210,188	10	1	$40,438	1,176	100	$1,295,394
Town of Haw River	2,352	2,139	91	$2,728,522	168	7	$350,117	31	1	$153,101	2,338	99	$3,231,741
Town of Ossipee	330	299	91	$307,230	21	6	$99,388	7	2	$15,674	327	99	$422,292
Town of Swepsonville	573	543	95	$833,748	24	4	$457,462	5	1	$29,685	572	100	$1,320,896

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Village of Alamance	798	714	89	$916,534	66	8	$112,489	17	2	$72,462	797	100	$1,101,485
Subtotal Alamance	**75,147**	**66,596**	**89**	**$91,433,457**	**7,356**	**10**	**$29,582,896**	**1,066**	**1**	**$7,612,188**	**75,018**	**100**	**$128,628,543**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$28,690,716	2,818	13	$10,861,573	229	1	$1,079,629	21,019	100	$40,631,918
City of Durham	75,585	67,750	90	$135,919,885	6,045	8	$42,068,159	1,672	2	$13,440,025	75,467	100	$191,428,068
Subtotal Durham	**96,622**	**85,722**	**89**	**164,610,601**	**8,863**	**9**	**52,929,732**	**1,901**	**2**	**14,519,654**	**96,486**	**100**	**$232,059,986**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$36,985,891	2,657	11	$5,170,896	246	1	$2,988,282	24,527	100	$45,145,069
Town of Carrboro	5,782	5,464	95	$16,504,977	261	5	$2,826,506	46	1	$1,705,569	5,771	100	$21,037,051
Town of Chapel Hill	15,108	13,923	92	$52,757,493	615	4	$9,110,764	529	4	$10,467,501	15,067	100	$72,335,758
Town of Hillsborough	3,883	3,408	88	$6,263,186	358	9	$1,860,930	111	3	$989,004	3,877	100	$9,113,119
Subtotal Orange	**49,306**	**44,419**	**90**	**112,511,547**	**3,891**	**8**	**18,969,096**	**932**	**2**	**16,150,356**	**49,242**	**100**	**$147,630,997**
Person County													
Unincorporated Person County	17,714	14,893	84	$25,609,387	2,613	15	$2,017,581	156	1	$1,870,455	17,662	100	$29,497,423
City of Roxboro	6,617	5,754	87	$10,323,182	710	11	$4,616,560	144	2	$1,747,326	6,608	100	$16,687,068
Subtotal Person	**24,331**	**20,647**	**85**	**$35,932,569**	**3,323**	**14**	**$6,634,141**	**300**	**1**	**$3,617,781**	**24,270**	**100**	**$46,184,491**
Total	**245,406**	**217,384**	**89**	**$404,488,174**	**23,433**	**10**	**$108,115,865**	**4,199**	**2**	**$41,899,979**	**245,016**	**100**	**$554,504,017**

Source: NCEM Risk Management Tool

ENVIRONMENT

Hurricane winds can cause massive damage to the natural environment, uprooting trees and other debris within the storm's path. Animals can either be killed directly by the storm or impacted indirectly through changes in habitat and food availability caused by high winds and intense rainfall. Endangered species can be dramatically impacted. Forests can be completely defoliated by strong winds.

CONSEQUENCE ANALYSIS

Table 4.68 summarizes the potential negative consequences of hurricanes and tropical storms.

Table 4.68 – Consequence Analysis – Hurricane and Tropical Storm

Category	Consequences
Public	Impacts include injury or death, loss of property, outbreak of diseases, mental trauma and loss of livelihoods. Power outages and flooding are likely to displace people from their homes. Water can become polluted such that if consumed, diseases and infection can be easily spread. Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed, resulting in cascading impacts on the public.
Responders	Localized impact expected to limit damage to personnel in the inundation area at the time of the incident.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel from flooding or wind may require temporary relocation of some operations. Operations may be interrupted by power outages. Disruption of roads and/or utilities may postpone delivery of some services. Regulatory waivers may be needed locally. Fulfillment of some contracts may be difficult. Impact may reduce deliveries.
Property, Facilities and Infrastructure	Structural damage to buildings may occur; loss of glass windows and doors by high winds and debris; loss of roof coverings, partial wall collapses, and other damages requiring significant repairs are possible in a major (category 3 to 5) hurricane.
Environment	Hurricanes can devastate wooded ecosystems and remove all the foliation from forest canopies, and they can change habitats so drastically that the indigenous animal populations suffer as a result. Specific foods can be taken away as high winds will often strip fruits, seeds and berries from bushes and trees. Secondary impacts may occur; for example, high winds and debris may result in damage to an above-ground fuel tank, resulting in a significant chemical spill.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damages. Intangible impacts also likely, including business interruption and additional living expenses.
Public Confidence in the Jurisdiction's Governance	Likely to impact public confidence due to possibility of major event requiring substantial response and long-term recovery effort.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes hurricane and tropical storm hazard risk by jurisdiction. Most aspects of hurricane risk do not vary substantially by jurisdiction; however, impacts may be greater in more highly developed areas with greater amounts of impervious surface and higher exposure in terms of both property and population density. Additionally, mobile home units are more vulnerable to wind damage. Mobile home units comprise over 10 percent of the occupied housing in unincorporated Alamance County, unincorporated Orange County, unincorporated Person County, Green Level, Haw River, Ossipee, and Roxboro; therefore, these jurisdictions may face more severe impacts from wind.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Alamance County	**3**	**4**	**4**	**1**	**2**	**3.2**	**H**
Burlington	3	3	4	1	2	2.9	M
Graham	3	3	4	1	2	2.9	M
Mebane	3	3	4	1	2	2.9	M
Elon	3	3	4	1	2	2.9	M
Green Level	3	4	4	1	2	3.2	H
Haw River	3	4	4	1	2	3.2	H
Ossipee	3	4	4	1	2	3.2	H
Swepsonville	3	3	4	1	2	2.9	M
Alamance	3	3	4	1	2	2.9	M
Durham County	**3**	**3**	**4**	**1**	**2**	**2.9**	**M**
Durham	3	3	4	1	2	2.9	M
Orange County	**3**	**4**	**4**	**1**	**2**	**3.2**	**H**
Carrboro	3	3	4	1	2	2.9	M
Chapel Hill	3	3	4	1	2	2.9	M
Hillsborough	3	3	4	1	2	2.9	M
Person County	**3**	**4**	**4**	**1**	**2**	**3.2**	**H**
Roxboro	3	4	4	1	2	3.2	H

4.5.7 LANDSLIDE

HAZARD BACKGROUND

A landslide is the downhill movement of masses of soil and rock, driven by gravity. Landslides occur when susceptible rock, earth, or debris moves down a slope under the force of gravity and water. They can be triggered by natural changes, such as heavy rains, snow melt, fires, and earthquakes; and human-caused changes, such as slope or drainage modifications. Landslides may be very small or very large and can move at slow to very high speeds.

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 accompany 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.

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.

Warning Time: 3 – 6 to 12 hours

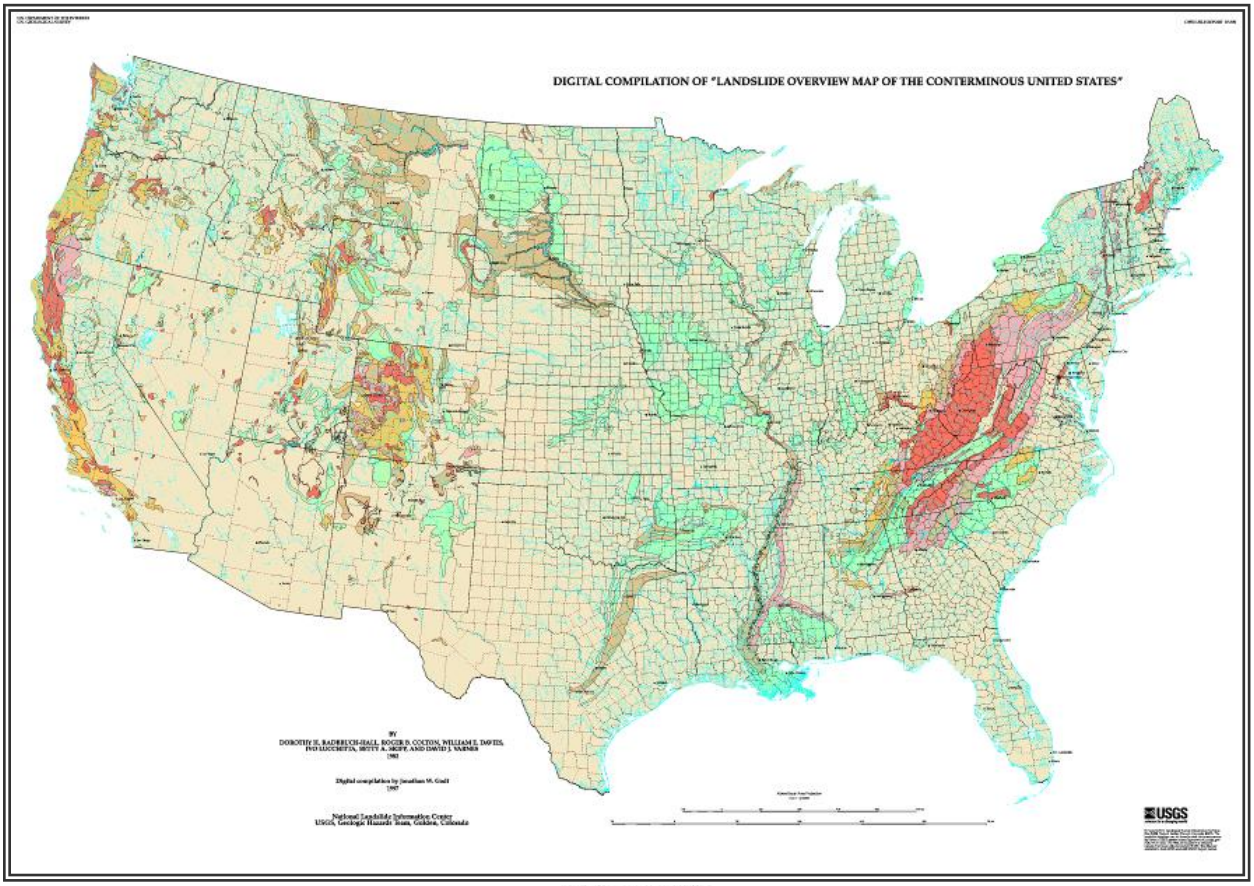
Duration: 1 – Less than 6 hours

LOCATION

The U.S. Geological Survey (USGS) has produced landslide susceptibility and incidence mapping of the U.S., as shown in Figure 4.31. The USGS determines susceptibility based on the probable degree of response to cutting or loading of slopes or to anomalously high precipitation. Incidence is measured by the rate of past occurrences. According to the USGS definition and mapping, most of the region faces moderate susceptibility with low to moderate incidence of landslide. Three common types of landslides that affect North Carolina are: debris flows, debris and earth slides, and rockslides.

Spatial Extent: 1 – Negligible

Figure 4.31 – Landslide Incidence and Susceptibility



EXPLANATION

LANDSLIDE INCIDENCE

- Low (less than 1.5% of area involved)
- Moderate (1.5%-15% of area involved)
- High (greater than 15% of area involved)

LANDSLIDE SUSCEPTIBILITY/INCIDENCE

- Moderate susceptibility/low incidence
- High susceptibility/low incidence
- High susceptibility/moderate incidence

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

Source: USGS

EXTENT

Two major factors that contribute to an area being prone to landslide are soil slippage potential and slope. In evaluating soils and their capacity for development the Natural Resources Conservation Service (NRCS) Soil Survey for Knox County identifies soil types by slippage hazard. Soil slippage hazard is a measure of "the possibility that a mass of soil will slip." When vegetation is cleared, water saturates the soil and normal construction practices are applied (such as the application of heavy machinery) soil failure is more likely. Soil slippage hazard classes are identified as high (unstable), medium (moderately

unstable) or low (slightly unstable to stable.) Classes are assigned based on observations of slope, mineral characteristics, strike and dip of bedrock geology, surface drainage patterns and occurrences of such features as slip scars and slumps. High slippage hazard soils are found predominately in steeply sloping hillside areas. The Eno Haw area exhibits a gentle topography, and thus a substantial landslide event is unlikely.

Impact: 1 – Minor

HISTORICAL OCCURRENCES

While there are no records of significant landslides in the planning area, the North Carolina Department of Environmental Quality notes minor landslide events, shown in Table 4.69.

Table 4.69 – Landslide Points in Eno Haw Region

Movement Date	County	Type	Event Description (if any)	Fatalities
01/1984	Durham	Slide	Road embankment	0
1992	Durham	Slide	Road cut	0
03/1994	Durham	Slide	Road embankment	0
06/27/2000	Durham	Slide	Road cut	0
02/2001	Orange	Slide – transitional	Cut slope – not road related	0
09/14/2019	Person	Flow	Embankment – not road related	0
N/A	Orange	Slide	Debris	0
N/A	Orange	Slide – transitional	N/A	0

Source: NCDEQ

The HMPC noted a landslide event that took place in Chapel Hill on September 17, 2018, during Hurricane Florence. The landslide occurred on an embankment off East Franklin Street, spilling significant debris onto the Bolin Creek Trail.

PROBABILITY OF FUTURE OCCURRENCE

Given the moderate susceptibility rating and lack of historical occurrences, the probability of a significant landslide event is unlikely. It is possible, that a minor event may occur in the future, but it would be unlikely to produce significant damages.

Probability: 1 – Unlikely

CLIMATE CHANGE

Water triggers landslides, and per the Fifth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. Additionally, increases in temperatures and precipitation totals are expected in the Southeast. Increased flooding may also result from more intense tropical cyclone; researchers have noted the occurrence of more intense storms bringing greater rainfall totals, a trend that is expected to continue as ocean and air temperatures rise. More rainfall falling in more intense incidents could contribute to an increase in landslide events.

VULNERABILITY ASSESSMENT

PEOPLE

People are unlikely to sustain serious physical harm as a result of landslides in the Eno-Haw Region. Impacts would be relatively minor and highly localized. An individual using an impacted structure or infrastructure at the time of a landslide event may sustain minor injuries.

PROPERTY

Landslides in the Piedmont are infrequent and occur in small, highly localized instances relative to the general area of risk. Additionally, these events are generally small scale in terms of the magnitude of impacts. As a result, it is difficult to estimate the property at risk to landslide. On average, a landslide event in the planning area may cause minor to moderate property damage to one or more buildings or cause localized damage to infrastructure. A landslide event may also result in the need for debris removal.

ENVIRONMENT

Because landslides are essentially a mass movement of sediment, they may result in changes to terrain, damage to trees in the slide area, changes to drainage patterns, and increases in sediment loads in nearby waterways. Landslides in the Eno-Haw Region are unlikely to cause any more severe impacts.

CONSEQUENCE ANALYSIS

Table 4.70 summarizes the potential negative consequences of landslide.

Table 4.70 – Consequence Analysis - Landslide

Category	Consequences
Public	Any impacts to the public are expected to be minor. Individuals may sustain injuries if they are in an affected structure or using affected infrastructure when the event occurs.
Responders	Impacts to responders are unlikely. Personnel responsible for debris cleanup or roadway closures may face increased risk.
Continuity of Operations (including Continued Delivery of Services)	Landslide is unlikely to affect continuity of operations.
Property, Facilities and Infrastructure	Buildings and infrastructure may incur minor damages as a result of landslide; however, vulnerability in the Region is low.
Environment	Environmental impacts are expected to be minimal. Landslide may cause terrain and drainage changes and may temporarily increase sediment loads in nearby waterways.
Economic Condition of the Jurisdiction	Economic impacts are not expected.
Public Confidence in the Jurisdiction's Governance	Any landslide occurring in the Region is unlikely to be severe and would not be expected to affect public confidence.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes landslide hazard risk by jurisdiction. Given the lack of historical records and the limited data on susceptibility, risk was considered uniform across the planning area.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	1	1	1	3	1	1.2	L

4.5.8 TORNADOES & THUNDERSTORMS

HAZARD BACKGROUND

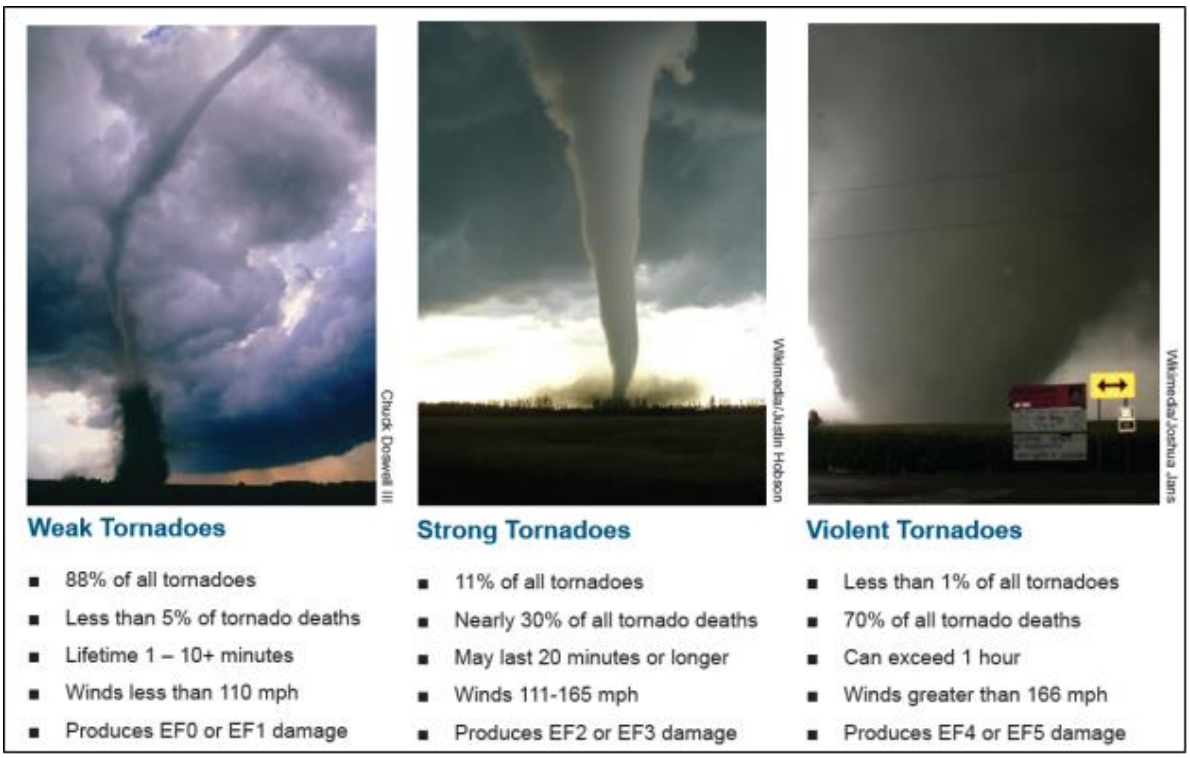
TORNADOES

According to the Glossary of Meteorology (AMS 2000), a tornado is "a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud." Tornadoes can appear from any direction. Most move from southwest to northeast, or west to east. Some tornadoes have changed direction or even backtracked.

Tornadoes are commonly produced by land falling tropical cyclones. Those making landfall along the Gulf coast traditionally produce more tornadoes than those making landfall along the Atlantic coast. Tornadoes that form within hurricanes are more common in the right front quadrant with respect to the forward direction but can occur in other areas as well. According to the NHC, about 10% of the tropical cyclone-related fatalities are caused by tornadoes. Tornadoes are more likely to be spawned within 24 hours of landfall and are usually within 30 miles of the tropical cyclone's center.

Tornadoes have the potential to produce winds in excess of 200 mph (EF5 on the Enhanced Fujita Scale) and can be very expansive – some in the Great Plains have exceeded two miles in width. Tornadoes associated with tropical cyclones, however, tend to be of lower intensity (EF0 to EF2) and much smaller in size than ones that form in the Great Plains. Figure 4.32 provides a description and breakdown of tornadoes by severity. Violent tornadoes, as described below, are unlikely in the Eno Haw Region.

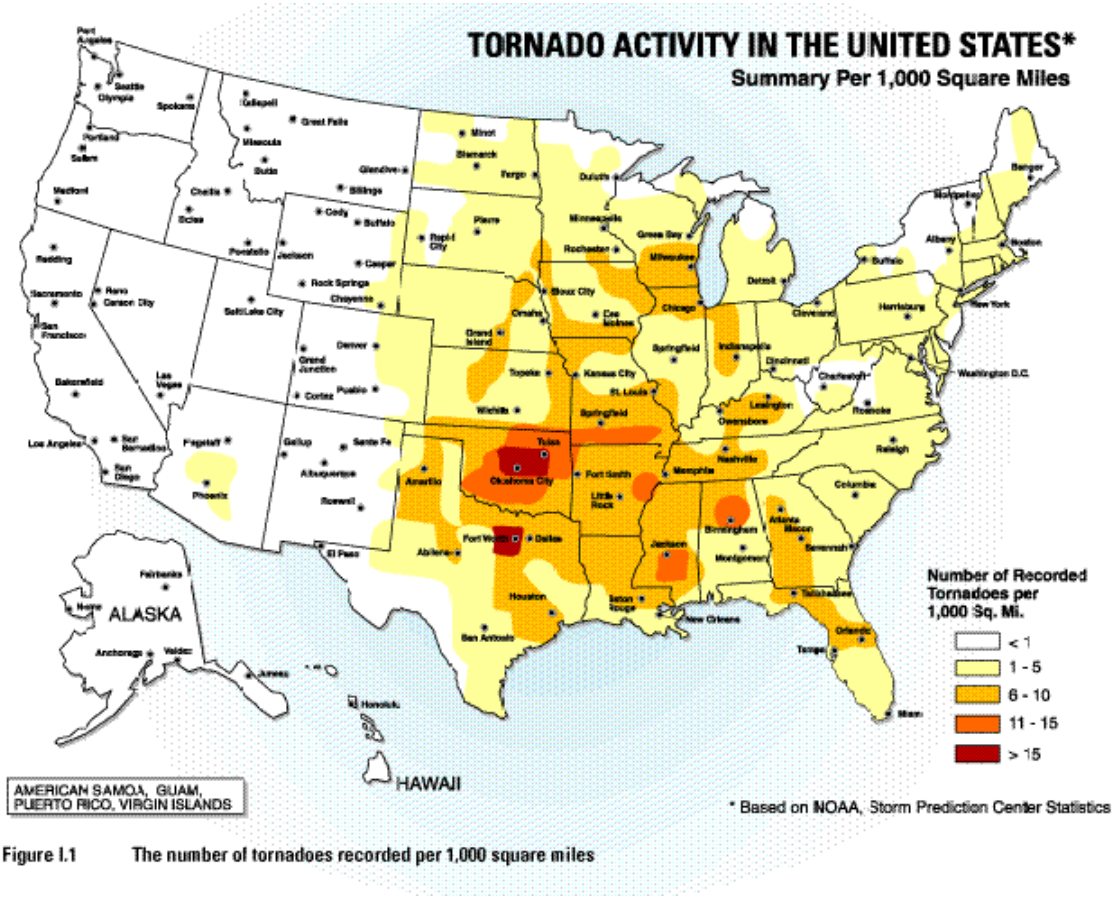
Figure 4.32 – Tornado by Severity



Source: NOAA National Weather Service

Figure 4.33 shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles. North Carolina has averaged 1 to 5 tornadoes per 1,000 square miles.

Figure 4.33 – Tornado Activity in the U.S.



Source: American Society of Civil Engineers

Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

THUNDERSTORM WINDS

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at earth's surface and causes strong winds associated with thunderstorms.

There are four ways in which thunderstorms can organize: single cell, multi-cell cluster, multi-cell lines (squall lines), and supercells. Even though supercell thunderstorms are most frequently associated with severe weather phenomena, thunderstorms most frequently organize into clusters or lines. Warm, humid conditions are favorable for the development of thunderstorms. The average single cell thunderstorm is approximately 15 miles in diameter and lasts less than 30 minutes at a single location. However,

thunderstorms, especially when organized into clusters or lines, can travel intact for distances exceeding 600 miles.

Thunderstorms are responsible for the development and formation of many severe weather phenomena, posing great hazards to the population and landscape. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorms are capable of producing tornadoes and waterspouts. While conditions for thunderstorm conditions may be anticipated within a few hours, severe conditions are difficult to predict. Regardless of severity, storms generally pass within a few hours.

Warning Time: 4 – Less than six hours

Duration: 1 – Less than six hours

LIGHTNING

Lightning is a sudden electrical discharge released from the atmosphere that follows a course from cloud to ground, cloud to cloud, or cloud to surrounding air, with light illuminating its path. Lightning's unpredictable nature causes it to be one of the most feared weather elements.

All thunderstorms produce lightning, which often strikes outside of the area where it is raining and is known to fall more than 10 miles away from the rainfall area. When lightning strikes, electricity shoots through the air and causes vibrations creating the sound of thunder. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start building fires and wildland fires, and damage electrical systems and equipment.

The watch/warning time for a given storm is usually a few hours. There is no warning time for any given lightning strike. Lightning strikes are instantaneous. Storms that cause lightning usually pass within a few hours.

Warning Time: 4 – Less than six hours

Duration: 1 – Less than six hours

HAIL

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow.

At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 mph, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 mph. The largest hailstone recorded in the United States was found in Vivian, South Dakota on July 23, 2010; it measured eight inches in diameter, almost the size of a soccer ball. While soccer-ball-sized hail is the exception, even small pea sized hail can do damage.

Hailstorms in North Carolina cause damage to property, crops, and the environment, and kill and injure livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other

things most commonly damaged by hail. Hail has been known to cause injury to humans; occasionally, these injuries can be fatal.

The onset of thunderstorms with hail is generally rapid. However, advancements in meteorological forecasting allow for some warning. Storms usually pass in a few hours.

Warning Time: 4 – Less than six hours

Duration: 1 – Less than six hours

LOCATION

TORNADOES

Tornadoes and thunderstorms can occur anywhere in the region and do not have a defined vulnerability zone. Tornadoes typically impact a small area, but damage may be extensive. Tornado locations are completely random, meaning risk to tornado isn't increased in one area of the county versus another. Tornadoes can be spawned by tropical cyclones; however, these tornadoes typically occur up to 2 days before and as many as 3 days after landfall of the tropical cyclone.

Spatial Extent: 2 – Small

THUNDERSTORM WINDS

Thunderstorm wind, lightning, and hail events do not have a defined vulnerability zone. The scope of wind, lightning and hail is generally defined to the footprint of its associated thunderstorm. Given the general size and movement of thunderstorm events, thunderstorm winds from one event may impact a large portion of the planning area. The entirety of the Eno Haw Region shares equal risk to the threat of severe weather.

Spatial Extent: 4 – Large

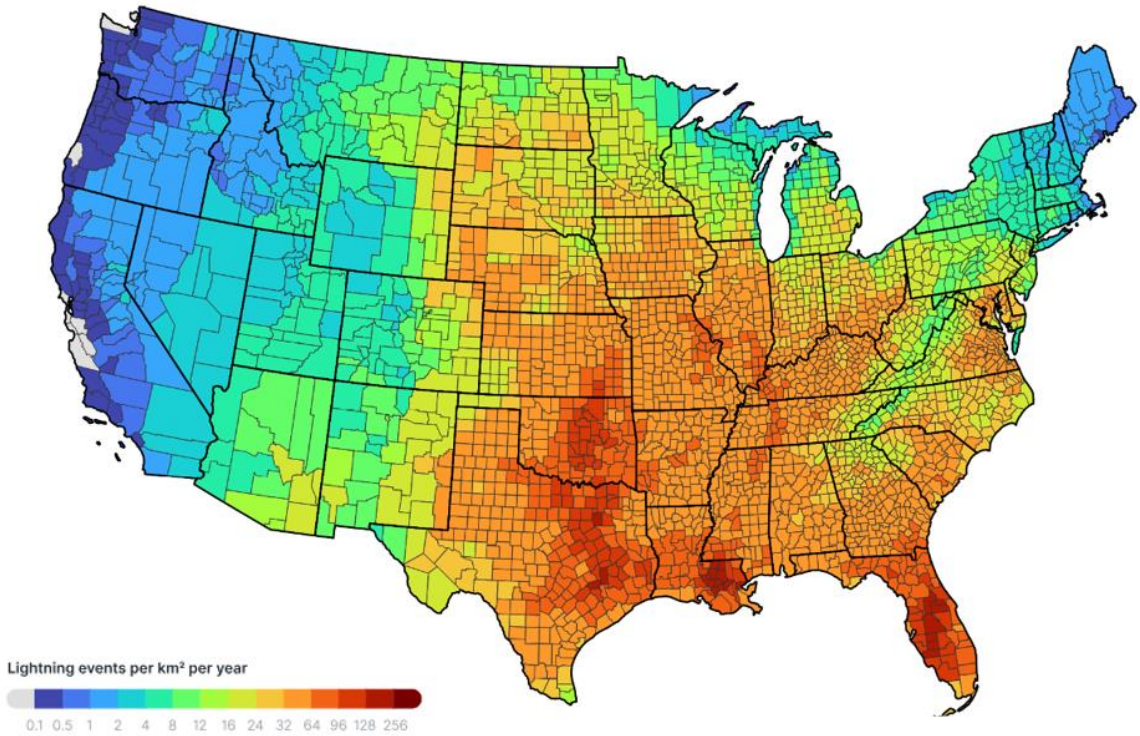
LIGHTNING AND HAIL

The scope of lightning and hail is generally defined to the footprint of its associated thunderstorm. However, large-scale hail tends to occur in a more localized area within the storm, and lightning strikes and associated damages are highly localized and occur randomly. It should be noted that while lightning is most often affiliated with severe thunderstorms, it may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall. The entire Eno-Haw Region is uniformly exposed to each of these hazards.

According to the Vaisala flash density map, shown in Figure , Alamance, Durham, and Orange counties experience 16 to 24 lightning flashes per square km per year, and 24 to 32 lighting events per square km occur in Person County each year. The entire planning area is uniformly exposed to the threat of lightning

Spatial Extent: 1 – Negligible

Figure 4.34 – Total Lighting Density by County (2016-2022)



Source: Vaisala

EXTENT

TORNADOES

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita (EF) scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. shows the wind speeds associated with the enhanced Fujita scale ratings and the damage that could result at different levels of intensity.

Table 4.71 – Enhanced Fujita Scale

EF Number	3 Second Gust (mph)	Damage
0	65-85	**Light damage.** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
1	96-110	**Moderate damage.** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.

EF Number	3 Second Gust (mph)	Damage
2	111-135	**Considerable damage.** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
3	136-165	**Severe damage.** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
4	166-200	**Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
5	Over 200	**Incredible damage.** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m; high-rise buildings have significant structural deformation; incredible phenomena will occur.

The most intense tornado to pass through the Eno-Haw Region in the past 20 years was an EF2 in Person County in 2011; this tornado caused $400,000 in property damage and caused the only 2 tornado related injuries. It was also the longest (9.66 miles) and widest (300 yards) tornado the region has experienced Another tornado on the same day in Alamance County caused the most property damage ($580,000).

Impact: 3 – Critical

THUNDERSTORM WINDS

The magnitude of a thunderstorm event can be defined by the storm's maximum wind speed and its impacts. NCEI divides wind events into several types including High Wind, Strong Wind, Thunderstorm Wind, Tornado and Hurricane. For this severe weather risk assessment, High Wind, Strong Wind and Thunderstorm Wind data was collected. Hurricane Wind and Tornadoes are addressed as individual hazards. The following definitions come from the NCEI Storm Data Preparation document.

- **High Wind** – Sustained non-convective winds of 40mph or greater lasting for one hour or longer or winds (sustained or gusts) of 58 mph for any duration on a widespread or localized basis.
- **Strong Wind** – Non-convective winds gusting less than 58 mph, or sustained winds less than 40 mph, resulting in a fatality, injury, or damage.
- **Thunderstorm Wind** – Winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 58 mph, or winds of any speed (non-severe thunderstorm winds below 58 mph) producing a fatality, injury or damage.

The Beaufort Wind Force Scale is an empirical measure that relates wind speed to observed conditions at sea or on land. In the United States, winds of force 6 to 7 are designated as "strong;" 8 to 9 "gale force;" 10 to 11 "usually results in a storm warning or tropical storm warning; and force 12 results in a hurricane warning.

Table 4.72 – Beaufort Wind Force Scale

Rating	(MPH)	Name	Appearance of Wind Effects	
			On Water	On Land
0	<1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Small waves 1-4 ft, becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Moderate waves 4-8 ft taking longer to form, many whitecaps, some spray	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	32-38	Near Gale	Sea heaps up, waves 13-19 ft, white foam streaks of breakers	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Moderately high (18-25 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	47-54	Strong Gale	High waves (23-32 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Very high waves (29-41 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	Violent Storm	Exceptionally high (37-52 ft) waves, foam patches cover sea, visibility more reduced	Very rarely experienced; widespread damage
12	73+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	Devastation

Source: NOAA Storm Prediction Center

The strongest recorded thunderstorm wind event in the Eno-Haw Region occurred on May 25, 2000 with a measured gust of 70 mph on the western side of the city of Burlington and gusts of 60 mph elsewhere across the region. The event caused two injuries

Impact: 2 – Limited

LIGHTNING

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the National Weather Service to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide.

Table 4.73 – Lightning Activity Level Scale

Lightning Activity Level Scale	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground lightning strikes in a five minute period
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five minute period
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five minute period
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five-minute period
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning

Source: National Weather Service

With the right conditions in place, the entire Region is susceptible to each lightning activity level as defined by the LAL. Most lightning strikes cause limited damage to specific structures in a limited area, and cause very few injuries or fatalities, and minimal disruption on quality of life.

Impact: 1 – Minor

HAIL

The NWS classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4.74 indicates the hailstone measurements used by the NWS.

Table 4.74 – Hailstone Measurement Comparison Chart

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf ball
2.0 inch	Hen egg
2.5 inch	Tennis ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

The Tornado and Storm Research Organization (TORRO) has further described hail sizes by their typical damage impacts. Table 4.75 describes typical intensity and damage impacts of the various sizes of hail.

Table 4.75 – Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > softball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University
Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity.

The average hailstone size recorded between 1999 and 2023 in the Haw-Eno Region was a little over 1" in diameter; the largest hailstone recorded was 2.5", recorded on June 23, 2016. Very little damage was reported due to hail in the region. The worst instance occurred on July 1, 2012 in Person County. The hail damaged 300 acres of tobacco causing $2,000,000 worth of damage.

Impact: 1 – Minor

HISTORICAL OCCURRENCES

TORNADOES

NCEI storm reports were reviewed from 1999 through 2023 to assess whether recent trends varied from the longer historical record. According to NCEI, the Eno-Haw Region experienced 23 tornado incidents between 1999 and 2023, causing no fatalities, 2 injuries, $5.9 million in property damage and $10,000 in crop damage. Table 4.76 shows historical tornadoes in the Eno-Haw Region during this time period.

Figure 4.35 reflects the tracks of past tornadoes that passed through the Region from 1950 through 2023 according to data from the NOAA/NWS Storm Prediction Center.

Table 4.76 – Recorded Tornadoes in Eno-Haw Region 1999-2023

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Carrboro	6/19/2000	1305	F0	0	0	$0	$0
Carrboro	9/8/2004	1145	F0	0	0	$0	$0
Schley	1/14/2005	445	F0	0	0	$0	$0
Ceffo	7/7/2005	1442	F0	0	0	$0	$0
Gorman	5/14/2006	1710	F0	0	0	$0	$0
Union Ridge	3/4/2008	1654	EF0	0	0	$150,000	$0
Mt Tirzah	3/28/2010	2255	EF1	0	0	$250,000	$0
Hesters Store	10/27/2010	1458	EF0	0	0	$0	$10,000
Brooksdale	10/27/2010	1513	EF1	0	0	$75,000	$0
Carr	10/27/2010	1630	EF1	0	0	$250,000	$0
Altamahaw	4/16/2011	1306	EF1	0	0	$580,000	$0
Hyco	4/16/2011	1340	EF2	0	2	$400,000	$0
Cunningham	7/2/2013	1125	EF0	0	0	$100,000	$0
Hope Vly	5/15/2014	1710	EF1	0	0	$250,000	$0
Huckleberry Spg	2/24/2016	1600	EF1	0	0	$100,000	$0
Teer	04/19/2019	1500	EF2	0	0	$2,000,000	$0
Sutphin	04/13/2020	0532	EF1	0	0	$500,000	$0
Clegg	03/31/2022	1449	EF1	0	0	$100,000	$0
Miles	05/06/2022	1608	EF1	0	0	$250,000	$0
Weaver	05/23/2022	1507	EF0	0	0	$150,000	$0
Total				**0**	**2**	**$5,905,000**	**$10,000**

Source: NCEI

Specific incidents with some level of impact include:

March 4, 2008 – A weak EF 0 tornado touched down in northern Alamance County just northeast of the Union Ridge community. The tornado initially touched down about a half mile south of Willie Pace Road. On the north side of Willie Pace Road the tornado blew the roof off of a tobacco barn, lifted a carport, destroyed one shed and caused roof and porch damage to a home. The tornado continued to track northeast into Caswell County for approximately 2 miles. Further north the tornado destroyed a barn on Vinson Road and damaged a tractor and irrigation system. Numerous trees were also blown down in the area. The tornado blew a large oak tree into a brick home on Blaney Road, resulting in substantial roof damage. A garage in the back yard was also destroyed. A single wide mobile home on Baynes Road lost its roof from the high wind. The roof was tossed about 70 feet before becoming wrapped around a tree.

October 27, 2010 – Five weak tornadoes occurred across Person, Orange, Granville and Vance counties during the afternoon and evening. In Person County, a supercell thunderstorm produced a short lived EF-1 tornado which produced significant damage to a double wide modular home along Apple Tree Lane near Allensville Road. Nearby modular homes sustained minor damage to the roof and siding. Numerous trees were either snapped off or uprooted at this location. Winds were estimated to be between 86 to 90

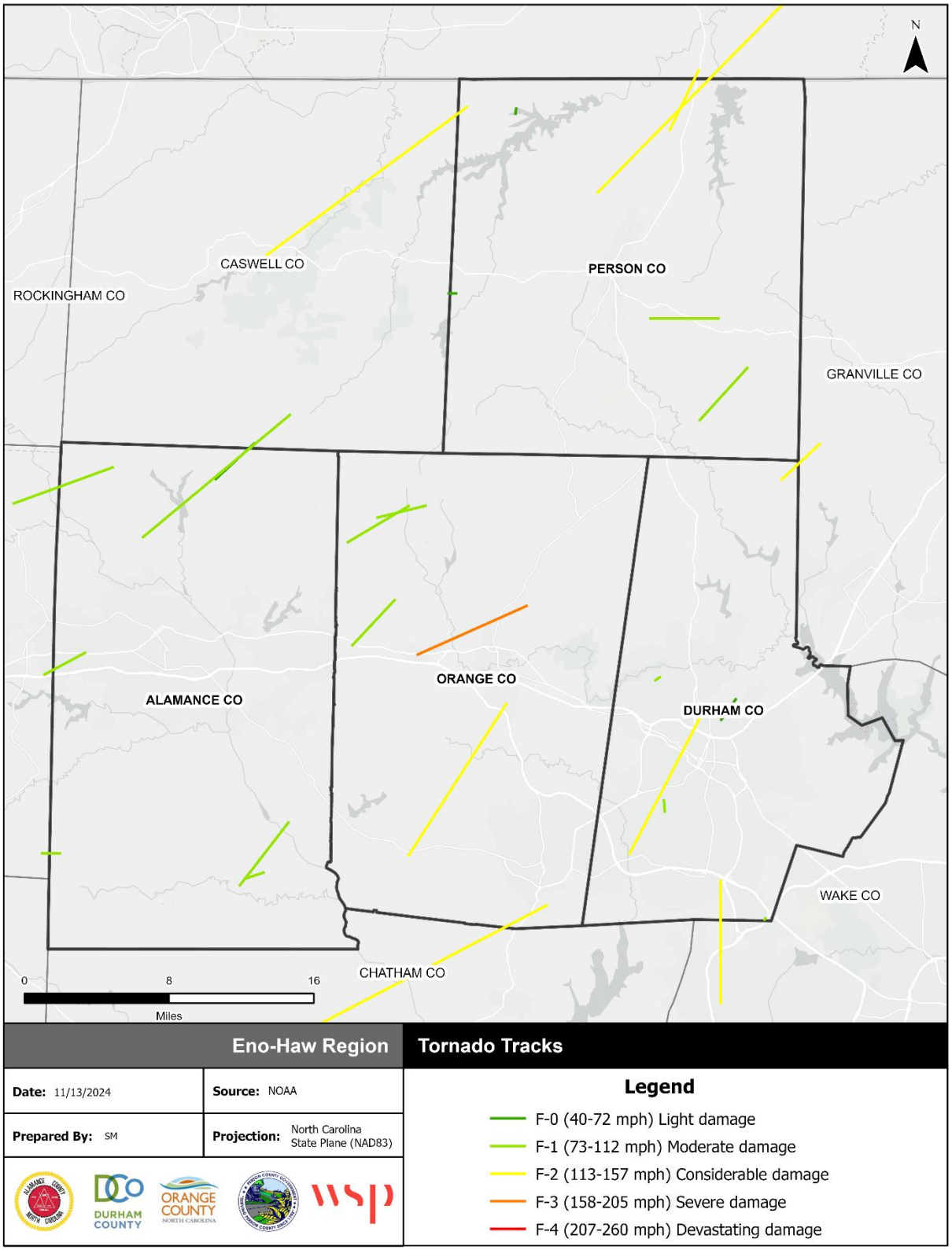
mph. The tornado then tracked eastward and across a wooded area before crossing Ruff Davis Road, where several trees were snapped off and downed in different directions. The tornado lifted as it moved into another wooded area east of Ruff Davis Road. In Orange County, the tornado produced EF-1 damage with winds between 90 to 95 mph along Carr Store Road near Allie Mae Road in northern Orange County. At this location a church sustained significant damage, with two walls made of cinder blocks blown down and numerous hard and soft wood trees were also snapped off and uprooted. The tornado continued to track east northeast and damaged two homes along Pentecost Road. Both homes sustained roof damage, including a partially collapsed chimney, and numerous trees were snapped and uprooted. Two individuals were home at the time of the tornado and were not injured. Numerous trees where snapped off and uprooted at this location as well. Winds were estimated to range from 86 to 90 mph. The tornado weakened as it continued to track east north-east across McDade Store Road and Efland-Cedar Grove Road before lifting.

April 16, 2011 – A strong storm system produced nine tornadoes in the Raleigh CWA, including two EF3s and four EF2s. The tornadoes left eight dead with approximately 275 injuries. In Altamahaw, an EF1 tornado first touched down at Bethel Methodist Church Road, As it moved through the area, it caused damage to many homes, including collapsing walls, ripping off roofs, and shattering windows. The tornado also caused damages to vehicles and uprooted and snapped many trees, some of which exceeded four feet in diameter. In total, 20 homes were damaged, including 6 homes that were completely destroyed. Another tornado initially touched down 4 miles north northwest of Roxboro as an EF0 but strengthened to an EF2 with intermittent EF1 damage. There were two schools damaged, two homes destroyed, 10 homes with minor damage, and two reported injuries as a result of this incident.

May 15, 2014 – Scattered storms impacted central North Carolina that lead to flash flooding as many areas received 2-4 inches of rain, with isolated amounts up to 5-6 inches. In addition, some isolated wind damage occurred and an isolated EF1 tornado formed near Durham. Damage consisted of dozens of snapped and uprooted trees and approximately 40 homes that experienced roof or other structural damage. Most of the damage to the homes was caused by falling trees and other debris. However, there were at least a half a dozen homes that experienced minor roof damage solely from the wind. In one case, a large oak tree was uprooted and fell onto a home, slicing through the roof and an exterior wall.

April 19, 2019 – A deepening upper-level trough brought severe thunderstorms that produced 7 tornadoes across central NC. The strongest tornado formed in southwestern Orange County and reached EF-2 strength as it neared Hillsborough. The tornado initially touched down in the White Cross area and Leslie Drive area of southwest Orange County. Considerable tree damage occurred in this area, including the snapping and splitting of healthy large-trunk trees. Subsequent damage to vehicles and homes occurred as the trees fell. Given the magnitude and nature of the damage, wind speeds were estimated at 110 mph. The tornado then tracked north-northeast eventually crossing Dodsons Cross Road, Dairlyland Road, Arthur Minnis Road, and Borland Roads, all while producing similar tree damage. The tornado finally began to lift and/or dissipate near Hillsborough just north of I-40 near exit 261, but not before producing considerable damage to several homes just south of exit 261. The roof and several exterior walls of one home were completely destroyed. Damage at this location was estimated at 115 mph.

Figure 4.35 – Tornado Paths Through the Eno-Haw Region, 1950-2023



Source: NOAA/NWS Storm Prediction Center

THUNDERSTORM WINDS

Between January 1, 1999 and December 31, 2023, the NCEI recorded 727 separate incidents of thunderstorm winds, occurring on 281 separate days. These events caused $3,569,250 in recorded property damage, 5 injuries and 3 fatalities. The recorded gusts averaged 50.4 mph, with the highest gusts recorded at 70 mph. Gusts of 70 mph were recorded three times in the region, twice during a storm on May 25, 2000.

Of these events, 139 caused reported property damage. Wind gusts with property damage recorded averaged $4,909 in damage, with three gusts causing over a reported $250,000 in damage each (at Elon College on July 27, 2012, in Huckleberry Spring on February 24, 2016 and in Quail Roost on June 13, 2013). These incidents are recorded below:

Table 4.77 – Recorded Thunderstorm Winds with Property Damages in Eno-Haw Region, 1999-2023

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Roxboro	6/2/2006	1458	50	0	0	$65,000
Roxboro	4/8/2010	2000	50	0	0	$1,000
Oak Grove	5/22/2010	1710	50	0	0	$4,000
Hillsborough	5/28/2010	2106	50	0	0	$50,000
Few	5/28/2010	2100	50	0	0	$10,000
Triple Springs	6/13/2010	1458	50	0	0	$2,000
Brooksdale	6/13/2010	1501	50	0	0	$2,000
Durham	6/23/2010	1255	50	0	0	$15,000
Cheeks Crossroads	7/13/2010	1935	50	0	0	$3,000
Elon College	7/17/2010	1010	50	0	0	$20,000
Snow Camp	7/17/2010	1315	50	0	1	$2,000
Hyco	7/25/2010	1903	50	0	0	$10,000
Swepsonville	8/5/2010	1415	50	0	0	$30,000
Mebane	8/5/2010	1700	50	0	0	$15,000
Roseville	8/5/2010	1620	50	0	0	$10,000
Snow Camp	11/16/2010	2245	50	0	0	$10,000
Burlington Airport	4/5/2011	203	52	0	0	$75,000
Durham	4/5/2011	236	50	0	0	$25,000
Occoneechee	4/27/2011	1210	50	0	0	$5,000
Timberlake	5/13/2011	1825	50	0	0	$500
Carr	6/18/2011	1705	50	0	0	$500
Chapel Hill Williams Airport	5/9/2012	1457	50	0	0	$2,500
Mebane	6/1/2012	1400	50	0	0	$110,000
Surf	6/1/2012	1505	50	0	0	$20,000
Glenn	6/1/2012	1544	50	0	0	$10,000
West Durham	6/29/2012	2202	50	0	0	$10,000
Surf	6/29/2012	2125	50	0	0	$5,000
Saxapahaw	6/29/2012	2155	50	0	0	$4,000
Cavel	7/1/2012	1305	50	0	0	$3,000
McGehees Mill	7/1/2012	1258	50	0	0	$2,000
Schley	7/5/2012	1255	50	0	0	$5,000

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Schley	7/5/2012	1257	50	0	0	$5,000
Hyco	7/19/2012	1515	50	0	0	$1,000
Union Ridge	7/21/2012	1730	50	0	0	$1,000
Bahama	7/23/2012	1714	50	0	0	$3,000
Graham	7/23/2012	1618	50	0	0	$2,000
Chapel Hill	7/24/2012	1426	50	0	0	$20,000
Chapel Hill	7/24/2012	1426	50	0	0	$10,000
Snow Camp	7/24/2012	1358	50	0	0	$5,000
Chapel Hill	7/24/2012	1425	50	0	0	$4,000
Snow Camp	7/24/2012	1345	50	0	0	$2,000
Snow Camp	7/24/2012	1350	50	0	0	$2,000
Teer	7/24/2012	1410	50	0	0	$2,000
Elon College	7/27/2012	1635	50	0	0	$313,000
Triple Springs	9/2/2012	1403	50	0	0	$750
West Durham	9/8/2012	1645	50	0	0	$750
Hillsborough	1/30/2013	2218	50	0	0	$1,500
Hurdle Mills	1/30/2013	2245	50	0	0	$1,000
Orange Factory	4/19/2013	1740	50	0	0	$1,500
Quail Roost	6/13/2013	1610	61	0	0	$250,000
Snow Camp	6/13/2013	1554	50	0	0	$200,000
Ceffo	6/13/2013	1548	50	0	0	$10,000
Chapel Hill	6/13/2013	1615	61	1	0	$3,000
Helena	6/26/2013	1652	50	0	0	$1,000
Quail Roost	6/28/2013	1645	50	0	0	$2,500
Chapel Hill	6/30/2013	1422	50	0	0	$5,000
Kimesville	7/2/2013	950	50	0	0	$10,000
Altamahaw	7/28/2013	2205	50	0	0	$1,000
Hope Valley	1/11/2014	1350	50	0	0	$5,000
Chapel Hill Williams Airport	1/11/2014	1340	50	0	0	$1,000
Hope Valley	3/12/2014	1730	50	1	0	$8,000
Mt Tirzah	5/15/2014	1752	50	0	0	$1,000
Calvander	5/27/2014	1457	50	0	0	$1,000
Durham	6/11/2014	1406	50	0	0	$25,000
Hope Valley	6/11/2014	1644	50	0	0	$10,000
Snow Camp	6/11/2014	1645	50	0	0	$2,000
Graham	6/11/2014	1715	50	0	0	$2,000
Schley	6/11/2014	1725	50	0	0	$2,000
West Hillsboro	6/19/2014	1556	50	0	0	$10,000
Durham	6/19/2014	1615	50	0	0	$8,000
Occoneechee	7/15/2014	1500	50	0	0	$5,000
Huckleberry Spring	8/12/2014	1710	50	0	0	$1,000
Ceffo	6/17/2015	1854	50	0	0	$25,000
Roxboro	6/20/2015	1824	50	0	0	$2,500

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Chapel Hill	6/26/2015	2223	50	0	0	$2,000
Carr	6/30/2015	1749	50	0	0	$10,000
Kimesville	7/8/2015	1851	50	0	0	$25,000
Union Ridge	7/13/2015	1946	50	0	0	$10,000
Chapel Hill Williams Airport	7/21/2015	1750	50	0	0	$5,000
Oak Grove	7/23/2015	925	50	0	0	$1,000
Hurdle Mills Airport	8/11/2015	1633	50	0	0	$1,250
Sutphin	9/10/2015	1618	50	0	0	$5,000
Huckleberry Spring	2/24/2016	1600	70	0	0	$250,000
Chapel Hill	2/24/2016	1550	50	0	0	$3,000
Hyco Jct	4/28/2016	1730	50	0	0	$1,000
Altamahaw	5/12/2016	1826	50	0	0	$5,000
Woodsdale	6/5/2016	1741	50	0	0	$10,000
Bethel Hill	6/5/2016	1750	50	0	0	$7,500
Gentrys Store	6/5/2016	1747	50	0	0	$2,500
Triple Springs	6/5/2016	1751	50	0	0	$2,500
Cedar Grove	6/29/2016	1739	50	0	0	$2,500
Hillsborough	7/8/2016	1953	50	0	0	$5,000
Few	7/15/2016	1550	50	0	1	$150,000
Burlington Airport	7/15/2016	1740	50	0	0	$10,000
Buckhorn	7/31/2016	1912	50	0	0	$10,000
Just Xrds	7/31/2016	1740	50	0	0	$5,000
Longs Store	9/1/2016	1247	50	0	0	$10,000
Longs Store	2/25/2017	1500	50	0	0	$1,000
Hope Valley	5/5/2017	335	50	0	0	$10,000
Mt Tirzah	5/5/2017	340	50	0	0	$2,500
Hopedale	5/5/2017	300	50	0	0	$1,000
West Durham	5/11/2017	2012	50	0	0	$100,000
Fairntosh	5/19/2017	1642	50	0	0	$3,000
Schley	5/19/2017	1624	50	0	0	$2,000
Occoneechee	5/25/2017	1158	50	0	0	$2,000
Mangum Store	6/16/2017	1918	50	0	0	$750
Cedar Grove	6/19/2017	2035	50	0	0	$4,000
Concord	7/13/2017	1703	50	0	0	$4,000
Elon College	7/13/2017	1650	50	0	0	$2,000
Cedar Grove	7/13/2017	1701	50	0	0	$1,000
Chapel Hill	7/23/2017	1645	50	0	0	$3,000
Burlington	4/15/2018	1646	50	0	0	$5,000
Hurdle Mills	4/15/2018	1725	50	0	0	$2,000
Mc Dade	4/15/2018	1715	50	0	0	$1,000
Chapel Hill	4/15/2018	1725	50	0	0	$1,000
Triple Springs	5/6/2018	1835	50	0	0	$2,500
Blackwood	5/21/2018	1435	50	0	0	$2,000

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Union Ridge	5/21/2018	1608	50	0	0	$1,000
Calvander	6/10/2018	2240	50	0	0	$25,000
West Durham	6/10/2018	2246	50	0	0	$1,000
Genlee	6/10/2018	2305	50	0	0	$1,000
Roseville	6/21/2018	2229	50	0	0	$4,000
Gorman	6/24/2018	1925	50	0	0	$4,000
Calvander	7/4/2018	1820	50	0	0	$2,500
Chapel Hill	7/4/2018	1821	50	0	0	$1,500
Rougemont	7/6/2018	1525	50	0	0	$10,000
Rougemont	7/6/2018	1540	50	0	0	$5,000
Cedar Grove	7/6/2018	1450	50	0	0	$2,500
Hillsborough	7/6/2018	1500	50	0	0	$1,500
Longs Store	7/11/2018	1625	50	0	0	$2,500
Mt Tirzah	7/22/2018	2042	50	0	0	$10,000
Ceffo	7/22/2018	2056	50	0	0	$10,000
Durham	7/22/2018	2005	50	0	0	$5,000
Hope Valley	8/2/2018	1438	50	0	0	$1,000
Alamance	8/7/2018	1840	50	0	0	$10,000
Occoneechee	8/7/2018	1900	50	0	0	$5,000
Etland	8/8/2018	1609	50	0	0	$250
Swepsonville	8/8/2018	1609	50	0	0	$250
Hope Valley	8/8/2018	1645	50	0	0	$250
Few	4/8/2019	1622	50	0	0	$1,000
Few	4/8/2019	1622	50	0	0	$1,000
Longs store	4/8/2019	1559	50	0	0	$5,000
Alamance	4/12/2019	1505	50	0	0	$1,000
Chapel Hill	4/12/2019	1628	50	0	0	$3,000
Chapel Hill Wllms ar	4/12/2019	1635	50	0	0	$3,000
Durham	4/19/2019	1423	50	0	0	$1,000
West Durham	4/19/2019	1427	50	0	0	$15,000
Dodsons Xrds	4/19/2019	1615	50	0	0	$1,000
Dodsons Xrds	4/19/2019	1617	50	0	0	$5,000
Roseville	5/25/2019	2232	50	0	0	$5,000
Burlington	6/20/2019	1350	50	0	0	$10,000
Burlington	6/20/2019	1401	50	0	0	$10,000
Burlington	6/20/2019	1403	50	0	0	$10,000
West Durham	6/20/2019	1428	50	0	0	$5,000
Chapel hill Wllms ar	6/20/2019	1423	50	0	0	$5,000
Chapel hill Wllms ar	6/20/2019	1434	50	0	0	$10,000
Longs store	6/20/2019	1345	50	0	0	$15,000
Cunningham	6/20/2019	1350	50	0	0	$2,500
Hurdle Mills	6/20/2019	1351	50	0	0	$10,000
Triple Spgs	6/20/2019	1357	50	0	0	$10,000
Timberlake	6/20/2019	1401	50	0	0	$10,000

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Timberlake	6/20/2019	1409	50	0	0	$10,000
Durham	7/4/2019	1300	50	0	0	$20,000
Mc Dade	7/4/2019	1422	50	0	0	$40,000
Burlington	7/18/2019	1809	50	0	0	$2,000
Timberlake	7/22/2019	1800	50	0	0	$5,000
Hesters store	8/13/2019	1459	50	0	0	$15,000
Occoneechee	8/21/2019	1757	50	0	0	$1,500
Haw River	10/31/2019	1815	50	0	0	$10,000
Huckleberry Spg	10/31/2019	1915	50	0	0	$10,000
Etland	10/31/2019	1840	50	0	0	$5,000
Glenn	10/31/2019	1910	50	0	0	$25,000
Concord	10/31/2019	1817	50	0	0	$10,000
Roseville	1/11/2020	2343	50	0	0	$5,000
Elon college	2/6/2020	1240	50	0	0	$50,000
Occoneechee	2/6/2020	1305	50	0	0	$2,500
Chapel Hill	2/6/2020	1349	50	0	0	$20,000
Chapel Hill	2/6/2020	1349	50	0	0	$20,000
Graham	4/8/2020	1752	50	0	0	$2,500
Mebane hurdle fld ar	4/13/2020	525	50	0	0	$50,000
Huckleberry Spg	4/13/2020	605	50	0	0	$10,000
Gorman	4/13/2020	610	50	0	0	$10,000
Schley	4/13/2020	535	50	0	0	$10,000
Hillsborough	4/13/2020	553	50	0	0	$1,500
Occoneechee	4/13/2020	600	50	0	0	$10,000
Chapel Hill	4/26/2020	1845	50	0	0	$25,000
West Durham	6/11/2020	1840	50	0	0	$2,500
Occoneechee	6/11/2020	1800	50	0	0	$2,500
Chapel Hill	6/11/2020	1820	50	0	0	$10,000
Glen Raven	6/28/2020	1527	50	0	0	$30,000
Chapel Hill Wllms ar	6/28/2020	1550	50	1	0	$50,000
Timberlake	6/30/2020	1653	50	0	0	$10,000
Mt Tirzah	6/30/2020	1700	50	0	0	$10,000
East Durham	7/5/2020	1254	50	0	0	$40,000
Haw river	7/17/2020	1610	50	0	0	$5,000
Haw river	7/17/2020	1610	50	0	0	$5,000
Occoneechee	3/27/2021	1502	50	0	0	$2,500
Chapel Hill Wllms ar	5/4/2021	1456	50	0	0	$1,500
Swepsonville	5/10/2021	1540	50	0	0	$5,000
Swepsonville	5/10/2021	1540	50	0	0	$20,000
Schley	7/17/2021	1702	50	0	0	$5,000
Surf	7/17/2021	1711	50	0	0	$5,000
Hurdle Mills	7/17/2021	2113	50	0	0	$10,000
Saxapahaw	8/20/2021	1913	50	0	0	$5,000
Mangum store	10/25/2021	1956	50	0	0	$2,500

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Elon college	12/11/2021	1811	50	0	0	$5,000
Clegg	3/31/2022	1250	50	0	0	$15,000
Orange factory	4/26/2022	1430	50	0	0	$10,000
Oak grove	4/26/2022	1430	50	0	0	$5,000
Weaver	5/1/2022	1638	50	0	0	$5,000
Roxboro	5/21/2022	1618	50	0	0	$5,000
Ceffo	5/21/2022	1745	50	0	0	$5,000
Haw River	5/23/2022	1425	50	0	0	$5,000
North Durham	5/23/2022	1510	50	0	0	$10,000
Gorman	5/27/2022	821	50	0	0	$10,000
Chapel hill	5/27/2022	810	50	0	0	$5,000
Saxapahaw	6/8/2022	1710	50	0	0	$10,000
Carrboro	6/8/2022	1729	50	0	0	$10,000
Blackwood	6/8/2022	1735	50	0	0	$1,000
Gentrys store	6/8/2022	1745	50	0	0	$5,000
Longs store	6/16/2022	1504	50	0	0	$10,000
Altamahaw	6/17/2022	1613	50	0	0	$25,000
Haw river	6/17/2022	1634	50	0	0	$10,000
Mebane	6/17/2022	1636	50	0	0	$25,000
Oak grove	6/17/2022	1706	50	0	0	$10,000
Miles	6/17/2022	1631	50	0	0	$1,000
Miles	6/17/2022	1638	50	0	0	$25,000
Miles	6/17/2022	1640	50	0	0	$5,000
Miles	6/17/2022	1641	50	0	0	$25,000
Roxboro	7/21/2022	1320	50	0	0	$5,000
Swepsonville	7/25/2022	1735	50	0	0	$5,000
Chapel Hill Wllms ar	7/26/2022	1324	50	0	0	$10,000
Cavel	7/27/2022	1640	50	0	0	$5,000
Mc Dade	7/29/2022	1745	50	0	0	$5,000
Quail Roost	9/12/2022	1512	50	0	0	$5,000
Gorman	10/17/2022	1746	50	0	0	$10,000
Snow camp	1/12/2023	2015	50	0	0	$5,000
Durham	1/12/2023	2049	50	0	0	$25,000
Carr	1/12/2023	2005	50	0	0	$5,000
Chapel Hill	1/12/2023	2023	50	0	0	$20,000
Swepsonville	5/16/2023	2050	50	0	0	$30,000
Mc Gehees Mill	5/16/2023	1648	50	0	0	$10,000
Gentrys store	5/16/2023	1712	50	0	0	$10,000
Concord	5/16/2023	1912	50	0	0	$10,000
Gentrys store	5/16/2023	1923	50	0	0	$5,000
West Hillsboro	6/16/2023	1600	50	0	0	$5,000
Hope Vly	6/19/2023	1409	50	0	0	$5,000
Hope Vly	6/19/2023	1410	50	0	0	$5,000
Durham	6/19/2023	1420	50	0	0	$5,000

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Chapel Hill Wllms ar	6/23/2023	1659	50	0	0	$10,000
Chapel Hill	6/30/2023	2045	50	0	0	$5,000
Alamance	7/1/2023	1543	50	0	0	$5,000
Calvander	7/1/2023	1606	50	0	0	$5,000
Burlington Arpt	7/6/2023	1502	50	0	0	$5,000
Blackwood	7/9/2023	1158	50	0	0	$5,000
West Durham	8/7/2023	1821	50	0	0	$10,000
Saxapahaw	8/15/2023	1440	50	0	0	$5,000
Graham	8/15/2023	1450	50	0	0	$25,000
Swepsonville	8/15/2023	1452	50	0	0	$10,000
West Durham	8/15/2023	1515	50	0	0	$10,000
West Durham	8/15/2023	1517	50	0	0	$15,000
West Durham	8/15/2023	1522	50	0	0	$1,500
Hope Vly	8/15/2023	1525	50	0	0	$1,500
Joyland	8/15/2023	1528	50	0	0	$5,000
Joyland	8/15/2023	1528	50	0	0	$1,500
Bethesda	9/8/2023	1528	50	0	0	$5,000
Durham	9/8/2023	1553	50	0	0	$1,500
Paynes Tavern	9/8/2023	1637	50	0	0	$1,500
Brooksdale	9/8/2023	1638	50	0	0	$5,000
Concord	9/8/2023	1653	50	0	0	$1,500
Total				**3**	**5**	**$3,569,250**

Source: NCEI

During this time period, 17 thunderstorm wind, high wind, and strong wind events also caused crop damage totaling $189,000. These incidents are recorded below:

Table 4.78 – Recorded Wind Events with Crop Damages in the Eno-Haw Region, 1999-2018

Location	Date	Time	Wind Speed (mph)	Crop Damage
Altamahaw	7/13/2005	1815	50	$150,000
Allensville	6/23/2006	1930	50	$1,000
Person (Zone)	11/22/2006	800	35	$1,000
Durham (Zone)	11/22/2006	1000	35	$1,000
Orange (Zone)	11/22/2006	1000	32	$1,000
Alamance (Zone)	11/22/2006	1000	30	$1,000
Burlington Airport	7/15/2016	1740	50	$10,000
Longs Store	2/25/2017	1500	50	$2,000
Hillsborough	5/11/2017	1955	50	$2,000
Total				**$189,000**

Source: NCEI

In addition to recorded thunderstorm wind events, NCEI reports 77 high wind and strong wind events during this same period that caused $5,533,150 in property damage. The costliest wind event during this period happened on October 29, 2020 caused $4 million of property damage in the planning region. Of all 804 wind events during this period, there were eight incidents that directly caused deaths or injuries. These incidents are recorded below:

Table 4.79 – Recorded Wind Events with Injuries and/or Fatalities, 1999-2018

Location	Event Type	Date	Wind Speed (mph)	Fatalities	Injuries
Orange County	Strong Wind	12/9/2009	40	0	2
Chapel Hill	Thunderstorm Wind	5/25/2000	60	0	2
Hillborough	Thunderstorm Wind	6/1/2002	50	0	1
Snow Camp	Thunderstorm Wind	7/17/2010	50	0	1
Chapel Hill	Thunderstorm Wind	6/13/2013	61	1	0
Hope Valley	Thunderstorm Wind	3/12/2014	50	1	0
Durham County	Strong Wind	4/9/2016	37	1	1
Few	Thunderstorm Wind	7/15/2006	50	0	1
Chapel Hills Wllms	Thunderstorm Wind	6/28/2020	50	1	0
Total				**4**	**8**

Source: NCEI

LIGHTNING

According to NCEI data, 28 lightning strikes occurred between 1999 and 2024. Cumulatively, lighting events in this period caused 4 deaths and 8 injuries and resulted in over $3 million in property damage. It should be noted that lightning events recorded by the NCEI are only those that are reported; it is certain that additional lightning incidents have occurred in the Eno-Haw Region. Table 4.80 details NCEI-recorded lightning strikes from 1999 through 2023.

Table 4.80 – Recorded Lightning Strikes in the Eno-Haw Region, 1999-2023

Location	Date	Time	Fatalities	Injuries	Property Damage
Durham	3/21/1999	1400	0	0	$20,000
Carrboro	8/14/1999	1500	0	1	$0
Roxboro	4/8/2000	1530	0	0	$110,000
Chapel Hill	7/2/2002	1515	0	0	$880,000
Burlington	7/4/2002	1815	0	3	$0
Mebane	7/4/2002	1827	0	0	$20,000
Snow Camp	7/22/2003	1830	0	0	$100,000
Cedar Grove	8/22/2003	1600	1	0	$0
Hillsborough	6/11/2006	435	1	0	$0
Roxboro	7/13/2006	1900	0	0	$100,000
Durham	3/27/2007	2200	0	0	$10,000
Chapel Hill	12/11/2008	1205	0	0	$1,500,000
Huckleberry Spring	5/28/2010	2100	0	0	$20,000
Mebane	6/2/2010	1645	0	0	$25,000
Graham	6/15/2010	1845	1	1	$0
Fairntosh	8/5/2010	1740	0	0	$3,000
Graham	8/18/2010	0	0	0	$7,000
Gorman	6/10/2011	2209	1	0	$0
Union Ridge	9/6/2011	1230	0	0	$75,000
Few	3/20/2012	2233	0	0	$100,000
Cedar Grove	7/5/2012	1325	0	0	$5,000
Hesters Store	6/13/2013	1605	0	0	$10,000

Location	Date	Time	Fatalities	Injuries	Property Damage
Few	7/5/2015	2000	0	0	$30,000
Occoneechee	7/5/2017	2035	0	0	$10,000
Genlee	7/5/2018	1730	0	1	$0
Carrboro	8/21/2019	1804	0	0	$5,000
Durham	9/8/2021	1040	0	3	$0
Etland	5/23/2022	1445	0	0	$10,000
		Total	**4**	**8**	**$3,040,000**

Source: NCEI

The following are a selection of narrative descriptions recorded in NCEI for lightning events that occurred in Eno-Haw Region:

June 11, 2006 – Tree fell on Interstate 85 near mile marker 168 when lightning struck a tree. One fatality when a motorcyclist struck the down tree.

December 11, 2008 – Lightning struck a home in Chapel Hill and caught fire. The house burned to the ground when the lightning got into the gas lines of the home.

May 28, 2010 – A lightning strike caused an electrical failure at a pump station near Durham, North Carolina. The electrical failure allowed 18,000 gallons of sewage to spill into the Eno River.

June 15, 2010 – A 19-year-old male was struck by lightning and killed while taking shelter under a tree. It was not raining at the time.

June 10, 2011 – A 45-year-old male died when he was struck by lightning while feeding his livestock.

HAIL

NCEI records 248 separate hail incidents across 106 days between January 1, 1999 and December 31, 2024 in the Eno-Haw Region. Of these, three events were reported to have caused property damage, totaling $2,017,500. Two events caused $60,500 in crop damage (total), and no hail event resulted in death or injury. The largest diameter hail recorded in the Eno-Haw Region was in Person County on June 23, 2016; the average hail size in all storms was a little over one inch in diameter.

Table 4.81 – Summary of Hail Occurrences by County

Location	Number of Occurrences	Average Hail Diameter
Alamance	63	1.02”
Durham	75	1.02”
Orange	44	1.04”
Person	66	1.09”

The following narratives provide detail on select hailstorms from the above list of NCEI recorded events:

April 17, 2000 – Golfball sized hail reported at intersection of Highway 98 and Miami Blvd.

March 28, 2007 - A back-door cold front combined with moderate to strong instability from afternoon heating.produced severe storms across northern portions of the piedmont. Minor flooding from heavy rainfall and hail blocking street drains.

July 27, 2007 – Pea size hail resulted in the total loss of 6 acres of tobacco crop.

July 1, 2012 – Large hail to the size of golf balls destroyed 300 acres of tobacco, with other surrounding areas experiencing a 30 to 50 percent loss. An upper-level disturbance moved across central North Carolina during the late afternoon into the evening and interacted with a moist and unstable atmosphere to

produce scattered showers and thunderstorms. Some of the thunderstorms became severe and produced damaging winds.

April 28, 2016 – Quarter sized to golf ball sized hail fell along a one-mile swath along highway 54 near the intersection of Orange Grove Road in Teer. The hail covered the road and was approximately half an inch deep, causing the road to be closed for a short period of time.

June 23, 2016 – Golf ball to tennis ball size hail fell along a swath from the Virginia state line to Bethel Hill.

May 16, 2023 – Half dollar size hail was reported near Bethel Hill School Road and Highway 501.

PROBABILITY OF FUTURE OCCURRENCE

Based on historical occurrences recorded by NCEI, the region experienced 23 tornado events from 1999 through 2023, which equates to approximately 92% annual probability of tornado winds. During the same period, the region experienced 804 wind events over the 25-year period from 1999 through 2023, the Eno-Haw Region averages approximately 32 wind events per year. Over this same period, 28 lightning events were reported as having caused death, injury, and/or property damage, which equates to an average of 1.12 damaging lightning strikes per year.

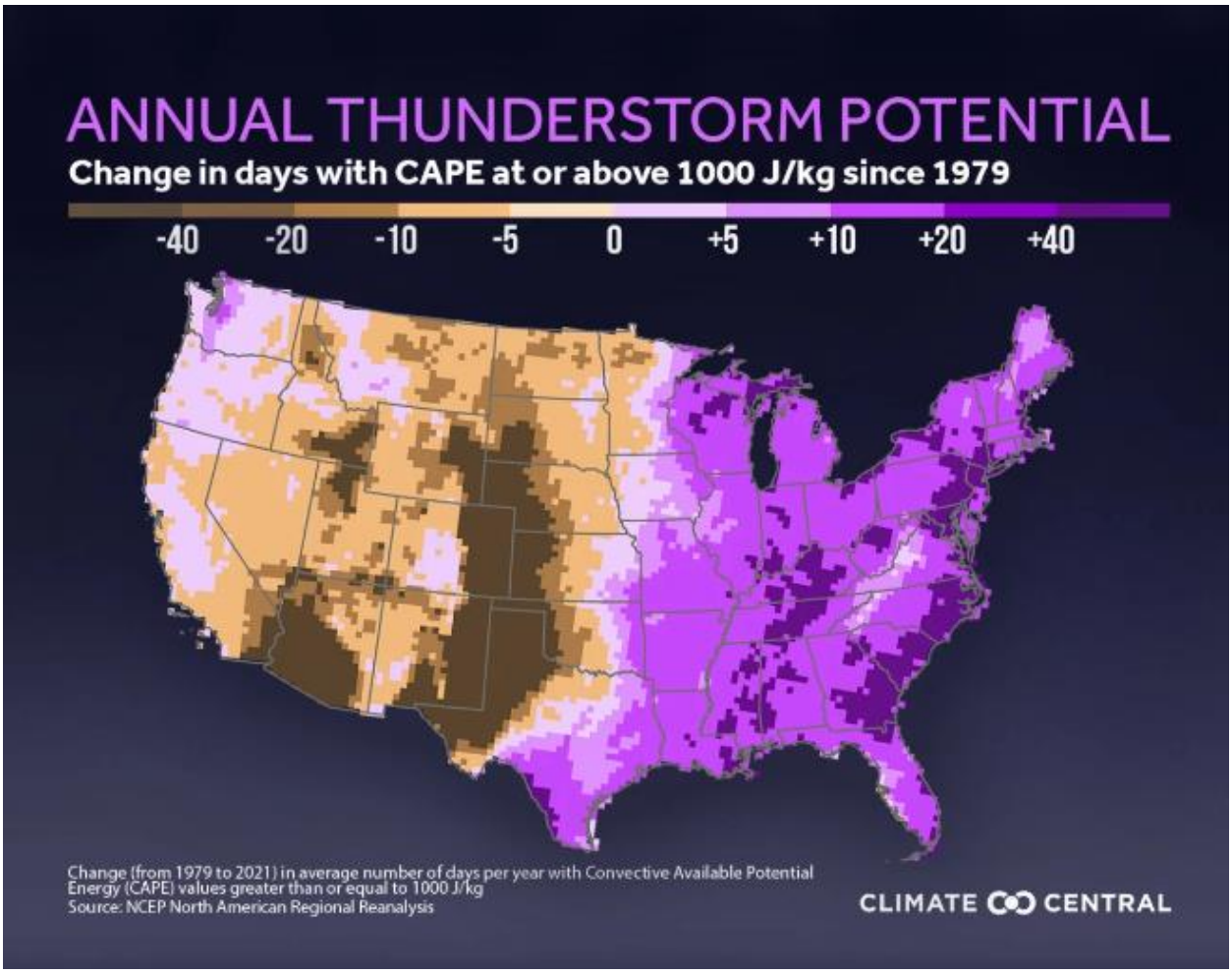
The average hailstorm in the Eno-Haw Region occurs in late afternoon and has a hail stone with a diameter of an inch. Over the 25-year period from 1999 through 2023, the Eno-Haw Region experienced 248 reported hail incidents; this averages almost 10 reported incidents per year somewhere in the planning area, or a 100% chance that the region will experience a hail incident each year. Based on these historical occurrences, there is a 100% chance that the region will experience severe weather each year. The probability of a damaging impacts is highly likely.

Probability: 4 – Highly Likely

CLIMATE CHANGE

According to the National Aeronautics and Space Administration (NASA), thunderstorm events in the future are likely to become more frequent in the southeast as a result of weather extremes. Thunderstorm potential is measured by an index that NASA created called the Convective Available Potential Energy (CAPE) index. This measures how warm and moist the air is, which is a major contributing factor in thunderstorm/tornado formation. Between 1979 and 2021, the Eno Haw Region experienced 10-20 more days on average with CAPE at or above 1000 J/kg, which is considered a high cape value.

Figure 4.36 – Change in Days with High Thunderstorm Potential from 1979 to 2021



Source: NCEP North American Regional Reanalysis, Climate Central 2022

NASA projects that by the period of 2072-2099, the CAPE in the southeastern United States will increase dramatically. Parts of North Carolina are in an area that will likely experience the greatest increase in CAPE in the United States, and the entire state is likely to experience at least some increase.

For a thunderstorm to become a supercell event, meaning that it produces more severe weather like large hail, damaging winds, and tornadoes, it relies on not only warm moist air, but also wind at different levels moving in different directions at different speed (wind shear). As the planet warms, wind shear, unlike warm, moist air, is expected to decrease. Therefore, it is difficult to predict if more supercell thunderstorm events and the tornadoes they can bring with them are more likely to occur.

Additionally, while supercell events are associated with tornadoes, only about 20% of supercell thunderstorms produce tornadoes. To complicate things further, no one fully understands how tornadoes are formed. Therefore, there is no identified conclusion on how climate change will impact tornadoes.

The relationship between hail and climate change is also unclear, however, a 2022 study shows that climate change could increase severe and/or significant spring hailstorms within the Central U.S. (Fan, et.al, 2022). Lightning has a more direct correlation with increasing temperatures as it occurs more frequently when the temperature is hotter than when it is colder. Romps, et. al postulate that lightning will increase by 12% for every degree of rise global average air temperature.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Population and property at risk to wind events was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool.

PEOPLE

People and populations exposed to the elements are most vulnerable to severe weather. A common hazard associated with wind events is falling trees and branches. Risk of being struck by lightning is greater in open areas, at higher elevations, and on the water. Lightning can also cause cascading hazards, including power loss. Loss of power could critically impact those relying on energy to service, including those that need powered medical devices. Additionally, the ignition of fires is always a concern with lightning strikes.

The availability of sheltered locations such as basements, buildings constructed using hail-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. Individuals who work outdoors may face increased risk. Residents living in mobile homes are also more vulnerable to hail events due to the lack of shelter locations and the vulnerability of the housing unit to damages. According to the 2022 American Community Survey (ACS), 15,817 occupied housing units (5.8%) in the Eno-Haw Region are classified as "mobile homes or other types of housing." Based on an estimated average of 2.4 persons per household from the 2022 ACS, there are approximately 37,960 people in the Region living in mobile homes. See Table 4.61 in Section 4,5,6 for details on the number of mobile home units in each jurisdiction.

Individuals who work outdoors may also face increased risk; data on outdoor workers is limited.

Since 1999, the NCEI records four fatalities and eight injuries attributed to lightning in the Eno-Haw Region. NCEI records four fatalities and eight injuries attributed to wind events in the Eno-Haw Region. There are no injuries or fatalities attributed to hail.

PROPERTY

Property damage caused by lightning usually occurs in one of two ways – either by direct damages through fires ignited by lightning, or by secondary impacts due to power loss. According to data collected on lightning strikes in Eno-Haw Region, the vast majority of recorded property damage was due to structure fires.

NCEI records lightning impacts over 25 years (1999-2023), with $3,040,000 in property damage recorded. Historically, this has resulted in $121, 600 in property impacts annually in the Eno-Haw Region. The average impact from lightning per incident in the Eno-Haw Region is $108,571.

General damages to property from hail are direct, including destroyed windows, dented cars, and building, roof and siding damage in areas exposed to hail. Hail can also cause enough damage to cars to cause them to be totaled. The level of damage is commensurate with both a material's ability to withstand hail impacts, and the size of the hailstones that are falling. Construction practices and building codes can help maximize the resistance of the structures to damage. Large amounts of hail may need to be physically cleared from roadways and sidewalks, depending on accumulation. Hail can cause other cascading impacts, including power loss. During a 25-year span between January 1, 1999 and December 31, 2023 in the Eno-Haw Region, NCEI reported $2,017,500 in property damage as a direct result of hail.

This averages to $80,700 per year in reported damages due to hail, though it should be noted that $2,000,000 in recorded damage was all due to one event.

According to PolicyGenius, North Carolina had one of the highest number of hail loss claims (25,026) in the U.S. in 2019. It should be noted that property damage due to hail is usually insured loss, with damages covered under most major comprehensive insurance plans. Because of this, hail losses are notoriously underreported by the NCEI. It is difficult to find an accurate repository of hail damages in the Eno-Haw Region, thus the NCEI is still used to form a baseline.

When strong enough, wind events can cause significant direct damage to buildings and infrastructure. NCEI reports $9,102,400 in property losses due to wind events over 25 years (1999-2023). The average impact from wind per incident in the Eno-Haw Region is $11,321. NCEM's IRISK database was used to estimate potential damages from wind events of different magnitudes, detailed in Table 4.82 and Table 4.83. Note that these tables sum the total estimated damage should every exposed property in each jurisdiction be impacted by an event of the given magnitude. Therefore, these tables are not an approximation of the total damages that would occur from an event of each magnitude because a thunderstorm wind event would not uniformly impact the entire Region. These tables should only be used to understand potential damages relative to storms of varying degrees of severity.

General damages to property are both direct (what the tornado physically destroys) and indirect (additional costs, damages, and losses attributed to secondary hazards spawned by the tornado or due to the damages caused by the tornado). Depending on its size and path, a tornado is capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage. Estimated building damages for different tornado magnitudes are detailed in Table 4.86 through Table 4.90. Note that these tables sum the total estimated damage should every exposed property in each jurisdiction be impacted by an event of the given magnitude. Therefore, these tables are not an approximation of the total damages that would occur from an event of each magnitude because a thunderstorm wind event would not uniformly impact the entire Region. These tables should only be used to understand potential damages relative to storms of varying degrees of severity.

Table 4.82 – Estimated Buildings Impacted by 50-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$9,113,652	3,425	12	$1,085,154	283	1	$297,999	29,619	100	$10,496,804
City of Burlington	24,403	21,618	89	$8,912,208	2,401	10	$2,164,023	320	1	$438,268	24,339	100	$11,514,499
City of Graham	7,269	6,575	90	$2,351,862	530	7	$309,603	155	2	$172,340	7,260	100	$2,833,806
City of Mebane	5,835	5,303	91	$2,350,875	465	8	$1,001,728	64	1	$121,817	5,832	100	$3,474,420
Town of Elon	2,760	2,437	88	$1,219,936	147	5	$288,850	174	6	$153,287	2,758	100	$1,662,072
Town of Green Level	1,177	1,057	90	$313,206	109	9	$40,743	10	1	$5,621	1,176	100	$359,570
Town of Haw River	2,352	2,139	91	$707,757	168	7	$53,849	31	1	$27,653	2,338	99	$789,258
Town of Ossipee	330	299	91	$95,720	21	6	$16,014	7	2	$2,907	327	99	$114,641
Town of Swepsonville	573	543	95	$234,417	24	4	$98,357	5	1	$5,274	572	100	$338,048
Village of Alamance	798	714	89	$270,376	66	8	$16,528	17	2	$11,541	797	100	$298,445
Subtotal Alamance	**75,147**	**66,596**	**89**	**$25,570,009**	**7,356**	**10**	**$5,074,849**	**1,066**	**1**	**$1,236,707**	**75,018**	**100**	**$31,881,563**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$8,283,440	2,818	13	$2,180,587	229	1	$242,791	21,019	100	$10,706,818
City of Durham	75,585	67,750	90	$35,145,911	6,045	8	$8,008,586	1,672	2	$2,545,367	75,467	100	$45,699,864
Subtotal Durham	**96,622**	**85,722**	**89**	**43,429,351**	**8,863**	**9**	**10,189,173**	**1,901**	**2**	**2,788,158**	**96,486**	**100**	**$56,406,682**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$10,956,321	2,657	11	$1,201,269	246	1	$697,859	24,527	100	$12,855,449
Town of Carrboro	5,782	5,464	95	$4,096,444	261	5	$657,012	46	1	$525,469	5,771	100	$5,278,925
Town of Chapel Hill	15,108	13,923	92	$13,801,737	615	4	$1,609,142	529	4	$2,013,414	15,067	100	$17,424,293
Town of Hillsborough	3,883	3,408	88	$1,670,389	358	9	$303,111	111	3	$239,835	3,877	100	$2,213,335
Subtotal Orange	**49,306**	**44,419**	**90**	**30,524,891**	**3,891**	**8**	**3,770,534**	**932**	**2**	**3,476,577**	**49,242**	**100**	**$37,772,002**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Person County													
Unincorporated Person County	17,714	14,893	84	$7,263,867	2,613	15	$477,046	156	1	$395,114	17,662	100	$8,136,027
City of Roxboro	6,617	5,754	87	$2,750,934	710	11	$807,474	144	2	$335,974	6,608	100	$3,894,381
Subtotal Person	**24,331**	**20,647**	**85**	**$10,014,801**	**3,323**	**14**	**$1,284,520**	**300**	**1**	**$731,088**	**24,270**	**100**	**$12,030,408**
Total	**245,406**	**217,384**	**89**	**$109,539,052**	**23,433**	**10**	**$20,319,076**	**4,199**	**2**	**$8,232,530**	**245,016**	**100**	**$138,090,655**

Source: NCEM Risk Management Tool

Table 4.83 – Estimated Buildings Impacted by 100-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$13,924,282	3,425	12	$2,089,117	283	1	$578,131	29,619	100	$16,591,530
City of Burlington	24,403	21,618	89	$13,493,947	2,401	10	$4,052,860	320	1	$848,233	24,339	100	$18,395,040
City of Graham	7,269	6,575	90	$3,602,727	530	7	$616,822	155	2	$340,949	7,260	100	$4,560,498
City of Mebane	5,835	5,303	91	$3,609,781	465	8	$1,857,712	64	1	$226,054	5,832	100	$5,693,548
Town of Elon	2,760	2,437	88	$1,861,681	147	5	$557,615	174	6	$299,887	2,758	100	$2,719,183
Town of Green Level	1,177	1,057	90	$463,551	109	9	$75,144	10	1	$11,399	1,176	100	$550,093
Town of Haw River	2,352	2,139	91	$1,080,120	168	7	$102,364	31	1	$52,594	2,338	99	$1,235,078
Town of Ossipee	330	299	91	$141,252	21	6	$31,151	7	2	$5,355	327	99	$177,757
Town of Swepsonville	573	543	95	$352,239	24	4	$171,731	5	1	$9,524	572	100	$533,494
Village of Alamance	798	714	89	$415,755	66	8	$33,440	17	2	$22,124	797	100	$471,318
Subtotal Alamance	**75,147**	**66,596**	**89**	**$38,945,335**	**7,356**	**10**	**$9,587,956**	**1,066**	**1**	**$2,394,250**	**75,018**	**100**	**$50,927,539**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$12,506,373	2,818	13	$3,832,447	229	1	$405,786	21,019	100	$16,744,606
City of Durham	75,585	67,750	90	$54,561,978	6,045	8	$14,339,389	1,672	2	$4,586,786	75,467	100	$73,488,153
Subtotal Durham	**96,622**	**85,722**	**89**	**67,068,351**	**8,863**	**9**	**18,171,836**	**1,901**	**2**	**4,992,572**	**96,486**	**100**	**$90,232,759**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$16,585,952	2,657	11	$2,090,339	246	1	$1,216,658	24,527	100	$19,892,949
Town of Carrboro	5,782	5,464	95	$6,312,753	261	5	$1,150,600	46	1	$854,587	5,771	100	$8,317,940
Town of Chapel Hill	15,108	13,923	92	$21,147,062	615	4	$2,991,653	529	4	$3,704,032	15,067	100	$27,842,747
Town of Hillsborough	3,883	3,408	88	$2,574,804	358	9	$573,404	111	3	$399,646	3,877	100	$3,547,854
Subtotal Orange	**49,306**	**44,419**	**90**	**46,620,571**	**3,891**	**8**	**6,805,996**	**932**	**2**	**6,174,923**	**49,242**	**100**	**$59,601,490**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Person County													
Unincorporated Person County	17,714	14,893	84	$10,764,695	2,613	15	$805,947	156	1	$685,196	17,662	100	$12,255,838
City of Roxboro	6,617	5,754	87	$4,130,487	710	11	$1,509,680	144	2	$600,321	6,608	100	$6,240,488
Subtotal Person	**24,331**	**20,647**	**85**	**$14,895,182**	**3,323**	**14**	**$2,315,627**	**300**	**1**	**$1,285,517**	**24,270**	**100**	**$18,496,326**
Total	**245,406**	**217,384**	**89**	**$167,529,439**	**23,433**	**10**	**$36,881,415**	**4,199**	**2**	**$14,847,262**	**245,016**	**100**	**$219,258,114**

Source: NCEM Risk Management Tool

Table 4.84 – Estimated Buildings Impacted by 300-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$29,422,337	3,425	12	$5,994,876	283	1	$1,637,855	29,619	100	$37,055,069
City of Burlington	24,403	21,618	89	$25,020,142	2,401	10	$10,721,802	320	1	$2,384,927	24,339	100	$38,126,871
City of Graham	7,269	6,575	90	$8,234,848	530	7	$2,200,394	155	2	$1,140,007	7,260	100	$11,575,249
City of Mebane	5,835	5,303	91	$8,843,654	465	8	$5,169,882	64	1	$660,516	5,832	100	$14,674,052
Town of Elon	2,760	2,437	88	$2,852,773	147	5	$1,002,673	174	6	$558,103	2,758	100	$4,413,549
Town of Green Level	1,177	1,057	90	$1,044,769	109	9	$210,188	10	1	$40,438	1,176	100	$1,295,394
Town of Haw River	2,352	2,139	91	$2,728,522	168	7	$350,117	31	1	$153,101	2,338	99	$3,231,741
Town of Ossipee	330	299	91	$205,256	21	6	$57,523	7	2	$9,343	327	99	$272,122
Town of Swepsonville	573	543	95	$833,748	24	4	$457,462	5	1	$29,685	572	100	$1,320,896
Village of Alamance	798	714	89	$916,534	66	8	$112,489	17	2	$72,462	797	100	$1,101,485
Subtotal Alamance	**75,147**	**66,596**	**89**	**$80,102,583**	**7,356**	**10**	**$26,277,406**	**1,066**	**1**	**$6,686,437**	**75,018**	**100**	**$113,066,428**
Durham County													
Unincorporated Durham County	75,585	67,750	90	$135,919,885	6,045	8	$42,068,159	1,672	2	$13,440,025	75,467	100	$191,428,068
City of Durham	21,037	17,972	85	$28,690,716	2,818	13	$10,861,573	229	1	$1,079,629	21,019	100	$40,631,918
Subtotal Durham	**96,622**	**85,722**	**89**	**164,610,601**	**8,863**	**9**	**52,929,732**	**1,901**	**2**	**14,519,654**	**96,486**	**100**	**$232,059,986**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$36,883,557	2,657	11	$5,166,059	246	1	$2,986,541	24,527	100	$45,036,157
Town of Carrboro	5,782	5,464	95	$16,504,977	261	5	$2,826,506	46	1	$1,705,569	5,771	100	$21,037,051
Town of Chapel Hill	15,108	13,923	92	$52,757,493	615	4	$9,110,764	529	4	$10,467,501	15,067	100	$72,335,758
Town of Hillsborough	3,883	3,408	88	$6,263,186	358	9	$1,860,930	111	3	$989,004	3,877	100	$9,113,119
Subtotal Orange	**49,306**	**44,419**	**90**	**112,409,213**	**3,891**	**8**	**18,964,259**	**932**	**2**	**16,148,615**	**49,242**	**100**	**$147,522,085**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Person County													
Unincorporated Person County	17,714	14,893	84	$20,472,393	2,613	15	$1,731,936	156	1	$1,376,778	17,662	100	$23,581,107
City of Roxboro	6,617	5,754	87	$6,673,123	710	11	$3,141,581	144	2	$1,061,219	6,608	100	$10,875,923
Subtotal Person	**24,331**	**20,647**	**85**	**$27,145,516**	**3,323**	**14**	**$4,873,517**	**300**	**1**	**$2,437,997**	**24,270**	**100**	**$34,457,030**
Total	**245,406**	**217,384**	**89**	**$384,267,913**	**23,433**	**10**	**$103,044,914**	**4,199**	**2**	**$39,792,703**	**245,016**	**100**	**$527,105,529**

Source: NCEM Risk Management Tool

Table 4.85 – Estimated Buildings Impacted by 700-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$55,149,111	3,425	12	$10,994,118	283	1	$3,121,708	29,619	100	$69,264,937
City of Burlington	24,403	21,618	89	$51,099,779	2,401	10	$23,042,692	320	1	$4,678,992	24,339	100	$78,821,463
City of Graham	7,269	6,575	90	$13,583,852	530	7	$4,135,997	155	2	$2,038,322	7,260	100	$19,758,170
City of Mebane	5,835	5,303	91	$15,341,726	465	8	$8,503,744	64	1	$1,127,008	5,832	100	$24,972,477
Town of Elon	2,760	2,437	88	$7,841,694	147	5	$2,876,455	174	6	$1,818,876	2,758	100	$12,537,024
Town of Green Level	1,177	1,057	90	$1,741,418	109	9	$347,643	10	1	$74,568	1,176	100	$2,163,629
Town of Haw River	2,352	2,139	91	$4,830,103	168	7	$674,524	31	1	$254,448	2,338	99	$5,759,076
Town of Ossipee	330	299	91	$498,921	21	6	$173,836	7	2	$26,103	327	99	$698,860
Town of Swepsonville	573	543	95	$1,441,011	24	4	$775,764	5	1	$53,138	572	100	$2,269,913
Village of Alamance	798	714	89	$1,478,862	66	8	$197,596	17	2	$130,927	797	100	$1,807,385
Subtotal Alamance	**75,147**	**66,596**	**89**	**$153,006,477**	**7,356**	**10**	**$51,722,369**	**1,066**	**1**	**$13,324,090**	**75,018**	**100**	**$218,052,934**
Durham County													
Unincorporated Durham County	75,585	67,750	90	$236,405,616	6,045	8	$74,681,111	1,672	2	$23,429,739	75,467	100	$334,516,465
City of Durham	21,037	17,972	85	$48,669,345	2,818	13	$18,659,037	229	1	$1,854,271	21,019	100	$69,182,653
Subtotal Durham	**96,622**	**85,722**	**89**	**285,074,961**	**8,863**	**9**	**93,340,148**	**1,901**	**2**	**25,284,010**	**96,486**	**100**	**$403,699,118**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$60,742,010	2,657	11	$7,868,413	246	1	$4,536,056	24,527	100	$73,146,479

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Carrboro	5,782	5,464	95	$29,820,852	261	5	$4,303,170	46	1	$2,283,999	5,771	100	$36,408,020
Town of Chapel Hill	15,108	13,923	92	$92,018,743	615	4	$16,053,918	529	4	$17,584,060	15,067	100	$125,656,721
Town of Hillsborough	3,883	3,408	88	$10,765,680	358	9	$3,318,816	111	3	$1,597,144	3,877	100	$15,681,640
Subtotal Orange	**49,306**	**44,419**	**90**	**193,347,285**	**3,891**	**8**	**31,544,317**	**932**	**2**	**26,001,259**	**49,242**	**100**	**$250,892,860**
Person County													
Unincorporated Person County	17,714	14,893	84	$44,672,005	2,613	15	$3,185,195	156	1	$3,171,655	17,662	100	$51,028,854
City of Roxboro	6,617	5,754	87	$18,387,907	710	11	$8,042,036	144	2	$3,060,295	6,608	100	$29,490,238
Subtotal Person	**24,331**	**20,647**	**85**	**$63,059,912**	**3,323**	**14**	**$11,227,231**	**300**	**1**	**$6,231,950**	**24,270**	**100**	**$80,519,092**
Total	**245,406**	**217,384**	**89**	**$694,488,635**	**23,433**	**10**	**$187,834,065**	**4,199**	**2**	**$70,841,309**	**245,016**	**100**	**$953,164,004**

Source: NCEM Risk Management Tool

Table 4.86 – Estimated Buildings Impacted by the EF0 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$166,142,190	3,425	12	$38,959,396	283	1	$6,870,494	29,619	100	$211,972,080
City of Burlington	24,403	21,618	89	$136,928,807	2,401	10	$115,309,319	320	1	$10,719,010	24,339	100	$262,957,136
City of Graham	7,269	6,575	90	$41,631,328	530	7	$19,412,298	155	2	$4,267,932	7,260	100	$65,311,558
City of Mebane	5,835	5,303	91	$40,737,269	465	8	$35,465,046	64	1	$2,624,545	5,832	100	$78,826,860
Town of Elon	2,760	2,437	88	$19,742,907	147	5	$6,545,156	174	6	$3,988,785	2,758	100	$30,276,848
Town of Green Level	1,177	1,057	90	$5,250,796	109	9	$1,403,519	10	1	$67,770	1,176	100	$6,722,086
Town of Haw River	2,352	2,139	91	$11,602,722	168	7	$4,480,324	31	1	$464,746	2,338	99	$16,547,792
Town of Ossipee	330	299	91	$1,540,046	21	6	$409,088	7	2	$112,991	327	99	$2,062,126
Town of Swepsonville	573	543	95	$3,978,658	24	4	$2,275,968	5	1	$232,647	572	100	$6,487,273
Village of Alamance	798	714	89	$4,986,272	66	8	$1,275,871	17	2	$394,410	797	100	$6,656,553
Subtotal Alamance	**75,147**	**66,596**	**89**	**$432,540,995**	**7,356**	**10**	**$225,535,985**	**1,066**	**1**	**$29,743,330**	**75,018**	**100**	**$687,820,312**
Durham County													
Unincorporated Durham County	75,585	67,750	90	$658,958,267	6,045	8	$379,173,116	1,672	2	$72,385,958	75,467	100	$1,110,517,340
City of Durham	21,037	17,972	85	$161,609,223	2,818	13	$123,115,608	229	1	$11,330,445	21,019	100	$296,055,276
Subtotal Durham	**96,622**	**85,722**	**89**	**820,567,490**	**8,863**	**9**	**502,288,724**	**1,901**	**2**	**83,716,403**	**96,486**	**100**	**$1,406,572,616**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$241,863,256	2,657	11	$48,758,037	246	1	$16,589,379	24,527	100	$307,210,671
Town of Carrboro	5,782	5,464	95	$75,803,920	261	5	$11,260,171	46	1	$6,282,145	5,771	100	$93,346,236
Town of Chapel Hill	15,108	13,923	92	$244,003,329	615	4	$55,544,036	529	4	$36,595,031	15,067	100	$336,142,396

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Hillsborough	3,883	3,408	88	$30,772,972	358	9	$18,696,740	111	3	$8,332,215	3,877	100	$57,801,928
Subtotal Orange	**49,306**	**44,419**	**90**	**592,443,477**	**3,891**	**8**	**134,258,984**	**932**	**2**	**67,798,770**	**49,242**	**100**	**$794,501,231**
Person County													
Unincorporated Person County	17,714	14,893	84	$132,188,535	2,613	15	$21,275,483	156	1	$8,981,136	17,662	100	$162,445,153
City of Roxboro	6,617	5,754	87	$46,846,920	710	11	$41,838,462	144	2	$10,113,865	6,608	100	$98,799,247
Subtotal Person	**24,331**	**20,647**	**85**	**$179,035,455**	**3,323**	**14**	**$63,113,945**	**300**	**1**	**$19,095,001**	**24,270**	**100**	**$261,244,400**
Total	**245,406**	**217,384**	**89**	**$2,024,587,417**	**23,433**	**10**	**$925,197,638**	**4,199**	**2**	**$200,353,504**	**245,016**	**100**	**$3,150,138,559**

Source: NCEM Risk Management Tool

Table 4.87 – Estimated Buildings Impacted by the EF1 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$1,199,435,283	3,425	12	$257,670,367	283	1	$38,487,642	29,619	100	$1,495,593,292
City of Burlington	24,403	21,618	89	$992,713,821	2,401	10	$715,529,497	320	1	$63,915,578	24,339	100	$1,772,158,896
City of Graham	7,269	6,575	90	$301,322,610	530	7	$123,040,252	155	2	$26,800,426	7,260	100	$451,163,289
City of Mebane	5,835	5,303	91	$293,610,650	465	8	$229,881,612	64	1	$15,761,180	5,832	100	$539,253,442
Town of Elon	2,760	2,437	88	$142,999,357	147	5	$53,946,784	174	6	$29,473,326	2,758	100	$226,419,466
Town of Green Level	1,177	1,057	90	$37,321,119	109	9	$8,910,581	10	1	$545,592	1,176	100	$46,777,292
Town of Haw River	2,352	2,139	91	$83,387,807	168	7	$30,271,855	31	1	$3,394,721	2,338	99	$117,054,383
Town of Ossipee	330	299	91	$11,184,995	21	6	$2,499,366	7	2	$726,465	327	99	$14,410,826
Town of Swepsonville	573	543	95	$29,036,656	24	4	$17,350,502	5	1	$1,095,062	572	100	$47,482,219
Village of Alamance	798	714	89	$36,565,204	66	8	$8,608,292	17	2	$2,074,076	797	100	$47,247,572
Subtotal Alamance	**75,147**	**66,596**	**89**	**$3,127,577,502**	**7,356**	**10**	**$1,447,709,108**	**1,066**	**1**	**$182,274,068**	**75,018**	**100**	**$4,757,560,677**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$1,191,691,240	2,818	13	$829,796,727	229	1	$68,110,547	21,019	100	$2,089,598,514
City of Durham	75,585	67,750	90	$4,741,342,991	6,045	8	$2,340,684,738	1,672	2	$442,803,768	75,467	100	$7,524,831,498
Subtotal Durham	**96,622**	**85,722**	**89**	**5,933,034,231**	**8,863**	**9**	**3,170,481,465**	**1,901**	**2**	**510,914,315**	**96,486**	**100**	**$9,614,430,012**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$1,748,461,726	2,657	11	$319,405,019	246	1	$91,580,103	24,527	100	$2,159,446,848
Town of Carrboro	5,782	5,464	95	$541,716,527	261	5	$72,023,960	46	1	$29,305,655	5,771	100	$643,046,141
Town of Chapel Hill	15,108	13,923	92	$1,749,405,985	615	4	$340,291,566	529	4	$232,188,750	15,067	100	$2,321,886,301

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Hillsborough	3,883	3,408	88	$222,355,911	358	9	$112,156,341	111	3	$41,634,386	3,877	100	$376,146,638
Subtotal Orange	**49,306**	**44,419**	**90**	**4,261,940,149**	**3,891**	**8**	**843,876,886**	**932**	**2**	**394,708,894**	**49,242**	**100**	**$5,500,525,928**
Person County													
Unincorporated Person County	17,714	14,893	84	$951,094,656	2,613	15	$135,901,815	156	1	$52,943,723	17,662	100	$1,139,940,194
City of Roxboro	6,617	5,754	87	$337,429,945	710	11	$273,640,829	144	2	$53,186,889	6,608	100	$664,257,662
Subtotal Person	**24,331**	**20,647**	**85**	**$1,288,524,601**	**3,323**	**14**	**$409,542,644**	**300**	**1**	**$106,130,612**	**24,270**	**100**	**$1,804,197,856**
Total	**245,406**	**217,384**	**89**	**$14,611,076,483**	**23,433**	**10**	**$5,871,610,103**	**4,199**	**2**	**$1,194,027,889**	**245,016**	**100**	**$21,676,714,473**

Source: NCEM Risk Management Tool

Table 4.88 – Estimated Buildings Impacted by the EF2 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$2,152,312,869	3,425	12	$530,898,994	283	1	$121,857,316	29,619	100	$2,805,069,179
City of Burlington	24,403	21,618	89	$1,934,437,747	2,401	10	$1,720,489,541	320	1	$208,120,631	24,339	100	$3,863,047,919
City of Graham	7,269	6,575	90	$585,042,814	530	7	$290,783,348	155	2	$89,155,573	7,260	100	$964,981,735
City of Mebane	5,835	5,303	91	$572,668,639	465	8	$546,352,865	64	1	$51,477,017	5,832	100	$1,170,498,521
Town of Elon	2,760	2,437	88	$280,873,786	147	5	$133,106,846	174	6	$103,920,025	2,758	100	$517,900,656
Town of Green Level	1,177	1,057	90	$64,524,039	109	9	$21,136,002	10	1	$1,974,262	1,176	100	$87,634,302
Town of Haw River	2,352	2,139	91	$150,510,662	168	7	$70,917,508	31	1	$11,925,119	2,338	99	$233,353,289
Town of Ossipee	330	299	91	$20,365,015	21	6	$6,203,240	7	2	$2,439,170	327	99	$29,007,424
Town of Swepsonville	573	543	95	$54,287,234	24	4	$37,109,512	5	1	$3,157,442	572	100	$94,554,188
Village of Alamance	798	714	89	$68,473,459	66	8	$19,430,817	17	2	$6,365,484	797	100	$94,269,759
Subtotal Alamance	**75,147**	**66,596**	**89**	**$5,883,496,264**	**7,356**	**10**	**$3,376,428,673**	**1,066**	**1**	**$600,392,039**	**75,018**	**100**	**$9,860,316,972**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$2,604,614,600	2,818	13	$2,263,029,442	229	1	$313,453,812	21,019	100	$5,181,097,853
City of Durham	75,585	67,750	90	$10,797,306,374	6,045	8	$7,389,518,621	1,672	2	$2,363,432,801	75,467	100	$20,550,257,796
Subtotal Durham	**96,622**	**85,722**	**89**	**13,401,920,974**	**8,863**	**9**	**9,652,548,063**	**1,901**	**2**	**2,676,886,613**	**96,486**	**100**	**$25,731,355,649**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$3,214,244,532	2,657	11	$680,602,468	246	1	$288,179,167	24,527	100	$4,183,026,168
Town of Carrboro	5,782	5,464	95	$1,091,118,771	261	5	$172,140,967	46	1	$84,030,692	5,771	100	$1,347,290,431
Town of Chapel Hill	15,108	13,923	92	$3,532,281,215	615	4	$823,295,113	529	4	$796,404,438	15,067	100	$5,151,980,766

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Hillsborough	3,883	3,408	88	$428,175,191	358	9	$279,835,936	111	3	$124,321,322	3,877	100	$832,332,449
Subtotal Orange	**49,306**	**44,419**	**90**	**8,265,819,709**	**3,891**	**8**	**1,955,874,484**	**932**	**2**	**1,292,935,619**	**49,242**	**100**	**$11,514,629,814**
Person County													
Unincorporated Person County	17,714	14,893	84	$1,689,469,662	2,613	15	$332,024,227	156	1	$171,491,334	17,662	100	$2,192,985,223
City of Roxboro	6,617	5,754	87	$632,571,764	710	11	$646,571,425	144	2	$163,188,103	6,608	100	$1,442,331,292
Subtotal Person	**24,331**	**20,647**	**85**	**$2,322,041,426**	**3,323**	**14**	**$978,595,652**	**300**	**1**	**$334,679,437**	**24,270**	**100**	**$3,635,316,515**
Total	**245,406**	**217,384**	**89**	**$29,873,278,373**	**23,433**	**10**	**$15,963,446,872**	**4,199**	**2**	**$4,904,893,708**	**245,016**	**100**	**$50,741,618,950**

Source: NCEM Risk Management Tool

Table 4.89 – Estimated Buildings Impacted by the EF3 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$2,487,029,632	3,425	12	$630,358,188	283	1	$189,931,114	29,619	100	$3,307,318,933
City of Burlington	24,403	21,618	89	$2,417,060,798	2,401	10	$2,176,925,295	320	1	$325,855,955	24,339	100	$4,919,842,049
City of Graham	7,269	6,575	90	$730,839,150	530	7	$361,530,908	155	2	$140,061,154	7,260	100	$1,232,431,213
City of Mebane	5,835	5,303	91	$724,668,108	465	8	$658,808,326	64	1	$80,636,670	5,832	100	$1,464,113,104
Town of Elon	2,760	2,437	88	$354,331,614	147	5	$177,245,511	174	6	$164,685,188	2,758	100	$696,262,313
Town of Green Level	1,177	1,057	90	$74,210,137	109	9	$25,714,925	10	1	$3,140,283	1,176	100	$103,065,345
Town of Haw River	2,352	2,139	91	$176,927,587	168	7	$81,931,597	31	1	$18,887,914	2,338	99	$277,747,098
Town of Ossipee	330	299	91	$23,591,695	21	6	$7,818,555	7	2	$3,837,345	327	99	$35,247,594
Town of Swepsonville	573	543	95	$64,072,184	24	4	$42,164,538	5	1	$4,842,102	572	100	$111,078,824
Village of Alamance	798	714	89	$80,107,337	66	8	$21,659,137	17	2	$9,869,977	797	100	$111,636,451
Subtotal Alamance	**75,147**	**66,596**	**89**	**$7,132,838,242**	**7,356**	**10**	**$4,184,156,980**	**1,066**	**1**	**$941,747,702**	**75,018**	**100**	**$12,258,742,924**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$2,663,830,987	2,818	13	$2,263,029,442	229	1	$313,453,812	21,019	100	$5,240,314,241
City of Durham	75,585	67,750	90	$12,606,809,912	6,045	8	$7,394,536,257	1,672	2	$2,364,600,498	75,467	100	$22,365,946,667
Subtotal Durham	**96,622**	**85,722**	**89**	**15,270,640,899**	**8,863**	**9**	**9,657,565,699**	**1,901**	**2**	**2,678,054,310**	**96,486**	**100**	**$27,606,260,908**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$3,803,114,902	2,657	11	$826,821,271	246	1	$448,364,911	24,527	100	$5,078,301,084
Town of Carrboro	5,782	5,464	95	$1,445,444,137	261	5	$229,615,650	46	1	$128,734,094	5,771	100	$1,803,793,881
Town of Chapel Hill	15,108	13,923	92	$4,585,182,288	615	4	$1,139,859,777	529	4	$1,220,310,019	15,067	100	$6,945,352,084

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Hillsborough	3,883	3,408	88	$532,364,636	358	9	$363,042,252	111	3	$191,853,741	3,877	100	$1,087,260,629
Subtotal Orange	**49,306**	**44,419**	**90**	**10,366,105,963**	**3,891**	**8**	**2,559,338,950**	**932**	**2**	**1,989,262,765**	**49,242**	**100**	**$14,914,707,678**
Person County													
Unincorporated Person County	17,714	14,893	84	$1,947,887,687	2,613	15	$411,520,220	156	1	$268,286,254	17,662	100	$2,627,694,161
City of Roxboro	6,617	5,754	87	$771,414,967	710	11	$779,740,838	144	2	$253,020,495	6,608	100	$1,804,176,301
Subtotal Person	**24,331**	**20,647**	**85**	**$2,719,302,654**	**3,323**	**14**	**$1,191,261,058**	**300**	**1**	**$521,306,749**	**24,270**	**100**	**$4,431,870,462**
Total	**245,406**	**217,384**	**89**	**$35,488,887,758**	**23,433**	**10**	**$17,592,322,687**	**4,199**	**2**	**$6,130,371,526**	**245,016**	**100**	**$59,211,581,972**

Source: NCEM Risk Management Tool

Table 4.90 – Estimated Buildings Impacted by the EF4 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	25,911	87	$2,489,407,280	3,425	12	$646,628,811	283	1	$203,849,721	29,619	100	$3,339,885,811
City of Burlington	24,403	21,618	89	$2,454,675,492	2,401	10	$2,259,677,120	320	1	$346,997,520	24,339	100	$5,061,350,131
City of Graham	7,269	6,575	90	$742,338,329	530	7	$373,949,908	155	2	$148,278,625	7,260	100	$1,264,566,863
City of Mebane	5,835	5,303	91	$738,200,254	465	8	$678,712,544	64	1	$85,796,647	5,832	100	$1,502,709,446
Town of Elon	2,760	2,437	88	$360,522,097	147	5	$181,537,479	174	6	$171,709,082	2,758	100	$713,768,658
Town of Green Level	1,177	1,057	90	$74,397,746	109	9	$26,613,523	10	1	$3,252,974	1,176	100	$104,264,243
Town of Haw River	2,352	2,139	91	$177,823,301	168	7	$83,937,634	31	1	$19,712,118	2,338	99	$281,473,054
Town of Ossipee	330	299	91	$23,604,936	21	6	$8,176,015	7	2	$4,052,387	327	99	$35,833,338
Town of Swepsonville	573	543	95	$64,304,068	24	4	$42,538,986	5	1	$5,344,274	572	100	$112,187,328
Village of Alamance	798	714	89	$80,201,494	66	8	$21,877,126	17	2	$10,689,059	797	100	$112,767,678
Subtotal Alamance	**75,147**	**66,596**	**89**	**$7,205,474,997**	**7,356**	**10**	**$4,323,649,146**	**1,066**	**1**	**$999,682,407**	**75,018**	**100**	**$12,528,806,550**
Durham County													
Unincorporated Durham County	21,037	17,972	85	$2,663,830,987	2,818	13	$2,263,029,442	229	1	$313,453,812	21,019	100	$5,240,314,241
City of Durham	75,585	67,750	90	$12,606,809,912	6,045	8	$7,395,639,713	1,672	2	$2,364,713,350	75,467	100	$22,367,162,976
Subtotal Durham	**96,622**	**85,722**	**89**	**15,270,640,899**	**8,863**	**9**	**9,658,669,155**	**1,901**	**2**	**2,678,167,162**	**96,486**	**100**	**$27,607,477,217**
Orange County													
Unincorporated Orange County	24,533	21,624	88	$3,823,989,828	2,657	11	$849,324,545	246	1	$482,111,367	24,527	100	$5,155,425,740
Town of Carrboro	5,782	5,464	95	$1,485,802,409	261	5	$239,506,927	46	1	$142,333,389	5,771	100	$1,867,642,726
Town of Chapel Hill	15,108	13,923	92	$4,693,317,729	615	4	$1,190,556,491	529	4	$1,288,138,057	15,067	100	$7,172,012,277

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Town of Hillsborough	3,883	3,408	88	$540,389,208	358	9	$379,563,608	111	3	$209,480,982	3,877	100	$1,129,433,797
Subtotal Orange	**49,306**	**44,419**	**90**	**10,543,499,174**	**3,891**	**8**	**2,658,951,571**	**932**	**2**	**2,122,063,795**	**49,242**	**100**	**$15,324,514,540**
Person County													
Unincorporated Person County	17,714	14,893	84	$1,950,079,217	2,613	15	$428,732,875	156	1	$286,100,406	17,662	100	$2,664,912,497
City of Roxboro	6,617	5,754	87	$780,609,400	710	11	$804,007,921	144	2	$274,031,484	6,608	100	$1,858,648,805
Subtotal Person	**24,331**	**20,647**	**85**	**$2,730,688,617**	**3,323**	**14**	**$1,232,740,796**	**300**	**1**	**$560,131,890**	**24,270**	**100**	**$4,523,561,302**
Total	**245,406**	**217,384**	**89**	**$35,750,303,687**	**23,433**	**10**	**$17,874,010,668**	**4,199**	**2**	**$6,360,045,254**	**245,016**	**100**	**$59,984,359,609**

Source: NCEM Risk Management Tool

Severe weather can also cause significant agricultural losses. Between 2007-2023, the sum of claims paid for crop damage due to hail and wind damages in the Eno-Haw Region was $5,595,524 or an average of $329,148 in losses every year. Table 4.91 summarizes the crop losses due to severe weather in reported in the RMA system.

Table 4.91 – Crop Losses Resulting from Severe Weather, 2007-2023

Year	Cause Description	Indemnity Amount
2007	Hail	$6,365
2008	Hail	$522,767
2009	Hail	$7,716
2011	Hail	$1,474
2012	Hail	$571,235
2013	Hail	$9,608
2015	Hail	$503,031.10
2016	Hail	$775,615.45
2017	Hail	$12,388
2018	Hail	$48,846
2019	Hail	$42,558
2020	Hail	$54,299
2021	Hail	$21,557
2022	Hail	$9,821
2023	Hail	$47,374
	Hail Subtotal	**$2,634,655**
2008	Wind/Excess Wind	$418,020
2009	Wind/Excess Wind	$7,397
2010	Wind/Excess Wind	$78,777
2011	Wind/Excess Wind	$7,827
2012	Wind/Excess Wind	$11,491
2013	Wind/Excess Wind	$72,210
2014	Wind/Excess Wind	$11,228.50
2015	Wind/Excess Wind	$198,019.36
2016	Wind/Excess Wind	$404,779
2017	Wind/Excess Wind	$55,246
2018	Wind/Excess Wind	$919,009
2019	Wind/Excess Wind	$115,715
2020	Wind/Excess Wind	$42,247
2021	Wind/Excess Wind	$74,421
2022	Wind/Excess Wind	$102,819
2023	Wind/Excess Wind	$441,663
	Wind Subtotal	**$2,960,869**
	Total	**$5,595,524**

Source: USDA Risk Management Agency

ENVIRONMENT

The main environmental impact from wind is damage to trees or crops. Wind events can also bring down power lines, which could cause a fire and result in even greater environmental impacts. Tornadoes can

cause massive damage to the natural environment, uprooting trees and other debris within the tornado's path. This is part of a natural process, however, and the environment will return to its original state in time. Lightning may also result in the ignition of wildfires. Hail can cause extensive damage to the natural environment, pelting animals, trees and vegetation with hailstones. Melting hail can also increase both river and flash flood risk.

CONSEQUENCE ANALYSIS

Table 4.92 summarizes the potential negative consequences of severe weather.

Table 4.92 – Consequence Analysis – Severe Weather (Thunderstorm Winds, Lightning, and Hail)

Category	Consequences
Public	Injuries; fatalities
Responders	Injuries; fatalities; potential impacts to response capabilities due to storm impacts
Continuity of Operations (including Continued Delivery of Services)	Potential impacts to continuity of operations due to storm impacts; delays in providing services
Property, Facilities and Infrastructure	Possibility of structure fire ignition; potential for disruptions in power and communications infrastructure; destruction and/or damage to any exposed property, especially windows, cars and siding; mobile homes see increased risk
Environment	Potential fire ignition from lightning; hail damage to wildlife and foliage
Economic Condition of the Jurisdiction	Lightning damage contingent on target; can severely impact/destroy critical infrastructure and other economic drivers
Public Confidence in the Jurisdiction's Governance	Public confidence is not generally affected by severe weather events.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes severe weather hazard risk by jurisdiction. Most aspects of severe weather risk do not vary substantially by jurisdiction; however, wind and hail impacts may be greater in more highly developed areas with higher exposure in terms of both property and population density. Additionally, mobile home units are more vulnerable to wind damage. Mobile home units comprise over 10 percent of the occupied housing in unincorporated Alamance County, unincorporated Orange County, unincorporated Person County, Green Level, Haw River, Ossipee, and Roxboro; therefore, these jurisdictions may face more severe impacts from wind. Where priority ratings vary between thunderstorm wind, lightning, and hail for impact and spatial extent, these scores represent an average rating with greater weight given to thunderstorm wind because it occurs much more frequently.

TORNADOES

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	3	3	2	4	1	2.7	M

THUNDERSTORM WIND

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Alamance County	**4**	**2**	**3**	**4**	**1**	**2.9**	**M**
Burlington	4	1	3	4	1	2.6	M
Graham	4	1	3	4	1	2.6	M
Mebane	4	1	3	4	1	2.6	M
Elon	4	1	3	4	1	2.6	M
Green Level	4	2	3	4	1	2.9	M
Haw River	4	2	3	4	1	2.9	M
Ossipee	4	2	3	4	1	2.9	M
Swepsonville	4	1	3	4	1	2.6	M
Alamance	4	1	3	4	1	2.6	M
Durham County	**4**	**2**	**3**	**4**	**1**	**2.9**	**M**
Durham	4	1	3	4	1	2.6	M
Orange County	**4**	**2**	**3**	**4**	**1**	**2.9**	**M**
Carrboro	4	1	3	4	1	2.6	M
Chapel Hill	4	1	3	4	1	2.6	M
Hillsborough	4	1	3	4	1	2.6	M
Person County	**4**	**2**	**3**	**4**	**1**	**2.9**	**M**
Roxboro	4	2	3	4	1	2.9	M

LIGHTNING AND HAIL

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	4	1	1	4	1	2.2	M

4.5.9 SEVERE WINTER WEATHER

HAZARD BACKGROUND

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

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

Ice storms are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces.

Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces. All of the winter storm elements – snow, low temperatures, sleet, ice, etcetera – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions and disrupt communication and power for days.

Advancements in meteorology and forecasting usually allow for mostly accurate forecasting a few days in advance of an impending storm. Most storms have a duration of a few hours; however, impacts can last a few days after the initial incident until cleanup is completed.

Warning Time: 1 – More than 24 hours

Duration: 3 – Less than 1 week

LOCATION

The entirety of North Carolina is susceptible to winter storm and freeze events. Severe winter storms are usually a countywide or regional hazard, impacting the entire county at the same time. Some ice storms 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 Eno Haw Region is accustomed to smaller scale 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 severe winter weather.

Spatial Extent: 4 – Large

EXTENT

The National Oceanic and Atmospheric Administration (NOAA) uses the Regional Snowfall Index (RSI) to assess the societal impact of winter storms in the six easternmost regions in the United States. The index makes use of population and regional differences to assess the impact of snowfall. For example, areas which receive very little snowfall on average may be more adversely affected than other regions, resulting in a higher severity. The Region may experience any level on the RSI scale. During the snowstorm of February 28 to March 3, 1980, which produced the greatest one-day snowfall amounts the region has experienced, the Region was classified as a Category 4 on the RSI scale. It is possible that more severe events and impacts could be felt in the future.

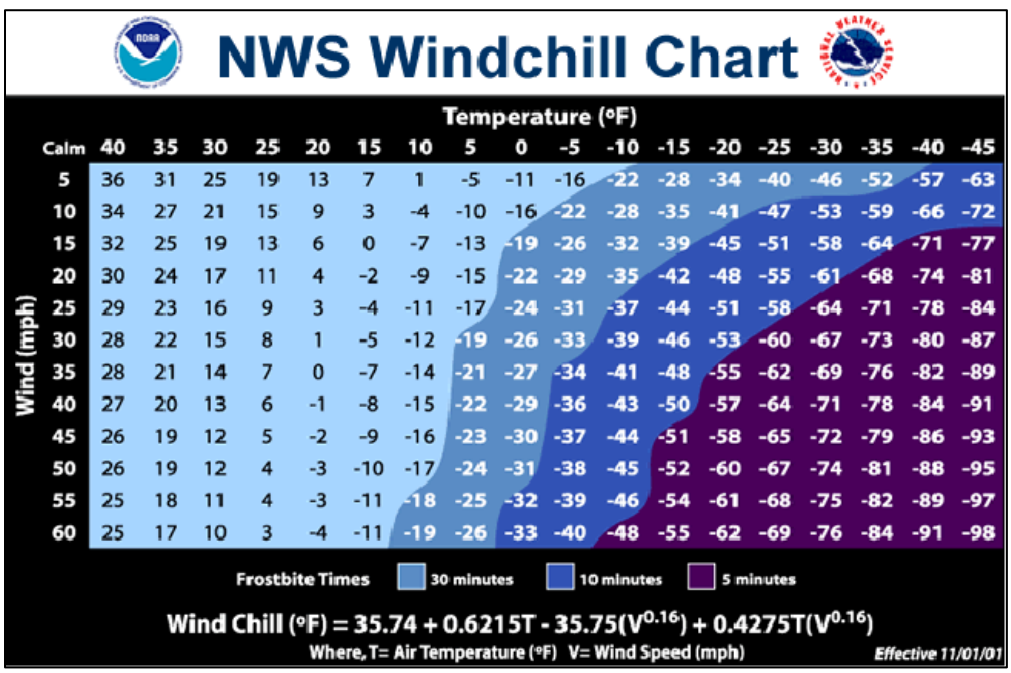
Table 4.93 – Regional Snowfall Index (RSI) Values

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18+	Extreme

Source: NOAA

Severe winter storms often involve a mix of hazardous weather conditions. The magnitude of an event can be defined based on the severity of each of the involved factors, including precipitation type, precipitation accumulation amounts, temperature, and wind. The NWS Wind Chill Temperature Index, shown in Figure 4.37, provides a formula for calculating the dangers of winter winds and freezing temperatures.

Figure 4.37 – NWS Wind Chill Temperature Index



Source: http://www.nws.noaa.gov/om/winter/windchill.shtml

Table 4.94 notes greatest recorded one-day snowfall totals for each county in the Eno Haw Region.

Table 4.94 – Greatest One-Day Snowfall by County

County	Inches	Location	Date
Alamance	18.0	Graham 2 ENE	Jan 24, 1940
Durham	18.5	Rougemont	Dec 18, 1930
Orange	12.0	Chapel Hill 2 W	Dec 17, 1930
Person	16.0	Roxboro 7 ESE	Jan 24, 1940

Source: North Carolina Climate Office

The most significant recorded snow depth over the last 20 years took place in January 2018 and December 2018, with recorded depths of up to 12.5 inches across the four-county region. The Region has received six emergency and disaster declarations related to severe winter weather, indicating the impacts can be extensive to the point that assistance is needed for recovery.

Impact: 3 – Critical

HISTORICAL OCCURRENCES

To get a full picture of the range of impacts of a severe winter storm, data for the following weather types as defined by the National Weather Service (NWS) Raleigh Forecast Office and tracked by NCEI were collected:

- **Blizzard** – A winter storm which produces the following conditions for 3 consecutive hours or longer: (1) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (2) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile.
- **Cold/Wind Chill** – Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory conditions of 0°F to -14°F with wind speeds 10 mph (9 kt) or greater.
- **Extreme Cold/Wind Chill** – A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria, defined as wind chill -15°F or lower with wind speeds 10 mph (9 kt) or greater.
- **Frost/Freeze** – A surface air temperature of 32°F or lower, or the formation of ice crystals on the ground or other surfaces, for a period of time long enough to cause human or economic impact, during the locally defined growing season.
- **Heavy Snow** – Snow accumulation meeting or exceeding 12 and/or 24 hour warning criteria of 3 and 4 inches, respectively.
- **Ice Storm** – Ice accretion meeting or exceeding locally/regionally defined warning criteria of ¼ inch or greater resulting in significant, widespread power outages, tree damage and dangerous travel. Issued only in those rare instances where just heavy freezing rain is expected and there will be no "mixed bag" precipitation meaning no snow, sleet or rain.
- **Sleet** – Sleet accumulations meeting or exceeding locally/regionally defined warning criteria of ½ inch or more.
- **Winter Storm** – A winter weather event that has more than one significant hazard and meets or exceeds locally/regionally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements. Defined by NWS Raleigh Forecast Office as snow accumulations 3 inches or greater in 12 hours (4 inches or more in 24 hours); Freezing rain accumulations ¼ inch (6 mm) or greater; Sleet accumulations ½ inch (13 mm) or more. Issued when there is at least a 60% forecast confidence of any one of the three criteria being met.
- **Winter Weather** – A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria.

Table 4.95 summarizes the recorded severe winter storm events that have impacted each county in the Eno-Haw Region according to the NCEI Storm Events Database for the 25-year period from 1999 through 2023. Note that many events impacted all or multiple counties. Cumulatively, severe winter storms caused over $9.1 million in property damage and $25,000 in crop damage. In this timeframe, the county experienced no fatalities or injuries from severe winter storm, though these types of impacts are possible in future events. No blizzard, cold/wind chill, extreme cold/wind chill, frost/freeze, or sleet events were recorded. Impacts in the Eno-Haw Region by incident are recorded in Table 4.95.

Table 4.95 – Total Severe Winter Storm Impacts in Eno-Haw Region, 1999-2023

Event Type	Number of Recorded Incidents	Total Fatalities	Total Injuries	Total Property Damage	Total Crop Damage
Alamance					
Winter Storm	31	0	0	$500,000	$0
Winter Weather	41	0	0	$20,000	$0
Ice Storm	1	0	0	$0	$0
Heavy Snow	1	0	0	$0	$0
Durham					
Winter Storm	26	0	0	$1,000,000	$0
Winter Weather	38	0	0	$30,000	$0
Ice Storm	1	0	0	$2,700,000	$0
Heavy Snow	1	0	0	$0	$0
Orange					
Winter Storm	31	0	0	$1,000,000	$0
Winter Weather	38	0	0	$30,000	$0
Ice Storm	1	0	0	$2,700,000	$0
Heavy Snow	1	0	0	$0	$0
Person					
Winter Storm	39	0	0	$600,000	$25,000
Winter Weather	34	0	0	$35,000	$0
Ice Storm	2	0	0	$534,000	$0
Heavy Snow	1	0	0	$0	$0
Region Total					
Winter Storm	127	0	0	$3,100,000	$25,000
Winter Weather	151	0	0	$115,000	$0
Ice Storm	5	0	0	$5,934,000	$0
Heavy Snow	4	0	0	$0	$0
Total Events	**287**	**0**	**0**	**$9,149,000**	**$25,000**

Source: NCEI

Several storm impacts from NCEI are summarized below:

December 7, 2007 – A brief period of light freezing rain fell across central North Carolina. Most of the freezing rain accumulation occurred from southern Wake County, east to Smithfield and north to Wilson, Rock Mount and Roanoke Rapids. Portions of Interstate 40 and Highway 70 in Johnston County were closed due to numerous accidents. Over 150 automobile accidents were reported across central North Carolina due to icy bridges. The storm caused $415,000 in damage across the region; The Eno-Haw region itself suffered $95,000 in recorded damage.

March 6, 2014 – A strong surface low deepening off the Carolina coast brought a wintry mix of snow, sleet, and freezing rain to the northern-northwestern Piedmont counties. Snowfall amounts of 4 to 7

inches fell in Person. Just to the south and east of this area, a corridor of mainly sleet mixed with freezing rain produced significant icing of a quarter to half inch. This icing produced widespread downed trees and power outages over the northwest Piedmont. At the peak of the storm, over 400,000 customers were without power. In Person County, one quarter of an inch of ice from freezing rain resulted in widespread downed trees and powerlines. Additionally, snowfall of 4 to 7 inches fell across the county. Orange and Durham Counties saw one quarter to one half of an inch of ice, leading to widespread downed trees and power lines.

February 25, 2015 – As a low-pressure system tracked along the southeast coast, wintry precipitation spread into Central North Carolina. A winter storm warning was issued for the majority of the area. Snowfall/sleet amounts of 5 to 9 inches fell across the region. The heavy wet snow caused extensive power outages from falling trees and power lines. At the peak of the storm, over 45,000 customers were without power.

The Eno-Haw Region received six emergency declarations and presidential disaster declarations since 1968 for incidents related to severe winter storms. As a state, North Carolina received eight disaster declarations related to severe winter storms during this timeframe.

Table 4.96 – Emergency & Disaster Declarations in Eno-Haw Region due to Severe Winter Storms

County	Disaster Number	Date	Disaster Type	Incident Start	Incident End
A,D,O,P	3110	1993	Severe Snowfall & Winter Storm	3/13/1993	3/17/1993
A,D,O,P	1087	1996	Blizzard	1/6/1996	1/12/1996
A,D,O,P	1312	2000	Severe Winter Storm	1/24/2000	2/1/2000
A,D,O,P	1448	2002	Severe Ice Storm	12/4/2002	12/6/2002
A,O,P	1457	2003	Severe Ice Storm	2/27/2003	2/28/2003
A,O,P	4167	2014	Severe Ice Storm	3/6/2014	3/7/2014

Source: FEMA, November 14, 2024

*County code: A = Alamance, D = Durham, O = Orange, P = Person

PROBABILITY OF FUTURE OCCURRENCE

NCEI records 84 severe winter storm related events during the 25-year period from 1999 through 2018, which is an average of 3.4 events per year or more than 100 percent probability in any given year.

Probability: 4 – Highly Likely

CLIMATE CHANGE

Per the 2023 North Carolina Hazard Mitigation Plan, there is uncertainty associated with climate change impacts on future severe winter storms. Global temperature rise could cause shorter and warmer winters in many areas; however, the likelihood of dangerously low temperatures may increase due to continuing trends of temperature extremes. Warmer winters, however, mean that precipitation that would normally fall as snow may begin to fall as rain or freezing rain instead.

VULNERABILITY ASSESSMENT

PEOPLE

Winter storms are considered deceptive killers because most deaths are indirectly related to the storm event. The leading cause of death during winter storms is from automobile or other transportation accidents due to poor visibility and/or slippery roads. Additionally, exhaustion and heart attacks caused by overexertion may result from winter storms.

Power outages during very cold winter storm conditions can also create potentially dangerous situations. Elderly people account for the largest percentage of hypothermia victims. In addition, if the power is out for an extended period, residents are forced to find alternative means to heat their homes. The danger arises from carbon monoxide released from improperly ventilated heating sources such as space or kerosene heaters, furnaces, and blocked chimneys. House fires also occur more frequently in the winter due to lack of proper safety precautions when using an alternative heating source.

PROPERTY

According to reported data of storm impacts recorded by the NCEI, between 1999 and 2023 the Eno-Haw Region experienced $6.8 million in property damage related to the impacts of severe winter storm. Based on this data, the Region experiences average annual losses of $273,960 due to severe winter storm events.

ENVIRONMENT

Winter storm events may include ice or snow accumulation on trees which can cause large limbs, or even whole trees, to snap and potentially fall on buildings, cars, or power lines. This potential for winter debris creates a dangerous environment to be outside in; significant injury or fatality may occur if a large limb snaps while a local resident is out driving or walking underneath it.

CONSEQUENCE ANALYSIS

Table 4.97 summarizes the potential negative consequences of severe winter storm.

Table 4.97 – Consequence Analysis – Severe Winter Storm

Category	Consequences
Public	Localized impact expected to be severe for affected areas and moderate to light for other less affected areas.
Responders	Adverse impact expected to be severe for unprotected personnel and moderate to light for trained, equipped, and protected personnel.
Continuity of Operations (including Continued Delivery of Services)	Localized disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities and Infrastructure	Localized impact to facilities and infrastructure in the areas of the incident. Power lines and roads most adversely affected.
Environment	Environmental damage to trees, bushes, etc.
Economic Condition of the Jurisdiction	Local economy and finances may be adversely affected, depending on damage.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes severe winter storm hazard risk by jurisdiction. Severe winter storm risk does not vary substantially by jurisdiction because these events are typically regional in nature.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	4	2	4	1	3	3.0	H

4.5.10 WILDFIRE

HAZARD BACKGROUND

A wildfire is an uncontained fire that spreads through the environment. Wildfires can consume large areas, including infrastructure, property, and resources. When massive fires, or conflagrations, develop near populated areas, evacuations may be required. Not only do the flames impact the environment, but the massive volumes of smoke spread by certain atmospheric conditions also impact the health of nearby populations. There are three general types of fire spread that are recognized.

- **Ground fires** – burn organic matter in the soil beneath surface litter and are sustained by glowing combustion.
- **Surface fires** – spread with a flaming front and burn leaf litter, fallen branches and other fuels located at ground level.
- **Crown fires** – burn through the top layer of foliage on a tree, known as the canopy or crown fires. Crown fires, the most intense type of fire and often the most difficult to contain, need strong winds, steep slopes and a heavy fuel load to continue burning.

Fuels to wildfires are subject to a variety of ignition sources, both natural and human-caused. Generally, wildfires are started by humans, either through arson or carelessness. Fire intensity is controlled by both short-term weather conditions and longer-term vegetation conditions. During intense fires, understory vegetation, such as leaves, small branches, and other organic materials that accumulate on the ground, can become additional fuel for the fire. The most explosive conditions occur when dry, gusty winds blow across dry vegetation. Historically, fire starts have been contained quickly with minimal loss to property.

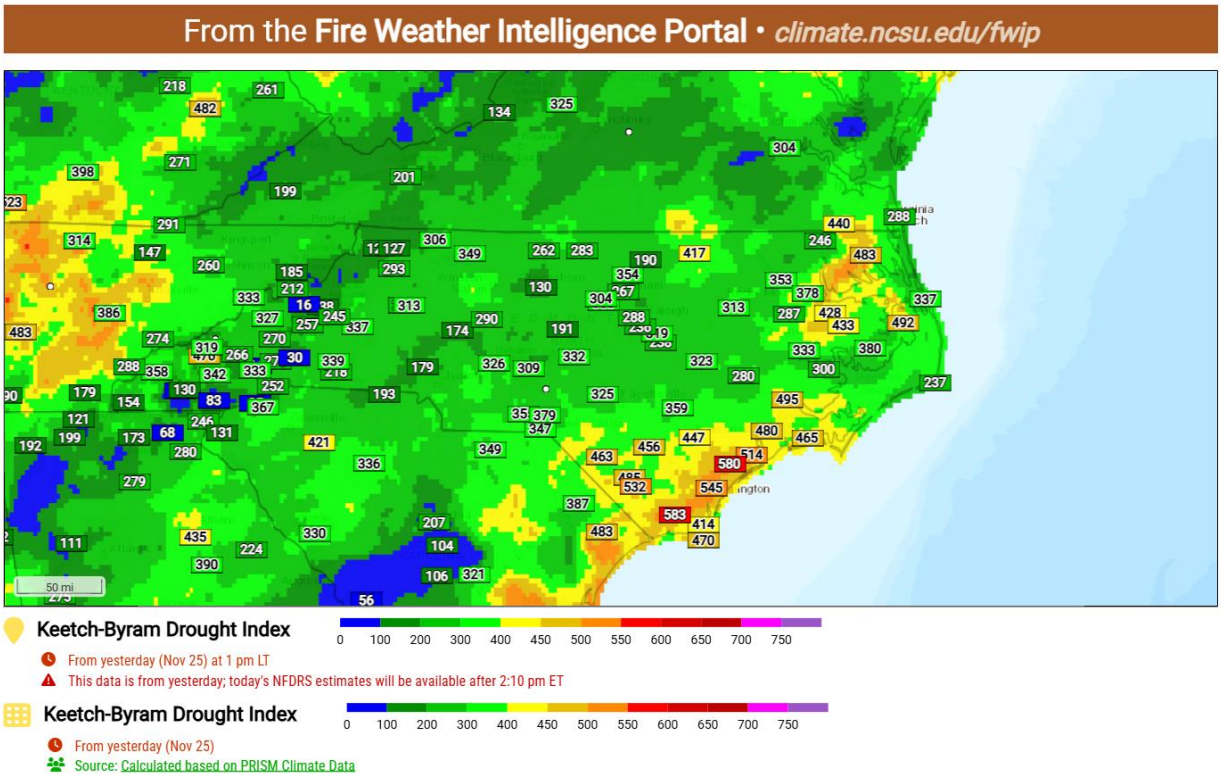
Weather plays a major role in the birth, growth and death of a wildfire. Weather conditions favorable to wildfire include drought, which increases flammability of surface fuels, and winds, which aid a wildfire 's progress. The combination of wind, temperature, and humidity affects how fast wildland fires can spread. Rapid response can contain wildfires and limit their threat to property. In support of forecasting for fire weather, the NWS Fire Weather Program emerged. This service is provided to federal and state land management agencies for the prevention, suppression, and management of forest and rangeland fires.

The Eno-Haw Region experiences a variety of wildfire conditions found in the Keetch-Byram Drought Index, which is described in Table 4.98. The Keetch-Byram Drought Index (KBDI) at weather stations in North Carolina for November 25, 2024 is shown in Figure 4.38. The KBDI for the Eno-Haw Region at this time was between 267 and 354.

Table 4.98 – Keetch-Byram Drought Index Fire Danger Rating System

KBDI	Description
0-200	Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in sports and patches.
200-400	Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.
400-600	Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
600-800	Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

Figure 4.38- Keetch-Byram Drought Index, November 25, 2024



Source: Fire Weather Intelligence Portal, North Carolina State Climate Office

Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

LOCATION

The location of wildfire risk can be defined by the acreage of Functional Wildland Urban Interface (WUI). The Functional WUI is described as the classification of the land near buildings into zones that describe the wildfire risk mitigation activities appropriate for each zone. Buildings used in producing the Functional WUI are defined as greater than 40 square meters. There are five Functional WUI categories recognized.

- **Direct Exposure:** Burnable land cover within 75 m of a building. Buildings in this zone are exposed to ignition from convective and radiative heat from a wildfire, embers, and adjacent burning structures/outbuildings.
- **Indirect Exposure:** Nonburnable land cover within 75 m of a building and less than 1530 m from a 500-ha contiguous block of wildland fuel. Buildings in this zone are exposed to ignition from embers and/or adjacent burning structures
- **Critical Fireshed:** The burnable land cover from which a wildfire can reach a significant number of buildings within a single burning period.
- **Little-to-no Exposure:** Nonburnable land cover within 75 m of a building and more than 1530 m from a 500-ha contiguous block of wildland fuel. Buildings in this zone are relatively safe from ember ignition and building-to-building spread.

— **Sources of Ember Load to Buildings:** Burnable land cover more than 75 m from a building that produces embers capable of reaching nearby buildings. Ember production is a function of fire type and intensity; ember travel is a function of wind speed and direction. Ember modeling is based on fire modeling based on gridded historical climatology.

The Southern Wildfire Risk Assessment (SWRA) estimates that 40 percent of the Eno-Haw Region's population lives within the critical fireshed and 23 percent live in direct exposure to the Functional WUI. The expansion of residential development from urban centers out into rural landscapes increases the potential for wildland fire threat to public safety and the potential for damage to forest resources and dependent industries. Population growth within the WUI substantially increases the risk of wildfire.

Spatial Extent: 3 – Moderate

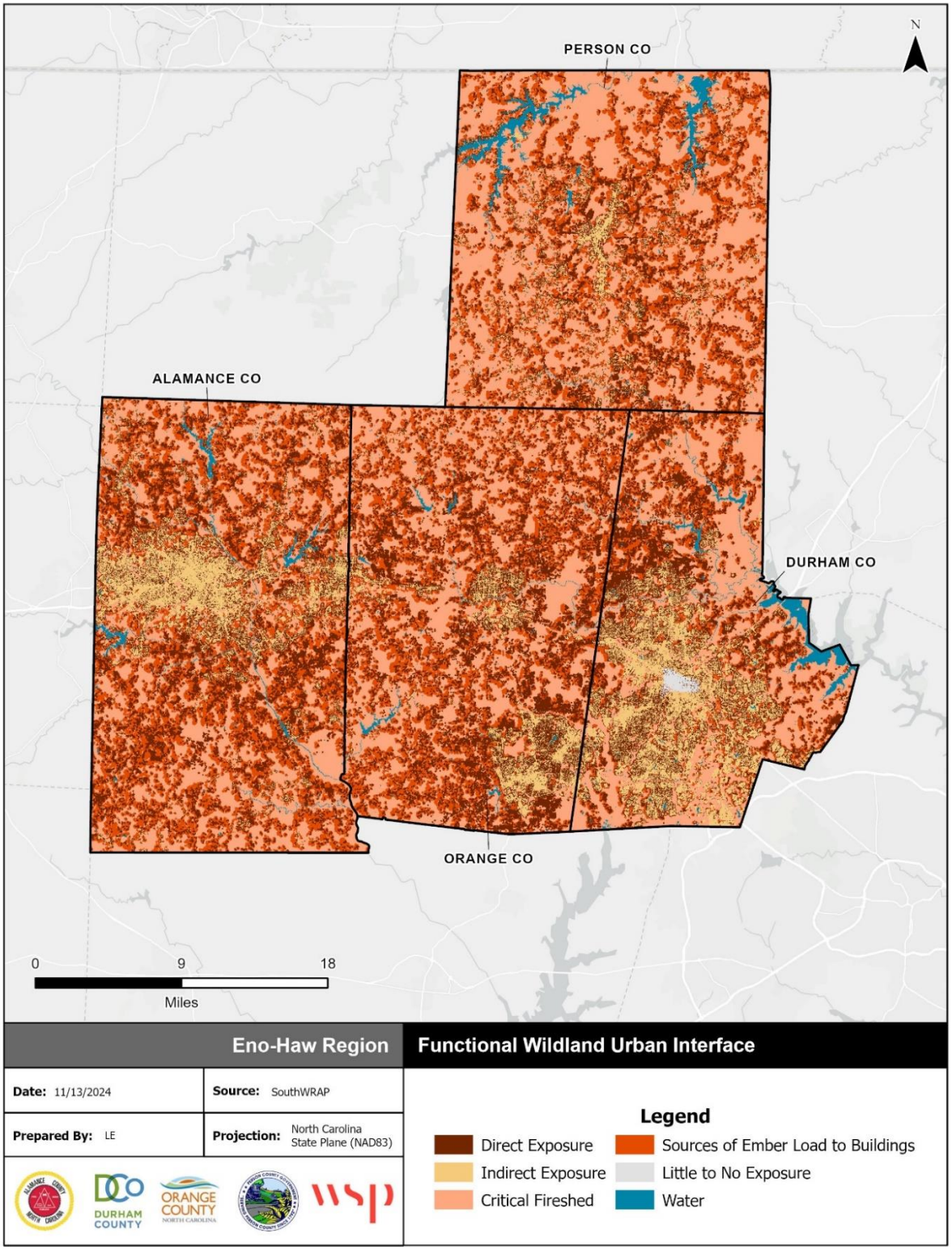
Table 4.99 details the extent of the Functional WUI in the Eno-Haw Region, and Figure 4.39 maps the Functional WUI.

Table 4.99 – Functional Wildland Urban Interface, Eno Haw Region

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	229,103	23%
	Indirect Exposure	86,081	9%
	Critical Fireshed	390,067	40%
	Sources of Ember Load to Buildings	255,539	26%
	Little to No Exposure	1,427	0%
	Water	21,805	2%
	Total	**984,021**	**100%**

Source: Southern Wildfire Risk Assessment

Figure 4.39 – Functional Wildland Urban Interface, Eno-Haw Region



Source: Southern Wildfire Risk Assessment

EXTENT

The extent of a wildfire can be quantified by assessing its intensity, which refers to the energy output or heat released by the fire as it burns. One of the most commonly used tools to measure wildfire intensity is the Characteristic Fire Intensity Scale (CFIS). This scale is instrumental in identifying areas where significant fuel hazards exit- those regions with a high potential to support dangerous and uncontrollable fires. The CFIS now only measures the current intensity of a wildfire but also helps to predict the potential for severe fires by analyzing the available fuel, topography, and weather conditions.

Fire intensity ratings provide critical information about the potential for extreme fire behavior by accounting for a range of factors that influence how a fire will behave. These factors include the type, amount, and arrangement of fuels (such as vegetation or trees), the slope and layout of the land (topography), and weather patterns, including wind speed, humidity, and temperature. The ratings are determined using a weighted average of four percentile weather categories, which represent different levels of fire weather conditions, from relatively mild to extreme. The Fire Intensity Scale consists of five classes, as defined by Southern Wildfire Risk Assessment and is shown in Table 4.100.

Table 4.101 and Figure 4.40 shows the potential fire intensity within the WUI across the Eno-Haw region.

Table 4.100 – Fire Intensity Scale

Class	Description
1, Very Low	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
2, Low	Small flames, usually less than two feet long; small amount of very short range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
3, Moderate	Flames up to 9 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
4, High	Large Flames, up to 40 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
5, Very High	Very large flames up to 200 feet in length; expect extreme fire behavior.

Source: Southern Wildfire Risk Assessment

Table 4.101 – Characteristic Fire Intensity, Eno-Haw Region

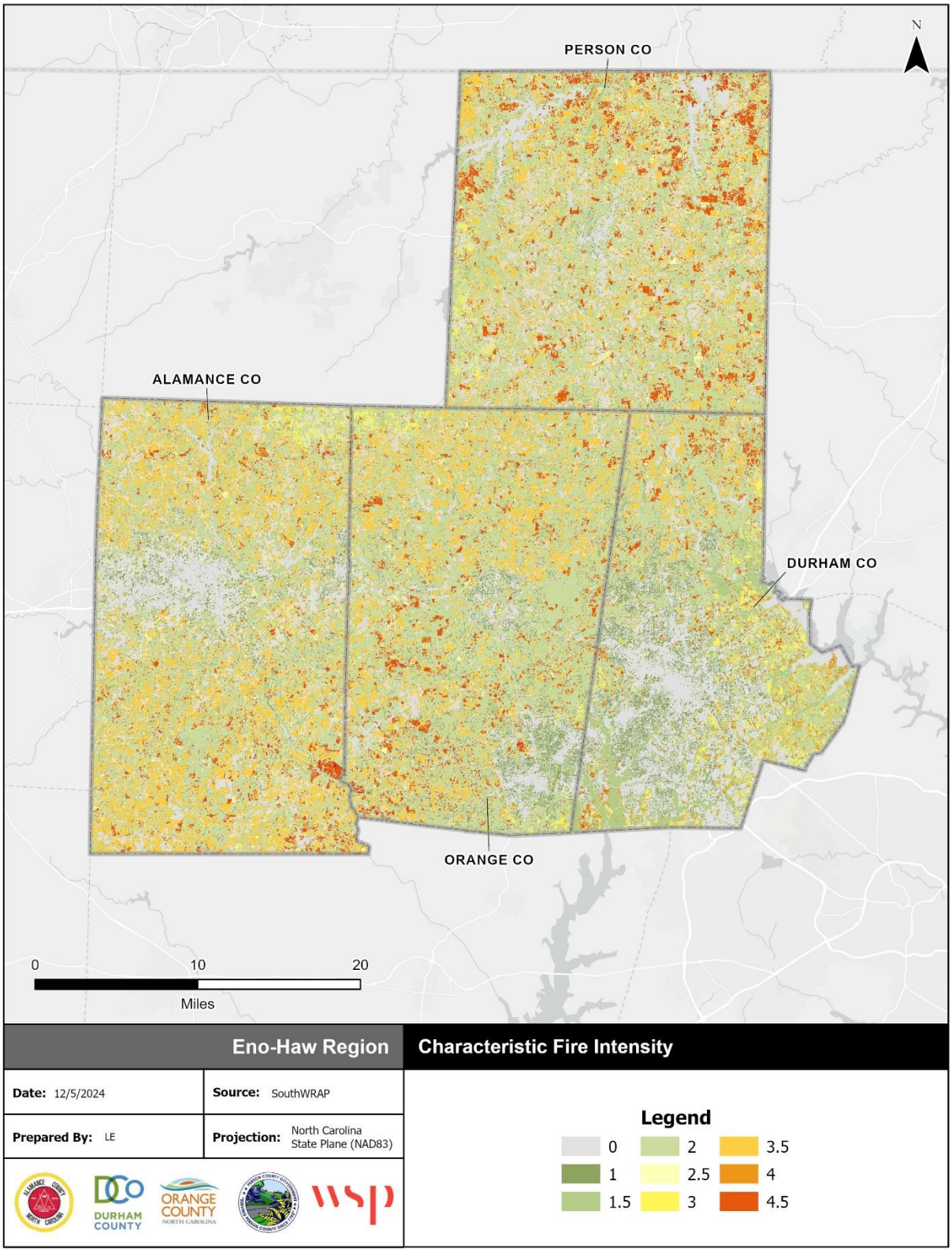
	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	218,376	22%
	1	87,020	9%
	1.5	356,782	36%
	2	86,244	9%
	2.5	15,747	2%
	3	163,412	17%
	3.5	31,448	3%
	4	24,986	3%
	4.5	7	0%
	5	0	0%
	> 5	0	0%
	Total	**984,021**	**100%**

Source: Southern Wildfire Risk Assessment

A small portion, approximately 3 percent, of the Eno-Haw Region may experience up to a Class 4 Fire Intensity, which poses significant harm or damage to life and property. 20 percent of the Eno-Haw Region may experience Class 3 Fire Intensity, which has potential for harm to life and property but is easier to suppress with dozer and plows. The remainder of the region is either non-burnable (22%) or would face a Class 1 or Class 2 Fire Intensity (56%), which are easily suppressed.

Impact: 2 – Limited

Figure 4.40 – Characteristic Fire Intensity, Eno Haw Region



Source: Southern Wildfire Risk Assessment

HISTORICAL OCCURRENCES

The North Carolina Forest Service (NCFS) began keeping records of fire occurrence on private and state-owned lands in 1928. Since this time, there has been an average of approximately 4,063 fires burning more than 104,000 acres annually. Recently, within the last 10 years, the State has averaged closer to 4,300 fires per year and 14,000 acres burned annually.

Table 4.102 summarizes past occurrences of wildfire in the Eno-Haw region by county since 1999 as provided by the NCFS in December 2024. This data only accounts for occurrences within unincorporated areas, which fall under the NCFS jurisdiction, as well as larger events in incorporated areas where local fire departments requested NCFS support for fire suppression. Actual number of fires and acreage burned are higher than what can be reported here.

Based on NCFS records, over the 24-year period from 1999 through 2023, the Eno-Haw Region experienced 3,221 wildfire events that have burned 5,216 acres of land, or approximately 1.6 acres per fire on average.

Table 4.102 – Records for Wildfire in Alamance County, 1999-2023

Year	Alamance County		Durham County		Orange County		Person County	
	Number of Fires	Acreage Burned	Number of Fires	Acreage Burned	Number of Fires	Acreage Burned	Number of Fires	Acreage Burned
1999	19	29.8	48	121.7	68	63.8	33	73.6
2000	11	60.7	21	117.2	55	43.5	33	33.7
2001	47	72.6	38	65.6	113	117.9	87	121.4
2002	29	47.6	27	97	85	55.6	62	155.7
2003	5	7.2	16	19.7	37	28.2	6	2.7
2004	12	49.9	21	21.6	41	54	31	221.4
2005	14	53.7	36	35.7	40	39.2	33	45.5
2006	46	70.9	40	92.1	64	102.5	50	135.7
2007	20	163.6	58	82.6	23	323.2	53	103.8
2008	7	30.3	18	106.6	23	18.4	28	52.2
2009	5	11.4	18	25	17	46.5	17	13.7
2010	3	1.7	20	58.5	31	42.3	15	62.9
2011	10	47.8	12	62.8	35	47.5	26	27.6
2012	3	4.5	8	196	13	31.5	9	10
2013	2	1.1	11	37.3	16	43.6	16	26.7
2014	6	33.7	3	33	23	33.5	15	21.6
2015	10	13.5	15	24.2	36	46.9	26	36.1
2016	24	15.0	33	3.7	62	44.3	47	134.5
2017	35	21.4	63	35.9	75	80.8	61	46.5
2018	23	14.7	28	8.9	35	21.7	39	146.9
2019	34	7.8	16	10.0	38	19.9	32	15.8
2020	23	8.5	10	4.9	27	22.9	27	35.9
2021	64	36.1	29	14.2	30	35.9	60	27.3
2022	86	33.7	38	52.6	36	26.4	60	33.2
2023	59	27.0	31	21.0	37	9.3	40	20.4
Total	**597**	**864.2**	**658**	**1,347.8**	**1,060**	**1,399.3**	**906**	**1,604.8**

Source: NC Forest Service

PROBABILITY OF FUTURE OCCURRENCE

The Southern Wildfire Risk Assessment provides a Burn Probability analysis which signifies the likelihood of a wildfire burning a specific location within a set time frame - commonly represented as the chance of burning during one calendar year or wildfire season. According to the SWRA, Burn Probability can be expressed as a fraction (ex. 0.005) or odds (1-in-200) and is based on fire behavior modeling across thousands of simulations of possible fire seasons. In each simulation, factors contributing to the probability of a fire occurring, including weather and ignition likelihood are varied based on patterns derived from observations in recent decades. It is not predictive and does not reflect any currently forecasted weather or fire danger conditions. Burn Probability does not say anything about the intensity of fire if it occurs. The Burn Probability for the Eno-Haw Region is presented in Table 4.103 and illustrated in Figure 4.41.

Table 4.103 – Burn Probability, Eno-Haw Region

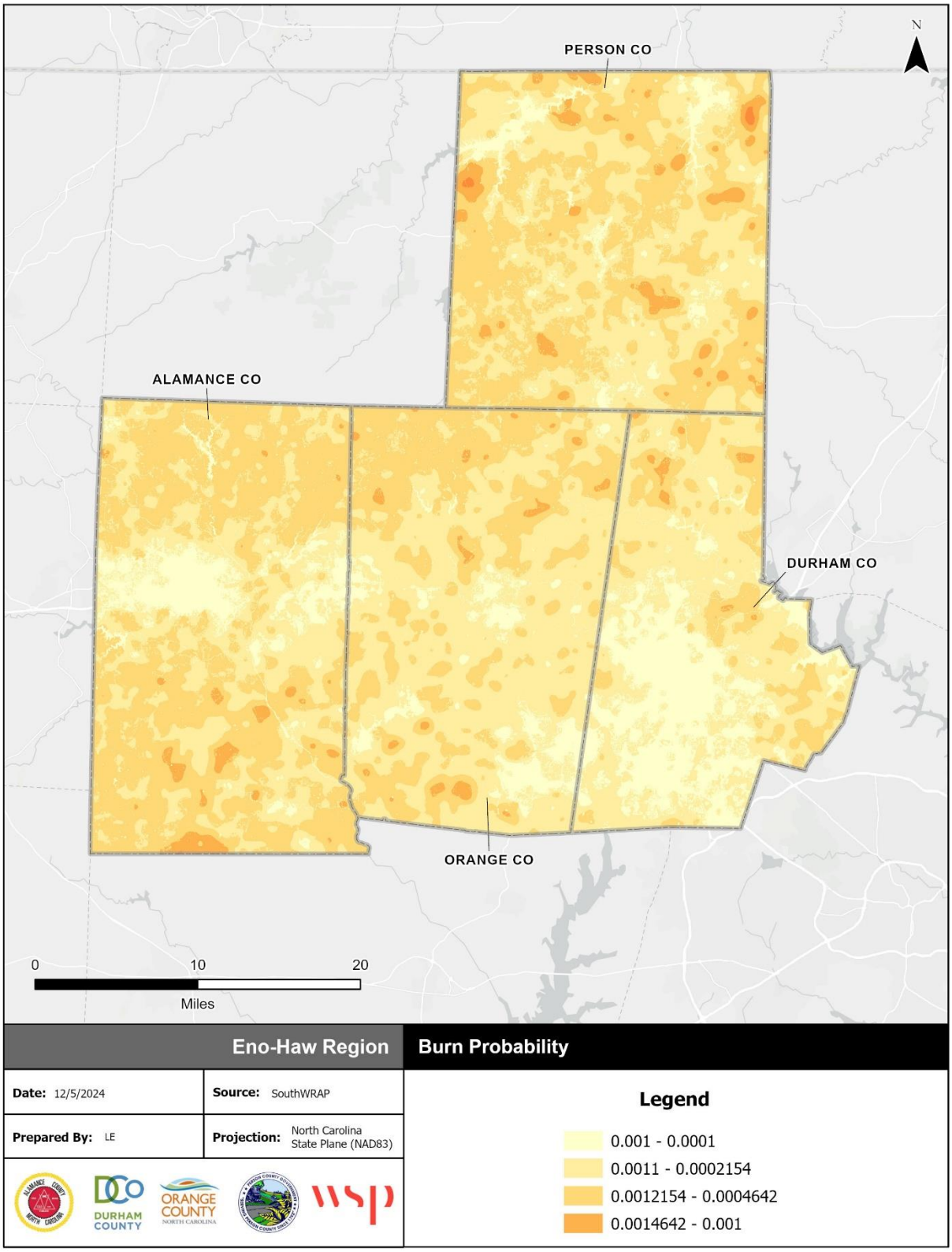
	Burn Probability Category	Acres	Percent
	0	23,535	2%
	>0 - 0.0001000	113,166	12%
	0.0001000 - 0.0002154	447,577	45%
	0.0002154 - 0.0004642	375,392	38%
	0.0004642 - 0.0010000	23,787	2%
	0.0010000 - 0.0021544	565	0%
	0.0021544 - 0.0046416	0	0%
	0.0046416 - 0.0100000	0	0%
	0.0100000 - 0.0215443	0	0%
	0.0215443 - 0.0464159	0	0%
	0.0464159 - 0.1000000	0	0%
	>0.10000000	0	0%
	Total	**984,021**	**100%**

Source: Southern Wildfire Risk Assessment

All of the Eno-Haw Region has a relatively low burn probability, with the highest probabilities reaching moderate burn probability. The areas of moderate burn probability are located primarily in the southern region of Alamance County and unincorporated Person County, particularly in the southwestern corner of the county. There is also limited area of moderate burn probability in northern unincorporated Orange County. The probability of wildfire across the region is considered possible, defined as between a 1% and 10% annual chance of occurrence. While all jurisdictions fall within this threshold, the communities containing moderate burn probability, noted above, have a comparatively higher probability of occurrence.

Probability: 2 – Possible

Figure 4.41 – Burn Probability, Eno-Haw Region



Source: Southern Wildfire Risk Assessment

CLIMATE CHANGE

Climate change is expected to have far-reaching effects on various environmental processes, including the frequency an intensity of extreme heat and drought events, both of which could profoundly influence wildfire behavior. As global temperatures rise, the likelihood of more frequent and prolonged periods of extreme heat increase, which can dry out vegetation, soil, and organic matter, making them more susceptible to ignition. Additionally, the intensification of drought conditions means that water availability for plants and ecosystems could become increasingly scarce, leading to a reduction in the moisture content of vegetation, soils, and decomposing organic material, all of which play a critical tole in wildfire dynamics. Moreover, the unpredictability of climate change means that both seasons could become more extreme in their respective ways, amplifying the impacts on wildfire behavior. Per the Triangle Regional Resilience Assessment, increasing temperatures and longer periods of drought in the region will contribute to increased wildfires frequency, intensity, and size.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Population and property at risk to wildfire was estimated using data from the NCEM IRISK database, which was compiled in NCEM's Risk Management Tool.

Within IRISK, wildfire hazard areas were determined using the Wildland Fire Susceptibility Index (WFSI). The following parameters were applied:

- Areas with a WFSI value of 0.01 – 0.05 were considered to be at moderate risk.
- Areas with a WFSI value greater than 0.05 were considered to be at high risk.
- Areas with a WFSI value less than 0.01 were considered to not be at risk.

The WFSI integrates the probability of an acre igniting and the expected final fire size based on the rate of spread in four weather percentile categories into a single measure of wildland fire susceptibility. Due to some necessary assumptions, mainly fuel homogeneity, it is not the true probability. But since all areas of the state have this value determined consistently, it allows for comparison and ordination of areas of the state as to the likelihood of an acre burning.

PEOPLE

Wildfire poses significant risks to human life and health, causing fatalities, injuries, and long-term health complications such as respiratory issues due to smoke inhalation. To mitigate these dangers, it is crucial to implement comprehensive procedures for rapid warning and evacuation. Developing reliable early warning systems that utilize satellite monitoring, drones, and weather forecasts can help alert communities to emerging threats. Local authorities should communicate through various channels, including SMS alerts, social media and community radio, to ensure that messages everyone effectively.

Effective communication and coordination among local fire departments, law enforcement, and emergency management agencies are vital for an orderly and safe evacuation process. After evacuations, providing support affected individuals and families is crucial, including access to medical care, mental health services, and resources for rebuilding. Establishing community networks can further assist residents during recovery.

Table 4.104 details the population estimated to be at risk to wildfire according to the NCEM IRISK database.

Table 4.104 – Estimated Population Impacted by Wildfire

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Alamance County									
Unincorporated Alamance County	57,799	50,684	88%	9,835	8,624	88%	3,308	2,901	88%
City of Burlington	63,032	10,645	17%	10,440	1,763	17%	3,975	671	17%
City of Graham	18,650	6,208	33%	3,356	1,117	33%	1,288	429	33%
City of Mebane	17,079	13,184	77%	2,206	1,703	77%	977	754	77%
Town of Elon	9,355	4,021	43%	1,524	655	43%	331	142	43%
Town of Green Level	1,541	690	45%	273	122	45%	104	47	45%
Town of Haw River	5,843	4,272	73%	979	716	73%	395	289	73%
Town of Ossipee	434	181	42%	64	27	42%	23	10	43%
Town of Swepsonville	558	468	84%	102	85	83%	38	32	84%
Village of Alamance	704	533	76%	143	108	76%	25	19	76%
Subtotal Alamance	**174,995**	**90,886**	**52%**	**28,922**	**14,920**	**52%**	**10,464**	**5294**	**51%**
Durham County									
Unincorporated Durham County	92,917	2,662	3%	15,332	439	3%	5,294	152	3%
City of Durham	235,187	694	0%	27,521	81	0%	15,501	46	0%
Subtotal Durham	**328,104**	**3,356**	**1%**	**42,853**	**520**	**1%**	**20,795**	**198**	**1%**
Orange County									
Unincorporated Orange County	61,819	4,624	7%	10,806	808	7%	3,164	237	7%
Town of Carrboro	18,405	3	0%	2,281	0	0%	671	0	0%
Town of Chapel Hill	63,329	0	0%	7,428	0	0%	2,477	0	0%
Town of Hillsborough	6,252	276	4%	1,118	49	4%	406	18	4%
Subtotal Orange	**149,805**	**4,903**	**3%**	**21,633**	**857**	**4%**	**6, 718**	**255**	**4%**
Person County									
Unincorporated Person County	29,696	4,582	15%	5,674	875	15%	1,641	253	15%
City of Roxboro	10,172	781	8%	2,211	170	8%	447	34	8%
Subtotal Person	**39,868**	**5,363**	**13%**	**7,885**	**1,045**	**13%**	**2,088**	**287**	**14%**
Total	**692,772**	**104,508**	**15%**	**101,293**	**17,342**	**17%**	**40,065**	**6,034**	**15%**

Source: NCEM Risk Management Tool

PROPERTY

Wildfire can cause direct property losses, including damage to buildings, vehicles, landscaped areas, agricultural lands, and livestock. The destruction of homes and businesses not only results in financial losses but can also displace families and disrupt communities. One effective approach to increasing fire resistance is the use of fire-rated materials in construction such as non-combustible roofing, siding, and decks, as well as tempered glass windows that can withstand high temperatures. Additionally, building codes that require certain fire safety measures, such as proper ventilation and firebreaks, can further protect properties from encroaching flames.

Landscaping practices are another vital element in reducing vulnerability to wildfires. By incorporating fire-resistant plants and creating defensible space around properties—typically a buffer zone that extends at least 30 feet from structures—homeowners can limit the flammability of their surroundings. Techniques such as maintaining a green lawn, using gravel or stone mulch, and keeping trees trimmed can minimize the potential for fire to spread to buildings.

Table 4.105 details the buildings at risk to wildfire in the Eno-Haw Region.

Table 4.106 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings across all jurisdictions, by sector. The sectors facing the greatest risk to wildfire in the Region are commercial facilities, critical manufacturing, and government facilities.

Table 4.105 – Estimated Buildings Impacted by Wildfire

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Alamance County													
Unincorporated Alamance County	29,650	22,720	77%	$2,189,482,865	3,206	11%	$592,495,065	255	1%	$184,154,306	26,181	88%	$2,966,132,236
City of Burlington	24,403	3,656	15%	$401,745,660	391	2%	$526,148,769	63	0%	$92,455,203	4,110	17%	$1,020,349,632
City of Graham	7,269	2,186	30%	$273,255,114	137	2%	$138,863,882	33	0%	$63,536,803	2,356	32%	$475,655,799
City of Mebane	5,835	4,091	70%	$580,442,829	275	5%	$455,518,397	42	1%	$68,570,137	4,408	76%	$1,104,531,363
Town of Elon	2,760	1,047	38%	$170,893,947	65	2%	$68,564,795	117	4%	$135,141,122	1,229	45%	$374,599,865
Town of Green Level	1,177	473	40%	$33,891,997	47	4%	$12,176,135	6	1%	$2,150,024	526	45%	$48,218,156
Town of Haw River	2,352	1,564	66%	$134,526,958	92	4%	$55,157,383	29	1%	$18,985,559	1,685	72%	$208,669,900
Town of Ossipee	330	125	38%	$10,933,983	15	5%	$7,404,940	5	2%	$3,301,904	145	44%	$21,640,827
Town of Swepsonville	573	455	79%	$56,169,359	21	5%	$37,867,378	3	1%	$4,890,848	479	84%	$98,927,585
Village of Alamance	798	541	68%	$65,102,560	47	6%	$19,385,064	13	2%	$9,156,697	601	75%	$93,644,321
Subtotal Alamance	**75,147**	**36,858**	**49%**	**$3,916,445,272**	**4,296**	**6%**	**$1,913,581,808**	**566**	**1%**	**$582,342,603**	**41,720**	**56%**	**$6,412,369,684**
Durham County													
Unincorporated Durham County	21,037	515	2%	$67,944,537	177	1%	$141,967,552	6	0%	$4,012,437	698	3%	$213,924,525
City of Durham	75,588	193	0%	$39,333,190	17	0%	$73,663,557	9	0%	$78,920,537	219	0%	$191,917,284
Subtotal Durham	**96,625**	**708**	**1%**	**$107,277,727**	**194**	**0%**	**$215,631,109**	**15**	**0%**	**$82,932,974**	**917**	**1%**	**$405,841,809**
Orange County													
Unincorporated Orange County	24,533	1,617	7%	$265,704,238	567	2%	$111,940,237	33	0%	$67,853,955	2,217	9%	$445,498,430
Town of Carrboro	5,782	1	0%	$226,330	0	0%	$0	0	0%	$0	1	0%	$226,330
Town of Chapel Hill	15,108	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Hillsborough	3,883	148	4%	$24,261,113	32	1%	$47,243,754	13	0%	$73,591,389	193	5%	$145,096,256
Subtotal Orange	**49,306**	**1,766**	**5%**	**$290,191,681**	**599**	**2%**	**$159,183,991**	**46**	**0%**	**$141,445,344**	**2,411**	**7%**	**$590,821,016**
Person County													

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Unincorporated Person County	17,714	2,299	13%	$301,898,644	523	3%	$37,110,347	15	0.1%	$20,159,406	2,837	16%	$359,168,397
City of Roxboro	6,617	443	6.7%	$62,595,545	84	1%	$59,718,889	7	0.1%	$14,987,106	534	8.1%	$137,301,540
Subtotal Person	**24,331**	**2,742**	**11%**	**$364,494,189**	**607**	**2%**	**$96,829,236**	**22**	**0.1%**	**$35,146,512**	**3,371**	**13.9%**	**$496,469,937**
Total	**245,410**	**42,074**	**17%**	**$4,678,408,869**	**5,696**	**2%**	**$2,385,226,144**	**649**	**0%**	**$815,198,425**	**48,419**	**20%**	**$7,905,502,446**

Source: NCEM Risk Management Tool

Table 4.106 – Critical Infrastructure and Key Resources Buildings at Risk to Wildfire by Sector

Sector	Number of Buildings at Risk	Estimated Damages
Banking and Finance	37	$38,218,693
Commercial Facilities	1,405	$1,141,325,876
Communications	2	$707,732
Critical Manufacturing	564	$840,428,481
Defense Industrial Base	3	$31,172,887
Emergency Services	14	$7,704,597
Energy	13	$210,084,334
Food and Agriculture	3,559	$203,121,864
Government Facilities	291	$505,499,028
Healthcare and Public Health	89	$117,901,959
Nuclear Reactors, Materials and Waste	1	$50,000
Transportation Systems	371	$266,961,024
Water	50	$341,060,599
All Categories	**6,399**	**$3,704,237,074**

Source: NCEM Risk Management Tool

ENVIRONMENT

Wildfires have the potential to cause extensive damage to forest and forage resources, significantly affecting both natural habitats and agricultural land. When a wildfire sweeps through a forest, it can obliterate vast areas of vegetation, leading to loss of trees, shrubs, and underbrush that provide habitat for wildlife. This destruction disrupts ecosystems, displacing animal species and impacting their food sources.

Additionally, wildfires can severely damage agricultural crops on private land. The intense heat and smoke can harm plants, leading to reduced yields or complete crop failure. This not only affects farmers economically but can also have broader implications for local and regional food supplies. The destruction of crops can lead to higher food prices and food scarcity, impacting communities that depend on these resources.

The recovery process can vary based on factors such as the severity of the fire, the type of ecosystem affected, and climate conditions. In many cases, wildfires can lead to the growth of new, diverse plant communities that enhance soil quality and increase habitat complexity. Additionally, the ash left behind can provide essential nutrients that stimulate the growth of new vegetation.

CONSEQUENCE ANALYSIS

Table 4.107 summarizes the potential detrimental consequences of wildfire.

Table 4.107 – Consequence Analysis - Wildfire

Category	Consequences
Public	In addition to the potential for fatalities, wildfire and the resulting diminished air quality pose health risks. Exposure to wildfire smoke can cause serious health problems within a community, including asthma attacks and pneumonia, and can worsen chronic heart and lung diseases. Vulnerable

Category	Consequences
	populations include children, elderly, and people with respiratory problems or heart disease. Even healthy citizens may experience symptoms such as sore throats and itchy eyes.
Responders	Public and firefighter safety is the priority in all wildland fire management activities. Wildfires are a real threat to the health and safety of the emergency services. Most fire-fighters in rural areas are 'retained'. This means that they are part-time and can be called away from their normal work to attend to fires.
Continuity of Operations (including Continued Delivery of Services)	Wildfire events can lead to power outages, disrupting operations significantly. Fallen trees, damaged power lines, and poor road conditions can hinder access to essential facilities and emergency equipment.
Property, Facilities and Infrastructure	Wildfires frequently damage community infrastructure, including roadways, communication networks and facilities, power lines, and water distribution systems. Restoring basic services is critical and a top priority. Efforts to restore roadways include the costs of maintenance and damage assessment teams, field data collection, and replacement or repair costs. Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground distribution lines, and soil erosion or debris deposits into waterways after the fire. Utilities and communications repairs are also necessary for equipment damaged by a fire. This includes power lines, transformers, cell phone towers, and phone lines.
Environment	Wildfires damage the natural environment by killing vegetation and wildlife. The aftermath increases the risk of floods and debris flows, as bare ground and the loss of plants leave areas more vulnerable. Moreover, the secondary effects of wildfires—such as erosion, landslides, the introduction of invasive species, and changes in water quality—can often be more catastrophic than the fire itself.
Economic Condition of the Jurisdiction	Wildfires can have significant short-term and long-term effects on the local economy. Wildfires, and extreme fire danger, may reduce recreation and tourism in and near the fires. If aesthetics are impaired, local property values can decline. Extensive fire damage to trees can significantly alter the timber supply, both through a short-term surplus from timber salvage and a longer-term decline while the trees regrow. Water supplies can be degraded by post-fire erosion and stream sedimentation.
Public Confidence in the Jurisdiction's Governance	Wildfire events can undermine public confidence due to their visible effects on the community. The level of trust in local governance may be shaped by actions taken before a disaster, such as mitigation efforts, preparation initiatives, public education, timely warnings to residents, response measures, and the speed and effectiveness of recovery efforts.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes wildfire hazard risk by jurisdiction. Wildfire warning time and duration do not vary by jurisdiction. Spatial extent ratings were based on the proportion of area within the Functional WUI. Impact ratings were based on fire intensity data from SWRA. No jurisdictions have significant clusters of moderate to high fire intensity; therefore, all jurisdictions were assigned a rating of

2. Probability ratings were determined based on burn probability data from SWRA. Jurisdictions with clusters of moderate burn probability were assigned a rating of 3; all other jurisdictions were assigned a probability of 2.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Alamance County	**3**	**2**	**3**	**4**	**3**	**2.8**	**M**
Burlington	2	2	3	4	3	2.5	M
Graham	2	2	3	4	3	2.5	M
Mebane	2	2	3	4	3	2.5	M
Elon	2	2	3	4	3	2.5	M
Green Level	2	2	3	4	3	2.5	M
Haw River	2	2	3	4	3	2.5	M
Ossipee	2	2	3	4	3	2.5	M
Swepsonville	2	2	3	4	3	2.5	M
Alamance	2	2	3	4	3	2.5	M
Durham County	**2**	**2**	**3**	**4**	**3**	**2.5**	**M**
Durham	2	2	3	4	3	2.5	M
Orange County	**3**	**2**	**3**	**4**	**3**	**2.8**	**M**
Carrboro	2	2	3	4	3	2.5	M
Chapel Hill	2	2	3	4	3	2.5	M
Hillsborough	2	2	3	4	3	2.5	M
Person County	**3**	**2**	**3**	**4**	**3**	**2.8**	**M**
Roxboro	2	2	3	4	3	2.5	M

4.5.11 CIVIL DISTURBANCE

HAZARD BACKGROUND

Civil disorder is a term that generally refers to groups of people purposely choosing not to observe a law, regulation, or rule, usually in order to bring attention to a cause, concern, or agenda. Civil disorder can take the form of small gatherings or large groups blocking or impeding access to a building or disrupting normal activities by generating noise and intimidating people. They can range from a peaceful sit-in to a full-scale riot in which a mob burns or otherwise destroys property and terrorizes individuals. Even in its more passive forms, a group that blocks roadways, sidewalks, or buildings interferes with public order. In the 1990s abortion clinics, for example, were targets for these disruptive-type activities.

Throughout this country's history, incidents that disrupted the public peace have figured prominently. The constitutional guarantees allow for ample expression of protest and dissent, and in many cases collide with the preamble's requirement of the government "to ensure domestic tranquility." Typical examples of such conflicting ideology include the protest movements for civil rights in the late 1960s and the Vietnam War protest demonstrations in the early 1970s. The balance between an individual's and group's legitimate expression of dissent and the right of the populace to live in domestic tranquility requires the diligent efforts of everyone to avoid such confrontations in the future.

In modern society, laws have evolved that govern the interaction of its members to peacefully resolve conflict. In the United States, a crowd itself is constitutionally protected under "the right of the people to peacefully assemble." However, assemblies that are not peaceable are not protected, and this is generally the dividing line between crowds and mobs. The laws that deal with disruptive conduct are generally grouped into offenses that disturb the public peace. They range from misdemeanors, such as blocking sidewalks or challenging another to fight, to felonies, such as looting and rioting.

It is important to note that civil unrest is not synonymous with peaceful assembly or peaceful protest; Americans are guaranteed a right to assemble peacefully under the First Amendment to the Constitution.

TYPES OF CROWDS

A crowd may be defined as a casual, temporary collection of people without a strong, cohesive relationship. Crowds can be classified into four general categories:

Casual Crowd — A casual crowd is merely a group of people who happen to be in the same place at the same time. Examples of this type include shoppers and sightseers. The likelihood of violent conduct is all but nonexistent.

Cohesive Crowd — A cohesive crowd consists of members who are involved in some type of unified behavior. Members of this group are involved in some type of common activity, such as worshiping, dancing, or watching a sporting event. Although they may have intense internal discipline (e.g., rooting for a team), they require substantial provocation to arouse to action.

Expressive Crowd — An expressive crowd is one held together by a common commitment or purpose. Although they may not be formally organized, they are assembled as an expression of common sentiment or frustration. Members wish to be seen as a formidable influence. One of the best examples of this type is a group assembled to protest something.

Aggressive Crowd — An aggressive crowd is made up of individuals who have assembled for a specific purpose. This crowd often has leaders who attempt to arouse the members or motivate them to action. Members are noisy and threatening and will taunt authorities. They tend to be impulsive and highly

emotional and require only minimal stimulation to arouse them to violence. Examples of this type of crowd include demonstrations and strikers.

TYPES OF MOBS

A mob can be defined as a large disorderly crowd or throng. Mobs are usually emotional, loud, tumultuous, violent, and lawless. Like crowds, mobs have different levels of commitment and can be classified into four categories:

Aggressive Mob—An aggressive mob is one that attacks, riots, and terrorizes. The object of violence may be a person, property, or both. An aggressive mob is distinguished from an aggressive crowd only by lawless activity. Examples of aggressive mobs are the inmate mobs in prisons and jails, mobs that act out their frustrations after political defeat, or violent mobs at political protests or rallies.

Escape Mob—An escape mob is attempting to flee from something such as a fire, bomb, flood, or other catastrophe. Members of escape mobs have lost their capacity to reason and are generally impossible to control. They are characterized by unreasonable terror.

Acquisitive Mob—An acquisitive mob is one motivated by a desire to acquire something. Riots caused by other factors often turn into looting sprees. This mob exploits a lack of control by authorities in safeguarding property. Examples of acquisitive mobs would include the looting in South Central Los Angeles in 1992, or food riots in other countries.

Expressive Mob—An expressive mob is one that expresses fervor or revelry following some sporting event, religious activity, or celebration. Members experience a release of pent up emotions in highly charged situations. Examples of this type of mob include the June 1994 riots in Canada following the Stanley Cup professional hockey championship, European soccer riots, and those occurring after other sporting events in many countries, including the United States.

Although members of mobs have differing levels of commitment, as a group they are far more committed than members of a crowd. As such, a "mob mentality" sets in, which creates a cohesiveness and sense of purpose that is lacking in crowds. Thus, any strategy that causes individual members to contemplate their personal actions will tend to be more effective than treating an entire mob as a single entity.

Warning Time: 4 – Less than six hours

Duration: 3 – Less than one week

LOCATION

Civil disorder can arise from a number of causes for a variety of reasons. Circumstances may be spontaneous or may result from escalating tensions. Civil disorder can erupt anywhere, but the most likely locations are those areas with large population groupings or gatherings. Sites that are attractive for political or other rallies should be considered as probable locations for the epicenter of civil disorder events; arenas and stadiums are another type of venue where civil disorder can occur. Civil disorder can also occur in proximity to locations where a "trigger event" occurred.

Spatial Extent: 2 – Small

EXTENT

The ultimate extent of any civil disorder incident will depend on the magnitude of that event and its location. The more widespread an incident is, the greater the likelihood of excessive injury, loss of life and property damage; additional factors, such as the ability of law enforcement to contain the event, are also critical in minimizing damages.

Impact: 2 – Limited

HISTORICAL OCCURRENCES

Events in North Carolina's early history, as well as those from the late 1960s through this decade, indicate the State is not immune to riots, protests, and social upheaval. Some brief examples of civil unrest across the state are provided below.

The Greensboro Uprising in 1969 occurred on and around the campuses of James B. Dudley High School and North Carolina Agricultural and Technical State University (A&T) in Greensboro in May 1969. The uprising was sparked by perceived civil rights issues at the segregated high school, and then spread to the A&T campus. The uprising ended after the National Guard made a sweep of A&T dormitories, taking hundreds of students into protective custody.

The Wilmington Ten were arrested for a firebombing in February 1971 in Wilmington. Responders reported being shot at by snipers from the roof of a nearby church; the neighborhood erupted in rioting that lasted through the next day, leaving two people dead. The National Guard was activated and entered the church the next day to remove the suspects; the violence resulted in two deaths, six injuries, and more than a half million dollars in property damage. Nine young black men and a white female were arrested in connection with the crime and convicted, though their sentences were commuted; ultimately, they were granted full pardons in 2012.

The Greensboro Massacre took place in November 1979, when members of the Communist Workers' Party and others demonstrated against the Ku Klux Klan in Greensboro. Gunfire was exchanged between the demonstrators and members of the KKK and the American Nazi Party. The incident resulted in five fatalities and twelve injuries.

The Charlotte Riot of 2016 was a protest that lasted for three days, as a reaction to the shooting of a black man by a black police officer. One person was killed by a civilian, and multiple officers and civilians were injured in the unrest. The City of Charlotte eventually instituted a citywide curfew to quell the violence, and a State of Emergency was issued by the Governor, providing additional law enforcement and national guard support. The shooting was eventually ruled as justified.

Since 2010, civil unrest has again trended toward race relations as a cause. From controversial shootings of African American men by white police officers to the resulting Black Lives Matter movement, these trends may continue into the future as the country finds ways to improve race relations. North Carolina has experienced specific incidents of racial unrest and violence as part of this trend, and may continue to see these types of incidents in the future.

Specific incidents occurring in a single jurisdiction can cause civil unrest nationally; the Michael Brown shooting incident in Ferguson, MO is an example of this. On November 25, 2014, CNN reported that thousands of people in more than 170 U.S. cities rallied to protest the grand jury decision not to indict the officer involved. Protests also took place internationally, with demonstrations held in several major cities in Canada, and as far away as London.

Another recent trend is the destruction and/or defacement of statues dedicated to the Confederacy during the Civil War; the planning area itself has experienced incidents of this nature, including the destruction of the Confederate Soldiers Monument in Durham County in August 2017, and the destruction of the Silent Sam statue at the University of North Carolina at Chapel Hill in 2018. As the country continues to debate whether monuments to the Confederacy are still appropriate in 2019, these types of incidents may continue to occur.

PROBABILITY OF FUTURE OCCURRENCE

In their article on "Understanding Riots" published in the *Cato Journal* (Vol. 14, No 1), David D. Haddock and Daniel D. Polsby note that a large crowd itself is not an incipient riot merely because it assembles a great many people. Haddock and Polsby explain that "starting signals" must occur for civil

disorder to erupt; these starting signals include certain kinds of high profile events. In fact, incidents can become signals simply because they have been signals in the past. In Detroit, for example, Devils Night (the night before Halloween) has in recent years become a springboard for multiple, independent, and almost simultaneous acts of arson. With any conventional triggering event, such as news of an assassination or unpopular jury verdict, crowds form spontaneously in various places as word of the incident spreads, without any one person having to recruit them. But since not every crowd threatens to evolve into a riot, the authors reason that a significant number of people must expect and desire that the crowd will become riotous. In addition, "someone has to serve as a catalyst—a sort of entrepreneur to get things going." A typical action is the breaking of a window (a signal that can be heard by many who do not necessarily see it). Someone will throw the first stone, so to speak, when he calculates the risk of being apprehended has diminished to an acceptable level. This diminished risk is generally based on two variables—the size of the crowd relative to the police force and the probability that others will follow if someone leads. The authors conclude that once someone has taken a risk to get things started, the rioting will begin and spread until civil authorities muster enough force to make rioters believe they face a realistic prospect of arrest.

Nationwide, riots are apt to be a recurrent, if unpredictable, feature of social life. Without question, the planning area will continue to experience future episodes of marches, protests, demonstrations, and gatherings in various cities and communities that could lead to some type of disruptive civil disorder. However, based on the State's general history of civil disturbance and the various human factors noted above, the probability that such incidents will develop into full-scale, widespread riots is considered low.

Should the planning area experience future incidents of disruptive civil disorder or rioting, the severity of a given event could range from low to high, depending on many factors. A spirited demonstration that gets out of hand may result in several arrests, minor damage to property (police vehicles with broken windows, etc.), some injuries, and manpower/overtime costs for police, fire, and other response services. To a greater extent, the threat of urban or intercity riots has the potential for millions of dollars in property damage, possible loss of life, and serious injuries, and extensive arrests. Sustaining police at the scene for extended periods, and possibly mobilizing state highway patrol and National Guard units, can add to the extensive manpower costs. Still, such riots tend to be confined to a single site or general area of a community rather than multiple locations or several areas of the State at the same time. Once a riot has occurred, police in other cities are generally on standby for possible riotous conditions and are better able to alleviate potential disturbances before they develop into full-scale riots.

Probability: 2 – Possible

CLIMATE CHANGE

As a human-caused hazard, any changes in climate would not have a direct impact on civil disorder. Far more relevant, though, could be the implications of future climate change as a cause for civil disorder. Climate change impact forecasts include increasingly extreme weather patterns that exacerbate issues of drought, flooding, severe weather and other weather hazards globally that could affect whole ecosystems. Incidents of civil disobedience could be a secondary result related to societal unrest as a result of other climate-impacted hazards.

VULNERABILITY ASSESSMENT

As discussed above, the impacts from civil disorder vary greatly depending on the nature, severity, and success of the attack.

When rioting does break out, it generally proves extremely difficult for first-responder law enforcement authorities to quell the mob promptly. The rules of constitutional law set stringent limits on how police officers can behave toward the people they try to arrest. Restraint also plays a crucial part in avoiding any action that "fans the flames." Initial police presence is often undermined because forces may be staffed

below the peak loads needed to bring things back under control. As a result, the riot may continue until enough state police or National Guard units arrive to bolster the arrest process and subsequently restore order. In many cases, damage to life and property may already be extensive.

METHODOLOGIES AND ASSUMPTIONS

Vulnerability to incidents of civil unrest were assessed based on past occurrences nationally and internationally as well as publicly available information on these vulnerabilities.

PEOPLE

Injuries and fatalities can occur during civil unrest.

PROPERTY

Should a large gathering of people turn violent, damage to property and infrastructure can result, as well as looting of property.

ENVIRONMENT

Environmental impacts could occur if the civil unrest occurs in an outdoor or environmentally sensitive area. These impacts would be tied to the parameters of the incident.

CONSEQUENCE ANALYSIS

Table 4.108 summarizes the potential consequences of civil unrest.

Table 4.108 – Consequence Analysis – Civil Unrest

Category	Consequences
Public	Localized impact expected to be severe for unprotected personnel and moderate to light for protected personnel.
Responders	Localized impact expected to be severe for unprotected personnel and moderate to light for protected personnel.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel in the area of the incident may require temporary relocation of operations; localized disruption of lines of communication and destruction of facilities may postpone delivery of some services.
Property, Facilities and Infrastructure	Localized impact to facilities and infrastructure in the area of the incident. Some severe damage possible.
Environment	May cause extensive damage in isolated cases and some denial or delays in the use of some areas. Remediation needed.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damage.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

4.5.12 CRITICAL INFRASTRUCTURE FAILURE

HAZARD BACKGROUND

Aging infrastructure is a concern across the United States, and transportation and utility systems in the Eno-Haw region are no exception. Per a FEMA Strategic Foresight Initiative report on Critical Infrastructure, infrastructure is becoming more prone to failure as average structure age increases, with age being the leading indicator of potential for failure in some cases. Average structure age has been steadily increasing as structures are being replaced at a slower rate. Circulation around the Eno-Haw region depends on several key bridges and roads for access and services. While there is redundancy in the transportation system in the more urban parts of the planning area, there is less redundancy in the more rural areas. As such, these key pieces of infrastructure are integral to the functioning of the communities in the planning area and would cause varying levels disruption should they become inaccessible. Damage to any of this infrastructure could result from the majority of the natural and human-caused hazards described in this plan. In addition to a secondary or cascading impact from another primary hazard, infrastructure can fail as a result of faulty equipment, lack of maintenance, degradation over time, or accidental damage such as a barge colliding with a bridge support.

Utility failure is another form critical infrastructure failure. Utility Failure refers to loss of electric power, water, sewage, natural gas, or other utilities. These failures might occur to either government or privately operated utility systems. They often occur because of, or in conjunction with, other disaster events such as high winds, hurricanes, tornadoes, winter storm events, flooding, or others. Critical utility failures might exacerbate the impacts and recovery times of such events. Failure might also be caused by accident separate of another hazard event and create hazardous conditions of their own.

Building and construction standards along with regular inspection and maintenance to transportation and utility infrastructure can provide a degree of certainty as to the capacity of infrastructure to withstand some damages. However, accidental damage is unpredictable. Moreover, any damages that take a road or bridge out of service will likely require significant repairs that could take weeks or months to complete.

Warning Time: 4 – Less than six hours

Duration: 4 – More than one week

LOCATION

Critical infrastructure failure is generally localized to the site of key transportation and utility infrastructure.

Spatial Extent: 3 – Moderate

Bridges are generally designed to last 50 years, therefore one way to target the location of critical transportation infrastructure failure is to identify the location of bridges 45 years or older. The North Carolina Department of Transportation maintains a list of bridges in North Carolina. Bridges built in 1975 or prior are listed below in Table 4.109. There are 206 bridges that are 45 years or older in the region.

Table 4.109 – Bridges Built in 1975 or Prior

County	Bridge Number	Route	Crossing	Year Built	Age (years)
Orange	32	US70	Eno River	1922	98
Alamance	92	NC49	Little Alamance Creek	1923	97
Person	28	US158	Deep Creek	1923	97
Alamance	72	NC87	Alamance Creek	1928	92
Alamance	14	NC87	Cane Creek	1929	91

County	Bridge Number	Route	Crossing	Year Built	Age (years)
Alamance	40	NC87	Branch Of Varnals Creek	1929	91
Durham	89	SR1902	Lick Creek	1930	90
Orange	16	NC751	Southern R.R.	1930	90
Person	11	US158	South Hyco Creek	1932	88
Durham	28	SR1774 (CLOSED)	Flat River	1935	85
Durham	98	NC55	Norfolk & Southern	1936	84
Alamance	81	US70	Back Creek	1938	82
Orange	86	SR1005	University Lake	1939	81
Durham	245	SR1321	Ellerbee Creek	1940	80
Orange	46	US70	Eno River	1941	79
Alamance	26	NC62	Gunn Creek	1949	71
Alamance	112	NC87	Reedy Fork Creek	1949	71
Alamance	119	NC87	Haw River	1949	71
Alamance	126	NC87	Mill Race	1949	71
Alamance	164	SR1113	Stinking Quarter Creek	1949	71
Orange	4	SR1004	West Fork Eno River	1949	71
Alamance	113	SR1003	Cane Creek	1950	70
Alamance	114	SR1003	South Fork Cane Creek	1950	70
Alamance	128	SR2369	Cane Creek	1950	70
Alamance	141	SR1005	Wells Creek	1950	70
Alamance	153	SR2371	Cane Creek	1950	70
Alamance	190	SR1005	Poppaw Creek	1950	70
Alamance	336	SR1569	Creek	1950	70
Orange	84	SR1005	Collins Creek	1950	70
Person	44	SR1111	South Flat River	1950	70
Alamance	22	SR1001	Mine Creek	1951	69
Durham	6	SR1617	Mountain Creek	1951	69
Durham	24	SR1004	Eno River	1951	69
Durham	25	SR1004	Little Creek	1951	69
Durham	44	PETTIGREW ST	NC55	1951	69
Durham	99	NC751	US15BUS, US501BUS	1951	69
Orange	24	SR1001	North Fork Little River	1951	69
Orange	37	NC86	New Hope Creek	1951	69
Orange	99	SR1723	New Hope Creek	1951	69
Person	15	SR1715	Rock Fork Branch	1951	69
Person	21	SR1715	North Flat River	1951	69
Alamance	170	SR1212	Prong Alamance Creek	1952	68
Durham	61	SR1464	Mountain Creek	1952	68
Orange	31	SR1010	Bolin Creek	1952	68
Orange	39	SR1010	Booker Creek	1952	68
Orange	41	SR1010 NBL	US15, US501 SBL	1952	68
Orange	45	US15, US501 SBL	NC54	1952	68
Durham	220	SR1004	Creek Off Eno River	1953	67
Orange	7	US70E	SR1239 W	1953	67

County	Bridge Number	Route	Crossing	Year Built	Age (years)
Orange	51	SR1534	Buffalo Creek	1953	67
Alamance	3	SR1529	Dry Creek	1954	66
Alamance	238	SR2128	Haw Creek	1954	66
Durham	106	US70 E BYP	NC98	1954	66
Durham	115	US70 W BYP	NC98	1954	66
Orange	49	NC86	Southern Railway	1954	66
Orange	77	SR1113	New Hope Creek	1954	66
Orange	114	SR1548	South Fork Little River	1954	66
Alamance	258	SR1522	Staley Creek	1955	65
Durham	92	US70 BUS., NC98	Norfolk & Western R.R.	1955	65
Durham	117	SR1308	Mud Creek	1955	65
Durham	128	US70 BUS WBL	US70 Bypass EBL	1955	65
Durham	195	SR1675	I85	1955	65
Orange	90	SR1940	Pritchard MILL CREEK	1955	65
Orange	137	SR1550	Forrest Creek	1955	65
Person	27	SR1138	Creek	1955	65
Durham	20	SR1616	Dial Creek	1956	64
Durham	80	US15/US501NBL	SR1308	1956	64
Durham	109	US15/501 NBL	NC751	1956	64
Durham	114	US15/501B SB	Norfolk Southern Railway	1956	64
Durham	216	I85 & US15 NBL	SR1637 & Southern R.R.	1956	64
Orange	18	SR1421	Branch	1956	64
Orange	61	SR1002	Creek	1956	64
Orange	73	SR1115	Cane Creek	1956	64
Orange	104	SR1712	Stoney Creek	1956	64
Orange	189	SR1114	Cane Creek	1956	64
Alamance	15	SR1530	Haw River	1957	63
Alamance	51	SR1712	Haw River	1957	63
Durham	222	I85,US15 N	SR1637	1957	63
Orange	5	US15/US501	NC54	1957	63
Orange	20	SR1365	Branch Of Stagg Creek	1957	63
Orange	59	NC86	I85	1957	63
Orange	81	I85N, NC86	SR1006	1957	63
Orange	82	I85S, NC86	SR1006	1957	63
Orange	91	I85 NBL	Southern R.R.	1957	63
Orange	93	I85 SBL	Southern R.R.	1957	63
Orange	95	SR1709	I85	1957	63
Orange	96	SR1712	I85	1957	63
Orange	209	SR1366	Frank Creek	1957	63
Person	35	SR1120 (CLOSED)	South Flat River	1957	63
Person	98	SR1565	Tar River	1957	63
Alamance	35	NC62	Haw River	1958	62
Alamance	103	SR2182	Big Branch	1958	62
Alamance	148	I40,I85	Haw River	1958	62

County	Bridge Number	Route	Crossing	Year Built	Age (years)
Orange	11	SR1336	Eno River	1958	62
Orange	63	SR1567	Eno River	1958	62
Orange	69	SR1134	Eno River	1958	62
Orange	83	I85N, NC86	SR1009	1958	62
Orange	87	I85S, NC86	SR1009	1958	62
Orange	98	I85 NBL	SR1713	1958	62
Orange	100	I85 SBL	SR1713	1958	62
Orange	103	I85 N	US70 E	1958	62
Orange	106	I85S, US70W	US70 EBL	1958	62
Orange	110	I85SBL,US70 EBL	US70 BUS WBL	1958	62
Orange	111	I85 SBL	US70 BUS WBL	1958	62
Alamance	52	SR1729	Stoney Creek	1959	61
Person	184	SR1532	Marlowe's Creek	1959	61
Alamance	24	SR1581	Stony Creek	1960	60
Alamance	36	SR1613	Tom's Creek	1960	60
Alamance	38	SR1611	Stoney Creek	1960	60
Alamance	41	SR1002	Stoney Creek	1960	60
Alamance	42	SR1002	Tom's Creek	1960	60
Alamance	173	SR1149	Back Creek	1960	60
Alamance	254	SR2104	Big Branch	1960	60
Durham	93	SR1945	Third Fork Creek	1960	60
Alamance	24	SR1581	Stony Creek	1960	60
Alamance	36	SR1613	Tom's Creek	1960	60
Alamance	38	SR1611	Stoney Creek	1960	60
Alamance	41	SR1002	Stoney Creek	1960	60
Alamance	42	SR1002	Tom's Creek	1960	60
Alamance	173	SR1149	Back Creek	1960	60
Alamance	254	SR2104	Big Branch	1960	60
Durham	93	SR1945	Third Fork Creek	1960	60
Alamance	301	SR2364	Wells Creek	1961	59
Durham	56	NC157	South Fork Little River	1961	59
Orange	27	SR1507	South Fork Little River	1961	59
Orange	192	SR1556	Strouds Creek	1961	59
Person	23	NC157	S. Flat River	1961	59
Person	50	SR1343	South Hyco Creek	1961	59
Person	51	SR1343 CLAYTON RD	Richland Creek	1961	59
Durham	85	SR1814	Little Lick Creek	1962	58
Alamance	59	SR1927	Quaker Creek Reservior	1963	57
Alamance	95	SR2116	Big Alamance Creek	1963	57
Alamance	121	SR1136	Stinking Quarter Cr.	1963	57
Orange	6	US70 BUS	Eno River	1963	57
Orange	240	SR1009	Southern Railroad	1963	57
Person	16	NC57	Hyco Lake	1963	57

County	Bridge Number	Route	Crossing	Year Built	Age (years)
Person	20	NC57	Cobbs Creek	1963	57
Person	32	NC57	Hyco Lake	1963	57
Durham	49	SR1401	Eno River	1964	56
Orange	65	SR1002	Prong Eno River	1964	56
Person	197	SR1326	N & W Railroad	1964	56
Person	198	SR1336	Norfolk & West Railway	1964	56
Person	199	SR1194	Spillway	1964	56
Alamance	109	SR2309	Alamance Creek	1965	55
Durham	200	I85 NBL, US15 NBL	SR1632	1965	55
Durham	201	I85 SBL&US15	SR1632	1965	55
Durham	218	I85, US15 SBL	SR1637 & Southern R.R.	1965	55
Durham	223	I85& US15 SB	SR1637	1965	55
Alamance	307	SR1936	Back Creek	1966	54
Durham	100	SR2028	I40	1966	54
Alamance	71	NC62	Stoney Creek	1967	53
Durham	35	US501	Eno River	1967	53
Durham	36	SR1671	Goose Creek	1967	53
Durham	55	US501N.B.	Little River(Lake)	1967	53
Durham	58	US501 S.B.	Little River(Lake)	1967	53
Durham	247	SR2028	Southern R/R	1967	53
Orange	102	SR1710	Stoney Creek	1967	53
Person	200	SR1325	Powell Creek	1967	53
Alamance	44	SR1768	Jordan's Creek	1968	52
Durham	71	US15/501 S	NC147	1968	52
Durham	147	SR1127	NC147	1968	52
Durham	154	SR1361	NC147	1968	52
Durham	156	SR1445	NC147	1968	52
Durham	160	NC147SBL	Blackwell Street	1968	52
Durham	163	NC147 NBL	Blackwell Street	1968	52
Durham	164	NC147 SBL	US15/501 NBL(BUS)	1968	52
Durham	166	NC147 NBL	US15, US501 NBL(BUS)	1968	52
Durham	169	SR1118	NC147	1968	52
Durham	173	NC147 SBL	Grant St.	1968	52
Durham	175	NC147 NBL	Grant St.	1968	52
Durham	202	SR2028 TW ALEXAND.	NC147	1968	52
Alamance	73	SR1928	Back Creek	1969	51
Durham	186	BRIGGS AVENUE	NC147	1969	51
Durham	194	SR1940	NC147	1969	51
Durham	226	I85NBL,US15N	Neuse River/Falls Lake	1969	51
Durham	227	I85 SBL,US15S	Neuse River/Falls Lake	1969	51
Durham	228	SR1959	I40	1969	51
Person	55	SR1337	Chub Lake	1969	51

County	Bridge Number	Route	Crossing	Year Built	Age (years)
Alamance	165	SR1131	Stinking Quarter Creek	1970	50
Alamance	178	SR1154	Little Alamance Creek	1970	50
Alamance	355	US70W	Storm Drain	1970	50
Durham	177	NC147 SBL	Bacon Street	1970	50
Durham	180	NC147 NBL	Bacon Street	1970	50
Durham	188	NC147 SBL	Southern Rr	1970	50
Durham	189	NC147NBL	Southern Railroad	1970	50
Durham	191	NC147 SBL	SR1171	1970	50
Durham	192	NC147 NBL	SR1171	1970	50
Person	33	SR1125	South Flat River	1970	50
Alamance	165	SR1131	Stinking Quarter Creek	1970	50
Alamance	178	SR1154	Little Alamance Creek	1970	50
Durham	83	US15/US501	SR1308	1971	49
Durham	113	US15BYP,US501	NC751	1971	49
Alamance	68	SR1928	Southern R.R.	1972	48
Alamance	105	SR2174	Mary's Creek	1972	48
Alamance	136	SR2351	South Fork Cane Creek	1972	48
Alamance	34	NC54	Back Creek	1973	47
Alamance	70	NC54	Haw Creek	1973	47
Alamance	293	SR2123	Back Creek	1973	47
Durham	206	SR1121	NC147	1973	47
Durham	212	I40 EBL RAMP	NC147 NBL	1973	47
Durham	224	SR1999	I40	1973	47
Durham	260	SR1118	American Tobacco Trail	1973	47
Person	56	SR1322	Hyco Reservoir	1973	47
Person	202	SR1313	Hyco Canal	1973	47
Person	203	SR1316	Intake Canal (CP&L)	1973	47
Alamance	98	SR1003	Mary's Creek	1974	46
Durham	137	SR1322	NC147	1974	46
Durham	138	NC147 SBL	Campus Drive	1974	46
Durham	140	NC147 NBL	Campus Drive	1974	46
Durham	142	NC147 SBL	Buchanan Blvd	1974	46
Durham	144	NC147 N	Buchanan Blvd	1974	46
Orange	17	NC54	Cane Creek	1974	46
Orange	228	SR1009	New Hope Creek	1974	46
Durham	82	SR1815	Lick Creek	1975	45
Durham	84	SR1815	Chunky Pipe Creek	1975	45
Orange	199	SR1946	Neville Creek	1975	45

Utilities in the region are provided by various public and private entities as detailed in Table 4.110, and utility failures may occur anywhere in the region where utilities are provided.

Table 4.110 – Local Utility Providers

Utility Type	Local Providers
Electricity	• Duke Energy • Piedmont Electric Membership Corporation

Utility Type	Local Providers
Natural Gas	• Piedmont Natural Gas Company • Dominion Energy (Public Service Company of North Carolina)
Water & Sewer	• City of Burlington • City of Elon • City of Graham • Town of Haw River • Durham County Water Management • City of Durham • Town of Hillsborough • Orange Water and Sewer Authority • Orange-Alamance Water System • Efland Sewer System • Graham-Mebane Water System • City of Mebane • City of Roxboro

EXTENT

The significance of any transportation infrastructure failure will vary depending on the location and nature of the infrastructure itself. The loss of a local road may have only minor impacts limited to the immediate area. However, the loss of a major highway or key bridge could cause significant disruption across the Region. Depending on time of day and the onset of the failure, significant casualties are also possible: the 1967 Silver Bridge collapse between Point Pleasant, West Virginia and Gallipolis, Ohio and the 1980 Sunshine Skyway Bridge collapse outside St. Petersburg, Florida killed 46 and 35 people respectively.

Critical utility failures also vary depending on the location and circumstances surrounding the failure itself. Such failures might be localized or impact large swaths of the planning area and can range in duration – lasting anywhere from a few hours to multiple days or weeks. Impacts could be small losses of communication systems or larger losses of lifelines such as water and electricity, especially to critical facilities.

Impact: 3 – Critical

HISTORICAL OCCURRENCES

A 2014 analysis of bridge failure rates by Dr. Wesley Cook of Utah State University found that an average of 128 bridges collapse every year in the U.S.; 53% of bridges that collapsed had been rated as structurally deficient prior to their collapse. Only 4% of bridge collapses resulted in loss of life.

A search of local newspapers and historical records did not return any instances of bridge failure in the four-county region.

Utility infrastructure failure, on the other hand, is more ubiquitous, particularly electricity outages. While small scale outages occur regularly, from high winds or downed branches, larger scale outages also occur, often in concert with large scale weather events like Hurricane Florence. The HMPC also noted two recent large scale water outages, although smaller events also occur:

— April 2016 – East Rosemary Street in Chapel Hill was shut down due to a water main break. The break caused 50 homes in the area to be without water for multiple hours as it was being repaired.

- November 2018 – A critical OWASA pipe broke in front of OWASA's building, filling Jones Ferry Road. The break left more than 80,000 customers in the Chapel Hill-Carrboro area under a boil water advisory and with limited water for over 24 hours, asking users to limit water use to save water for necessary uses, like the UNC Hospital and UNC Chilled Water facilities. UNC Classes were cancelled, and Chapel Hill-Carrboro City schools were closed for two days. The broken pipe drained more than four water towers – neighboring Chatham, Hillsborough, and Durham piped in over 3.5 million gallons of water to supplement the system while the pipe was being fixed. The brake occurred in a 77-year old pipe.
- March 2020 – OWASA had to repair to broken mains in Chapel Hill, one on South Road between Country Club Road and Raleigh Street and another on East Franklin Street between Estes Drive and Elliott Road.

The frequency of the above events highlights the fragility of aging infrastructure throughout not only the OWASA system, but across the planning area and the State of North Carolina.

PROBABILITY OF FUTURE OCCURRENCE

The likelihood of a major transportation infrastructure failure occurring in the Eno-Haw region is difficult to quantify. The continuing age and deterioration of America's transportation infrastructure, coupled with increasing traffic and declining public investment in maintaining our infrastructure, indicate that road and bridge failures are likely to be more common in future decades than they have in the past. The American Society of Civil Engineers (ASCE) has estimated that $2.2 trillion would be needed to bring the nation's infrastructure up to a condition that meets the needs of the current population. (Note that this total includes non-transportation infrastructure.) The potential for accidents and failures from infrastructure operating beyond its intended lifespan or with insufficient maintenance thus continues to increase.

According to the Federal Highway Administration (FHA), North Carolina ranks 27th among the 50 states in having the most roads in poor condition (6.6 percent) and 18th in terms of number of bridges rated as structurally deficient (9.9 percent). According to the U.S. Census Bureau's 2017 Annual Survey of State Government Finances, 8.8 percent of North Carolina's public spending is devoted to highways, ranking 11th among all states, and well above the national average of 5.6 percent.

Outages of critical utilities, however, are likely to occur more frequently. Power outages or water main breaks of some size happen regularly, with major incidents happening less frequently. The probability of some sort of critical infrastructure failure, then, is likely when considering large scale utility events and transportation network disruptions.

Probability: 3 – Likely

VULNERABILITY ASSESSMENT

The impacts of transportation failures vary widely by the type of system, as well as the time of day and season of the failure.

METHODOLOGIES AND ASSUMPTIONS

Vulnerability to critical infrastructure failures was assessed based on past occurrences nationally and internationally as well as publicly available information on infrastructure vulnerability.

PEOPLE

People can be injured or killed during transportation infrastructure failures. As noted above, the U.S. averages five fatality-causing bridge collapses per year, although data on the number of fatalities involved was not available. Numbers of non-fatal injuries was also not available.

Aside from direct injuries and fatalities, transportation failures can result in significant losses of time and money as individuals and commercial shipments are detoured or blocked. Disruption of transportation systems can limit the ability of emergency services and utility work crews to reach affected areas, and can put some members of the public at severe risk if they are unable to reach needed medical services, such as dialysis patients.

In extreme cases, a transportation failure could leave residents stranded without power, food, or other emergency supplies.

Utility failures can severely impact the health and safety of the public, particularly for children or elderly residents. An outage at any time poses risks to vulnerable populations who cannot be without water and electricity for medical treatments or refrigerated medications. Loss of water and electricity also poses a large risk to hospitals and health systems. During periods of extreme heat or cold, loss of electricity can pose a safety hazard. In the planning area, 36% of homes are heated by utility gas and 55% by electricity. The following table summarizes the number of Medicare recipients by county who are electricity-dependent. This is defined by the Department of Health and Human Services as Medicare recipients who rely on electricity dependent medical equipment and is represented below in Table 4.111.

Table 4.111 – Electricity Dependent Medicare Recipients by County

County	Electricity Dependent Medicare Recipients (as of October 2024)
Alamance County	1,937
Durham County	1,733
Orange County	837
Person County	515

Source: Department of Health and Human Services emPOWER

PROPERTY

The primary property damage from transportation infrastructure failures is to the infrastructure itself, as well as to privately-owned automobiles.

Downed power lines might directly fall on houses or indirectly cause fires. Water or sewer pipe breaks or backups might cause flooding to property.

ENVIRONMENT

Transportation infrastructure failures can result in oil spills or other hazardous materials releases that can severely impact the environment in the surrounding area.

CONSEQUENCE ANALYSIS

Table 4.112 summarizes the potential consequences of a critical infrastructure failure.

Table 4.112 – Consequence Analysis - Critical Infrastructure Failure

Category	Consequences
Public	Potential injuries and fatalities.
Responders	Potential injuries and fatalities, as well as potentially significant delays to response times.

Category	Consequences
Continuity of Operations (including Continued Delivery of Services)	Loss of key utilities, roads, or bridges can affect delivery of services. Water, sewer, or electric outages can affect jurisdictions and entities abilities to operate at full capacity.
Property, Facilities and Infrastructure	In addition to the loss of transportation infrastructure itself, sustained road closure can impact supply chain deliveries to other critical facilities. Potential damage to property due to downed power lines
Environment	Potential for contamination of natural environment depending on the utility or infrastructure failure. May result in excess resource consumption.
Economic Condition of the Jurisdiction	May cause temporary shutdown of businesses. Delays in movement of people, goods, and services. Jurisdiction may incur costs of rebuilding or upgrading failed infrastructure.
Public Confidence in the Jurisdiction's Governance	Can cause loss of confidence in government's ability to maintain other critical infrastructure.

4.5.13 CYBER THREAT

HAZARD BACKGROUND

The State of North Carolina Hazard Mitigation Plan defines cyber attacks as "deliberate attacks on information technology systems in an attempt to gain illegal access to a computer, or purposely cause damage." Cyber-attacks use malicious code to alter computer operations or data. The vulnerability of computer systems to attacks is a growing concern as people and institutions become more dependent upon networked technologies. The Federal Bureau of Investigation (FBI) reports that "cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated," with implications for private- and public-sector networks.

There are many types of cyber-attacks. Among the most common is a direct denial of service, or DDoS attack. This is when a server or website will be queried or pinged rapidly with information requests, overloading the system and causing it to crash.

Malware, or malicious software, can cause numerous problems once on a computer or network, from taking control of users' machines to discreetly sending out confidential information. Ransomware is a specific type of malware that blocks access to digital files and demands a payment to release them. Hospitals, school districts, state and local governments, law enforcement agencies, businesses, and even individuals can be targeted by ransomware.

Cyber spying or espionage is the act of illicitly obtaining intellectual property, government secrets, or other confidential digital information, and often is associated with attacks carried out by professional agents working on behalf of a foreign government or corporation. According to cybersecurity firm Symantec, in 2016 "…the world of cyber espionage experienced a notable shift towards more overt activity, designed to destabilize and disrupt targeted organizations and countries."

Major data breaches - when hackers gain access to large amounts of personal, sensitive, or confidential information - have become increasingly common. The Symantec report says more than seven billion identities have been exposed in data breaches over the last eight years. In addition to networked systems, data breaches can occur due to the mishandling of external drives, as has been the case with losses of some state employee data.

Cyber crime can refer to any of the above incidents when motivated primarily by financial gain or other criminal intent.

The most severe type of attack is cyber terrorism, which aims to disrupt or damage systems in order to cause fear, injury, and loss to advance a political agenda.

The North Carolina State Bureau of investigation' Computer Crime Unit helps law enforcement across North Carolina solve sophisticated crimes involving digital evidence.

Warning Time: 4 – Less than six hours

Duration: 4 – More than one week

LOCATION

Cyber disruption events can occur and/or impact virtually any location in the state where computing devices are used. Incidents may involve a single location or multiple geographic areas. A disruption can have far-reaching effects beyond the location of the targeted system; disruptions that occur far outside the region can still impact people, businesses, and institutions within the region.

Spatial Extent: 2 – Small

EXTENT

The extent or magnitude/severity of a cyber disruption event is variable depending on the nature of the event. A disruption affecting a small, isolated system could impact only a few functions/processes. Disruptions of large, integrated systems could impact many functions/processes, as well as many individuals that rely on those systems.

There is no universally accepted scale to quantify the severity of cyber-attacks. The strength of a DDoS attack is sometimes explained in terms of a data transmission rate. One of the largest DDoS disruptions ever, which brought down some of the internet's most popular sites on October 21, 2016, peaked at 1.2 terabytes per second.

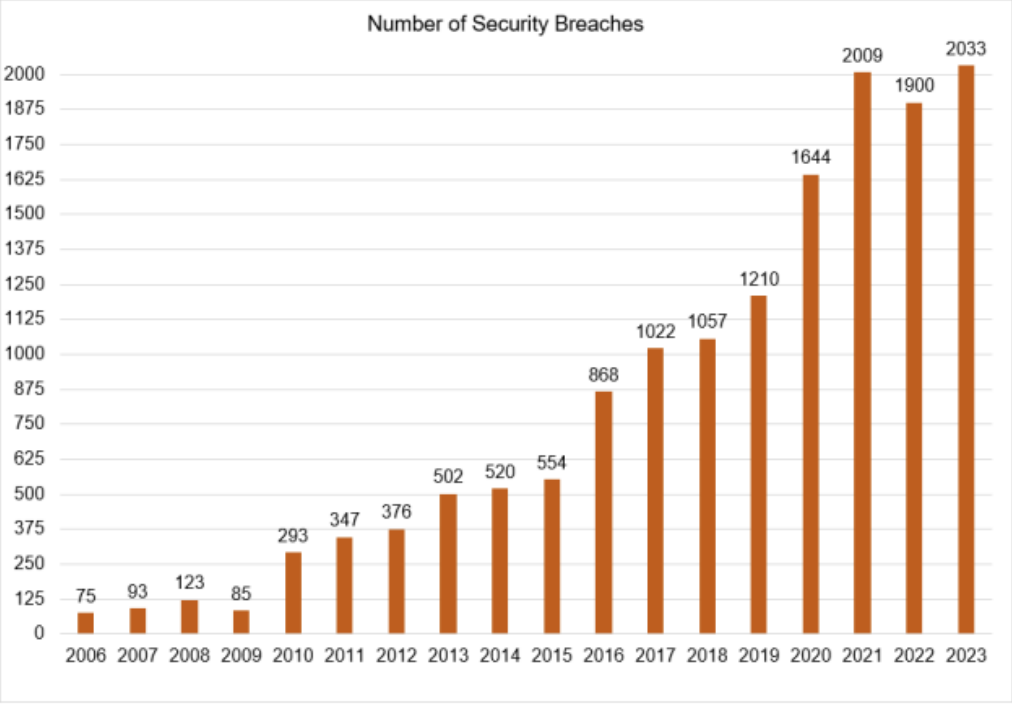
Data breaches are often described in terms of the number of records or identities exposed.

Impact: 2 – Limited

HISTORICAL OCCURRENCES

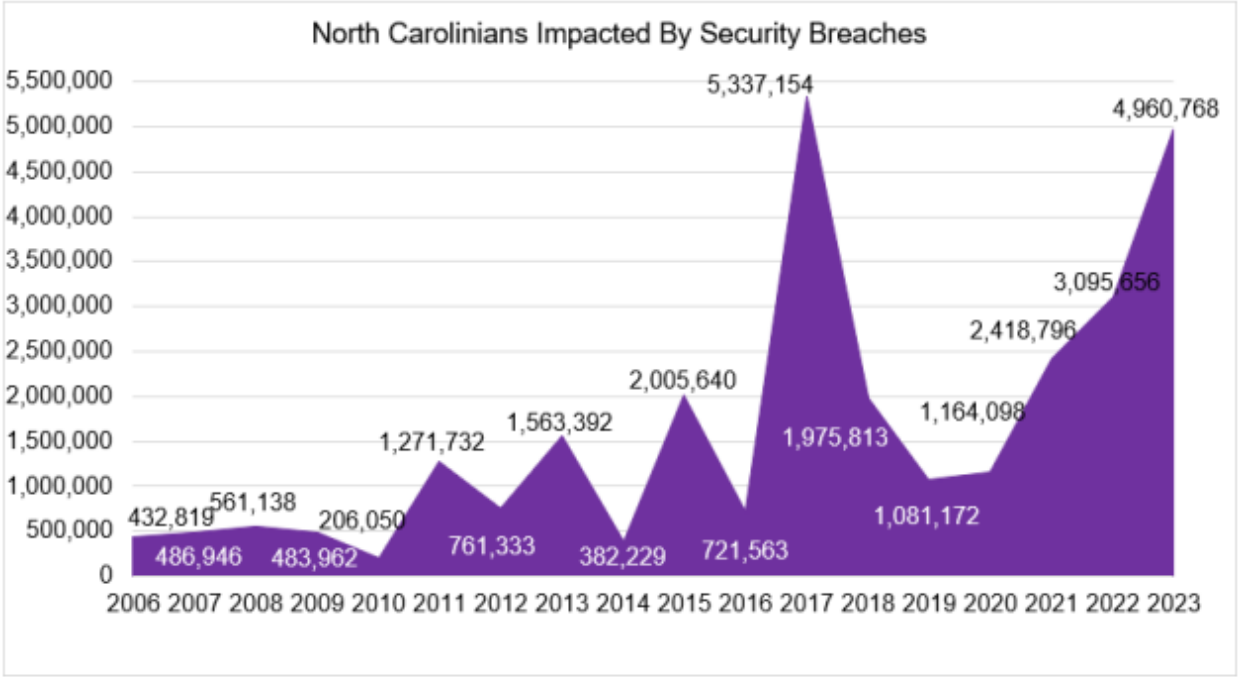
In North Carolina, businesses and organizations that experience data breaches are required to report the breach and the information that was compromised to the NC Department of Justice (DOJ). In 2023, the DOJ received 2,033 data breach notices from organizations according to their annual Data Breach Report. These breaches impacted more than 4.9 million North Carolinians – the second highest number of people impacted in a single year. Additionally, in 2023, hacking-related breaches were at a record high, causing 80 percent of all reported breaches. The report noted that most security breaches impacted general businesses (50%), healthcare industries (14%), and financial services/insurance (23%). It is common for these types of industries to collect many kinds of personal information, making them prime targets for hacking. Figure 4.42 and Figure 4.43 show the findings from the DOJ Annual Data Breach Report.

Figure 4.42 – Number of Security Breaches in North Carolina



Source: North Carolina Department of Justice

Figure 4.43 – North Carolinians Impacted by Security Breaches



Note: In 2017, Equifax experienced the largest-ever data breach in history affecting nearly 5 million North Carolinians, resulting in a high number of people having their information compromised that year.

Source: North Carolina Department of Justice

The Privacy Rights Clearinghouse, a nonprofit organization based in San Diego, maintains a timeline of 17,552 unique data breaches resulting from computer hacking incidents in the United States from 2002-2023. The database lists 359 data breaches on file in North Carolina, totaling 16,588,348 records breached since 2005. Local governments in the Eno Haw Region have reported concerning data breaches in recent years and notable incidents, based on media reports and county statements, are described below:

- **Orange County** was attacked with a ransomware virus in March 2019, causing slowdowns and service problems at key public offices such as the Register of Deeds, the sheriff's office and county libraries. The attack impacted a variety of county services, including disrupting the county's capability to process real estate closings, issue marriage licenses, process housing vouchers and verify tax bills. The county's Planning Department was unable to process fees or permits, and the county libraries' computers were out of service.
- **Person County** experienced a ransomware cyber-incident on Saturday, May 30, 2020. The incident had a multi-system impact affecting phones, email, and internet access for Person County Government and the City of Roxboro.
- **Durham County** and the City of Durham reported a ransomware attack on March 10, 2020. Durham city and county official responded by taking 80 servers offline, and phonelines for the city and county were unavailable. Because of the Durham's pre-existing cybercontingency plan, data backups were untouched, and the City of Durham's core business systems were back online within 5 days of the attack.

PROBABILITY OF FUTURE OCCURRENCE

Cyber attacks occur daily, but most have negligible impacts at the local or regional level. The possibility of a larger disruption affecting systems within the region is a constant threat, but it is difficult to quantify the exact probability due to such highly variable factors as the type of attack and intent of the attacker.

Minor attacks against business and government systems have become a commonplace occurrence but are usually stopped with minimal impact. Similarly, data breaches impacting the information of residents of the Eno-Haw Region are almost certain to happen in coming years. While attacks targeting local government systems in the Eno Haw Region have occurred in the last few years, no significant data breaches happened, and local governments restored their operating systems in a short period of time. Because minor breaches have occurred, major attacks or breaches are possible.

Probability: 2 – Possible

VULNERABILITY ASSESSMENT

As discussed above, the impacts from a cyber attack vary greatly depending on the nature, severity, and success of the attack.

METHODOLOGIES AND ASSUMPTIONS

Vulnerability to cyber attacks was assessed based on past occurrences nationally and internationally as well as publicly available information on these vulnerabilities, as well as attacks occurring in the region.

PEOPLE

Cyber-attacks can have a significant cumulative economic impact. According to the Internet Crime Complaint Center run by the Federal Bureau of Investigation, the U.S. experienced a loss of $27.6 billion between the years 2018 to 2022. A major cyber-attack has the potential to undermine public confidence and build doubt in their government's ability to protect them from harm.

Injuries or fatalities from cyber-attacks would generally only be possible from a major cyber terrorist attack against critical infrastructure.

PROPERTY

Short of a major cyber terrorist attack against critical infrastructure, property damage from cyber attacks is typically limited to computer systems.

ENVIRONMENT

Short of a major cyber terrorist attack against critical infrastructure, property damage from cyber attacks is typically limited to computer systems. A major cyber terrorism attack could potentially impact the environment by triggering a release of a hazardous materials, or by causing an accident involving hazardous materials by disrupting traffic-control devices.

CONSEQUENCE ANALYSIS

Table 4.113 summarizes the potential consequences of a cyber threat.

Table 4.113 – Consequence Analysis – Cyber Threat

Category	Consequences
Public	Cyber attacks can impact personal data and accounts. Injuries or fatalities could potentially result from a major cyber terrorist attacks against critical infrastructure.

Category	Consequences
Responders	Cyber attacks can impact personal data and accounts. Injuries or fatalities could potentially result from a major cyber terrorist attacks against critical infrastructure.
Continuity of Operations (including Continued Delivery of Services)	Agencies that rely on electronic backup of critical files are vulnerable. The delivery of services can be impacted since governments rely, to a great extent, upon electronic delivery of services.
Property, Facilities and Infrastructure	Rare. Most attacks affect only data and computer systems. Sabotage of utilities and infrastructure from a major cyber terrorist attacks could potentially result in system failures that damage property on a scale equal with natural disasters. Facilities and infrastructure may become unusable as a result of a cyber-attack.
Environment	Rare. A major attack could theoretically result in a hazardous materials release.
Economic Condition of the Jurisdiction	Could greatly affect the economy. In an electronic-based commerce society, any disruption to daily activities can have disastrous impacts to the economy. It is difficult to measure the true extent of the impact.
Public Confidence in the Jurisdiction's Governance	The government's inability to protect critical systems or confidential personal data could impact public confidence. An attack could raise questions regarding the security of using electronic systems for government services.

4.5.14 HAZARDOUS SUBSTANCES

HAZARD BACKGROUND

Generally, a hazardous material is a substance or combination of substances which, because of quantity, concentration, or physical, chemical, or infectious characteristics, may either cause or significantly contribute to an increase in mortality or serious illness. Hazardous materials may also pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Hazardous material incidents can occur while a hazardous substance is stored at a fixed facility, or while the substance is being transported along a road corridor or railroad line or via an enclosed pipeline or other linear infrastructure.

The U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) all have responsibilities relating to the transportation, storage, and use of hazardous materials and waste. The EPA's Toxic Release Inventory (TRI), is a primary source of information on the use and storage of hazardous materials, as well as data regarding spills and releases.

Hazardous materials are typically divided into the following classes:

- Explosives
- Compressed gases: flammable, non-flammable compressed, poisonous
- Flammable or combustible liquids
- Flammable solids: spontaneously combustible, dangerous when wet
- Oxidizers and organic peroxides
- Toxic materials: poisonous material, infectious agents
- Radioactive material
- Corrosive material: destruction of human skin, corrodes steel

It is common to see hazardous materials releases as escalating incidents resulting from other hazards such as floods, wildfires, and earthquakes that may cause containment systems to fail or affect transportation infrastructure. The release of hazardous materials can greatly complicate or even eclipse the response to the natural hazards disaster that caused the spill.

FIXED HAZARDOUS MATERIALS INCIDENT

A fixed hazardous materials incident is the accidental release of chemical substances or mixtures during production or handling at a fixed facility. While these incidents can sometimes involve large quantities of materials, their locations can be more easily predicted and monitored.

TRANSPORTATION HAZARDOUS MATERIALS INCIDENT

A transportation hazardous materials incident is the accidental release of chemical substances or mixtures during transport. Transportation Hazardous Materials Incidents in the Eno-Haw Region can occur during highway or air transport. Highway accidents involving hazardous materials pose a great potential for public exposures. Both nearby populations and motorists can be impacted and become exposed by accidents and releases. If airplanes carrying hazardous cargo crash, or otherwise leak contaminated cargo, populations and the environment in the impacted area can become exposed.

PIPELINE INCIDENT

A pipeline transportation incident occurs when a break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small, slow leak to a large rupture where an explosion is possible. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those near the pipelines.

Warning Time: 4 – Less than six hours

Duration: 2 – Less than 24 hours

LOCATION

The Toxics Release Inventory (TRI) Program run by the U.S. Environmental Protection Agency (EPA) maintains a database of industrial facilities across the country and the type and quantity of toxic chemicals they release. The program also tracks pollution prevention activities and which facilities are reducing toxic releases. The Toxic Release Inventory reports 33 total sites with hazardous materials in the planning area, 13 in Alamance County, 11 in Durham County, 3 in Orange County, and 6 in Person County. These sites are listed in Table 4.114 and locations are shown in Figure 4.44 through Figure 4.47.

The U.S. Department of Transportation (USDOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) maintains an inventory of the location of all gas transmission and hazardous liquid pipelines as well as liquid natural gas plants and hazardous liquid breakout tanks. The location of pipelines and pipeline infrastructure in the Eno-Haw Region are shown in Figure 4.48 through Figure 4.51.

Spatial Extent: 1 – Negligible

Table 4.114 – Toxic Release Inventory Sites

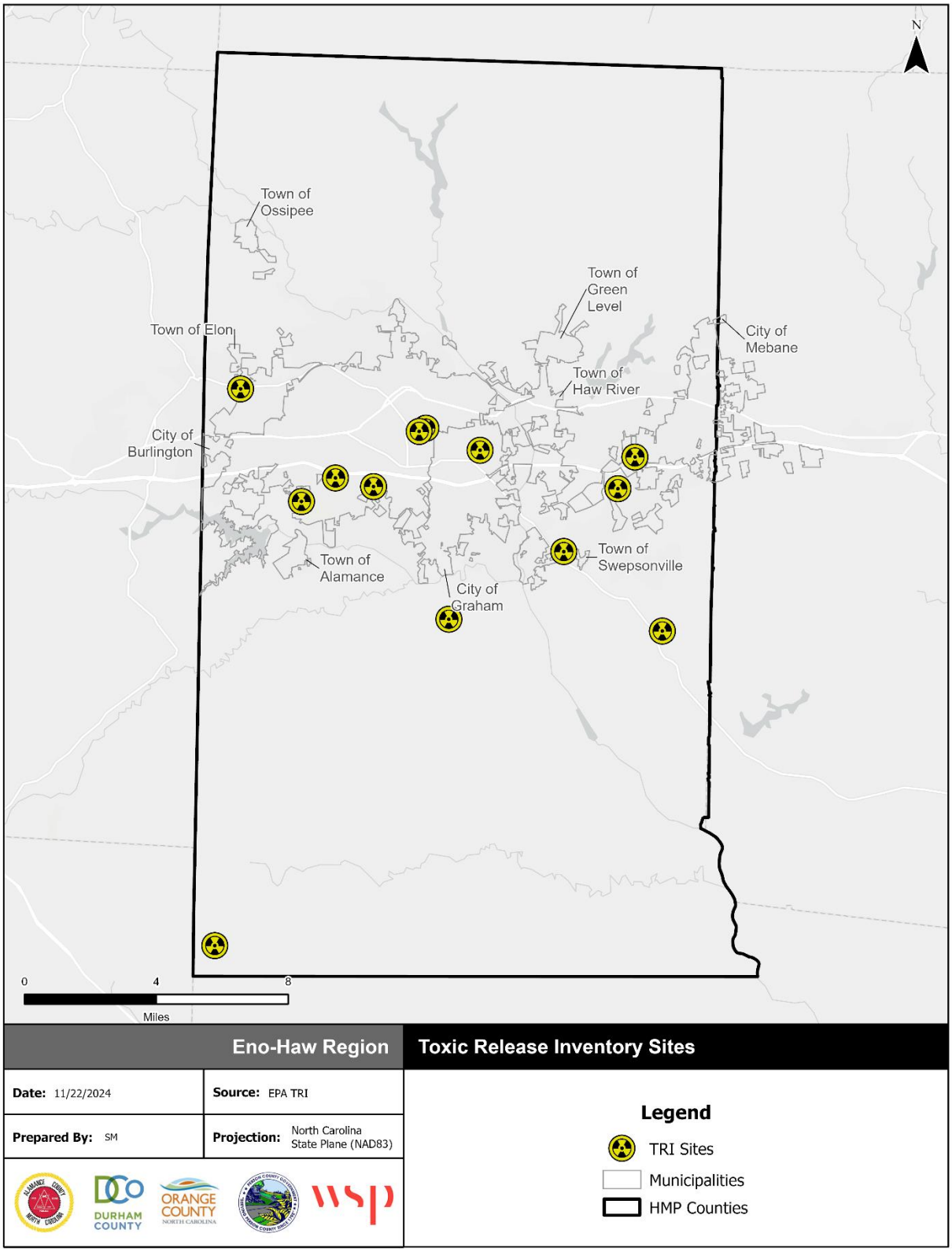
Facility Name	City	Industry Sector	Chemicals Present
Alamance County			
APOLLO CHEMICAL	BURLINGTON	Chemicals	Certain glycol ethers, Ethylene glycol
BURLINGTON FINISHING PLANT	BURLINGTON	Textiles	N-Methyl-2-pyrrolidone
CANFOR SOUTHERN PINE - GRAHAM PLANT	GRAHAM	Wood Products	Dioxin and Dioxin-like compounds, Lead, Lead compounds
CONCRETE SUPPLY CO. LLC - HATCHERY RD	BURLINGTON	Nonmetallic Mineral Product	Lead and Lead compounds
EDWARDS WOOD PRODUCTS INC.	LIBERTY	Wood Products	Lead and Lead compounds
ENGINEERED CONTROLS INTERNATIONAL LLC	ELON	Fabricated Metals	Copper, Silver, Lead, Nickel
HUFFMAN OIL CO INC	BURLINGTON	Petroleum Bulk Terminals	1,2,4-Trimethylbenzene, Zinc compounds, Xylene, n-Hexane, Toluene
HYDRO EXTRUSION USA LLC	BURLINGTON	Primary Metals	Lead
INDULOR AMERICA LP	GRAHAM	Chemicals	Acrylamide, Acrylic Acid, Ammonia, Ethyl Acrylate, Butyl Acrylate, Styrene, Methyl Methacrylate
LIGGETT GROUP LLC	MEBANE	Tobacco	Nicotine and salts

Facility Name	City	Industry Sector	Chemicals Present
NORTH CAROLINA MANUFACTURING	SWEPSONVILLE	Machinery	Copper, Ethylene glycol, Lead
REVERE SOUTH INC.	MEBANE	Primary Metals	Copper
SOUTH ATLANTIC GALVANIZING	GRAHAM	Fabricated Metals	Zinc compounds, Lead
Durham County			
AISIN NORTH CAROLINA CORP	DURHAM	Transportation Equipment	Manganese, Copper, Lead, Nickel, Chromium
ARGOS READY MIX HWY 55 CONCRETE PLANT	DURHAM	Nonmetallic Mineral Product	Lead
BRENNTAG MID-SOUTH	DURHAM	Chemical Wholesalers	Methanol, Methyl methacrylate, Cyclohexane, Certain glycol ethers, Nitric acid, n-Hexane, n-Butyl alcohol, Sodium nitrite, Methyl isobutyl etone, Toluene, N-Methyl-2-pyrrolidone, Triethylamine, Ammonia
CAROLINA SUNROCK LLC - MDC	DURHAM	Nonmetallic Mineral Product	Lead and Lead compounds, Polycyclic aromatice compounds, Mercury and mercury compounds, Nitrate compounds
CORMETECH INC	DURHAM	Nonmetallic Mineral Product	Vanadium compounds, Mercury
FOUNDATION LABS BY PLY GEM LLC	DURHAM	Miscellaneous Manufacturing	Diisocyanates
GENERAL ELECTRIC AVIATION - DURHAM ENGINE FACILITY	DURHAM	Transportation Equipment	Nickel
IPS STRUCTURAL ADHESIVES INC.	DURHAM	Chemicals	Methyl methacrylate
SCM METAL PRODUCTS INC	RESEARCH TRIANGLE PARK	Primary Metals	Chromium and Chromium Compounds,certain glycol ethers, Copper and copper compounds, Zinc compounds, Ethylene glycol, Antimony, Lead, Manganese compounds, Nickel
WOLFSPEED INC.	DURHAM	Computers and Electronic Products	Certain glycol ethers, N-Methyl-2-pyrrolidone, Ammonia, Hydrogen flouride, Manganese compounds, Nitric acid
WOLFSPEED INC. (RTP)	RESEARCH TRIANGLE PARK	Computers and Electronic Products	Hydrogen flouride, N-Methyl-2-pyrrolidone
Orange County			
ARMACELL LLC	MEBANE	Plastics and Rubber	Zinc compounds
INDUSTRIAL CONNECTIONS & SOLUTIONS LLC	MEBANE	Electrical Equipment	Silver, Copper, Cyanide compounds, Nickel, Manganese
WILMORE ELECTRONICS CO INC	HILLSBOROUGH	Electrical Equipment	Lead

Facility Name	City	Industry Sector	Chemicals Present
Person County			
CAROLINA SUNROCK LLC - WOODSDALE	ROXBORO	Nonmetallic Mineral Product	Lead And Lead Compounds
CERTAINTEED GYPSUM NC INC	SEMORA	Nonmetallic Mineral Product	Lead, Mercury
DUKE ENERGY PROGRESS LLC - ROXBORO STEAM ELECTRIC PLANT	SEMORA	Electric Utilities	Chromium compounds, Manganese compounds, Sulfuric acid, Hydrogen fluoride, Lead and Lead compounds, Ammonia, Hydrochloric acid, Copper copounds, Zinc compounds, Nickel compounds, Barium compounds, Dioxin and dioxin-like compounds, Naphthalene, Cobalt compounds, Polycyclic aromatic compounds, Benzo perylene, Vanadium compounds, Mercury and Mercury compounds, Arsenic compounds
DUKE ENERGY PROGRESS LLC-MAYO ELECTRIC GENERATING PLANT	ROXBORO	Electric Utilities	Sulfuric acid, Zinc compounds, Polycyclic aromatic compounds, Lead and Lead compounds, Benzo perylene, Naphthalene, Hydrochloric acid, Manganese compounds, Barium compounds, Hydrogen fluoride, Ammonia, Mercury and Mercury compounds, Dioxin and dioxin-like compounds, Vanadium compounds
LOUISIANA PACIFIC CORP. ROXBOR O OSB	ROXBORO	Wood Products	Acetaldehyde, Diisocyanates, Methanol, Formaldehyde, Lead
US FLUE CURED TOBACCO GROWERS INC.	TIMBERLAKE	Tobacco	Nicotine and salts
Region Total: 33			

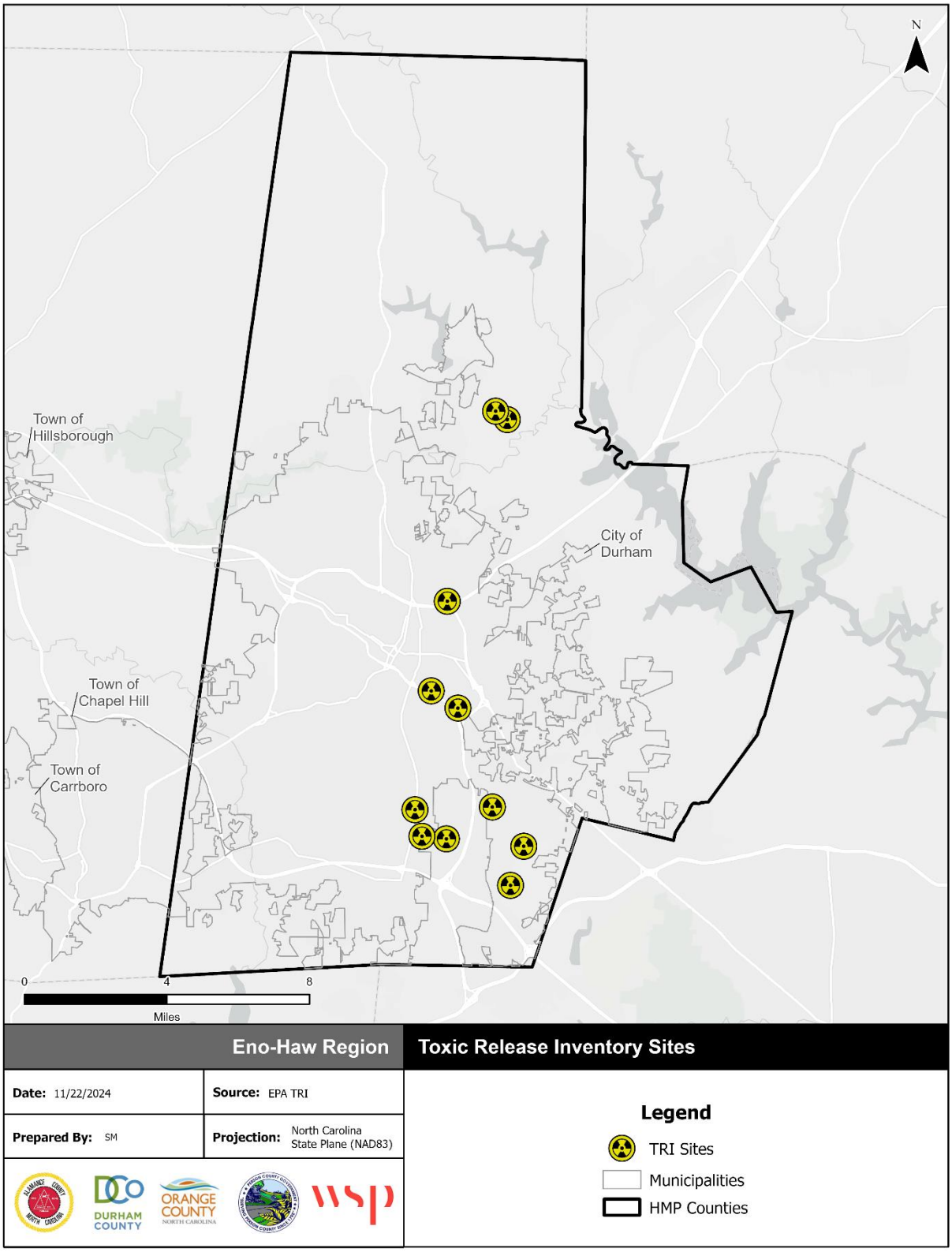
Source: US EPA Toxic Release Inventory

Figure 4.44 – Toxic Release Inventory Sites in Alamance County



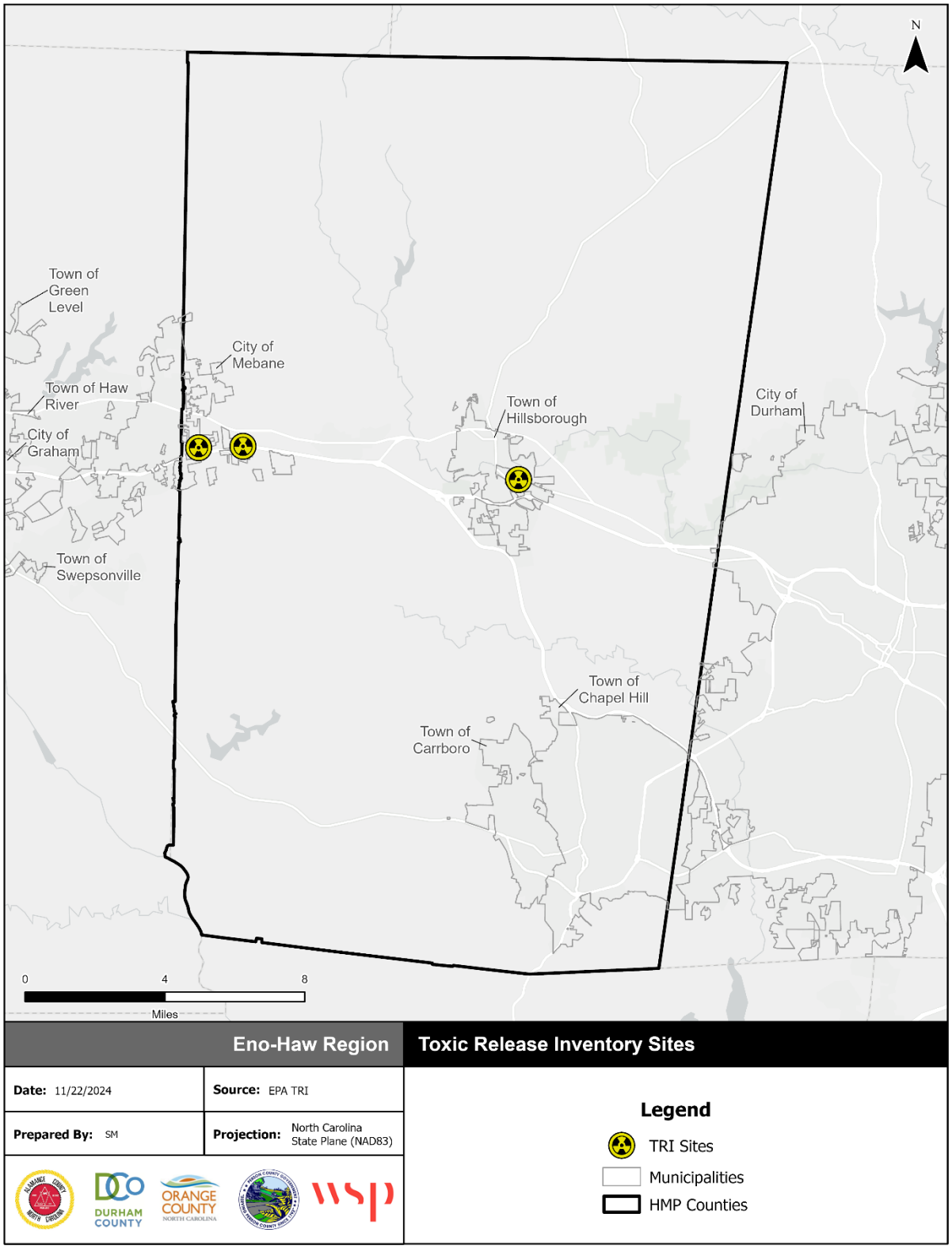
Source: EPA Toxic Release Inventory

Figure 4.45 – Toxic Release Inventory Sites in Durham County



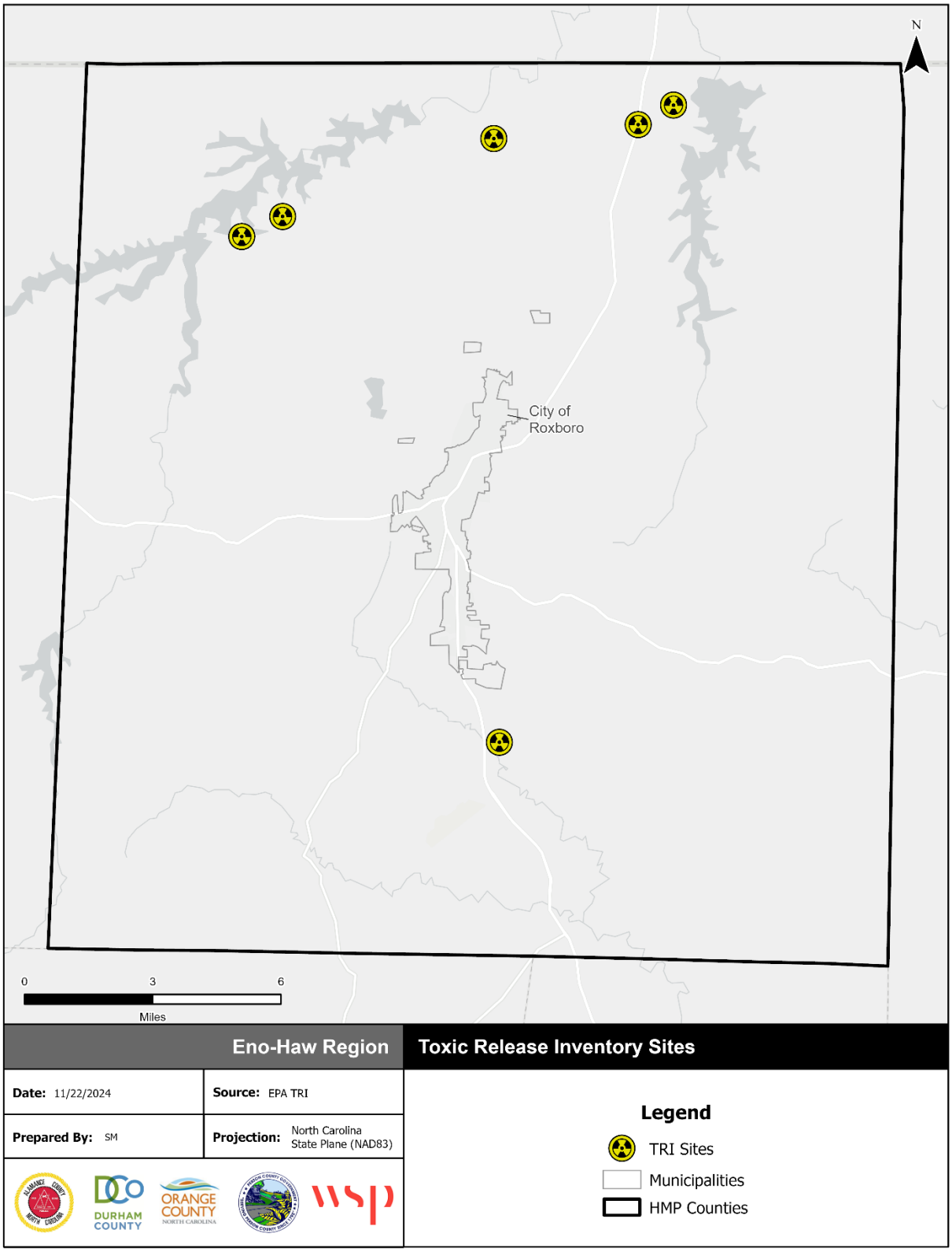
Source: EPA Toxic Release Inventory

Figure 4.46 – Toxic Release Inventory Sites in Orange County



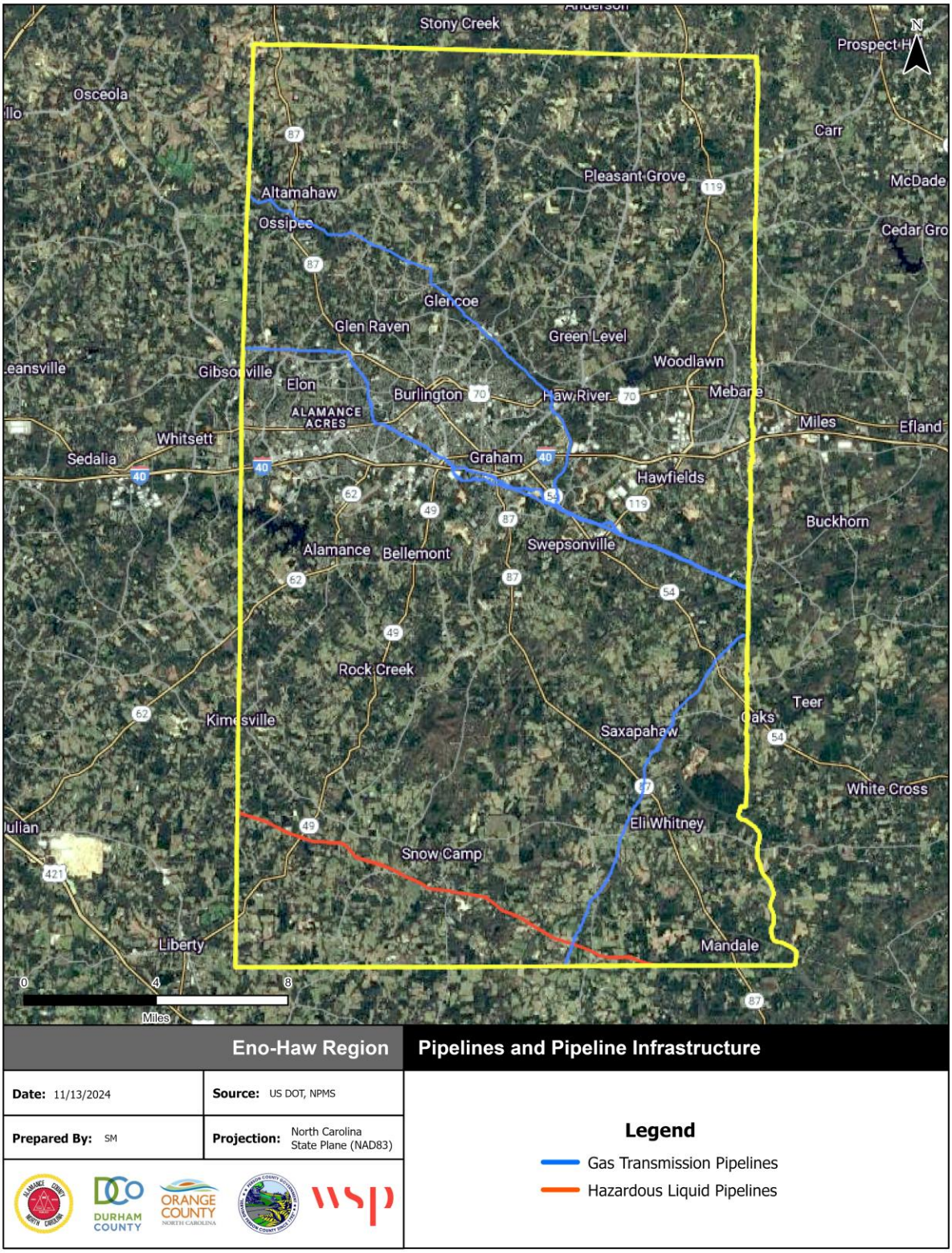
Source: EPA Toxic Release Inventory

Figure 4.47 – Toxic Release Inventory Sites in Person County



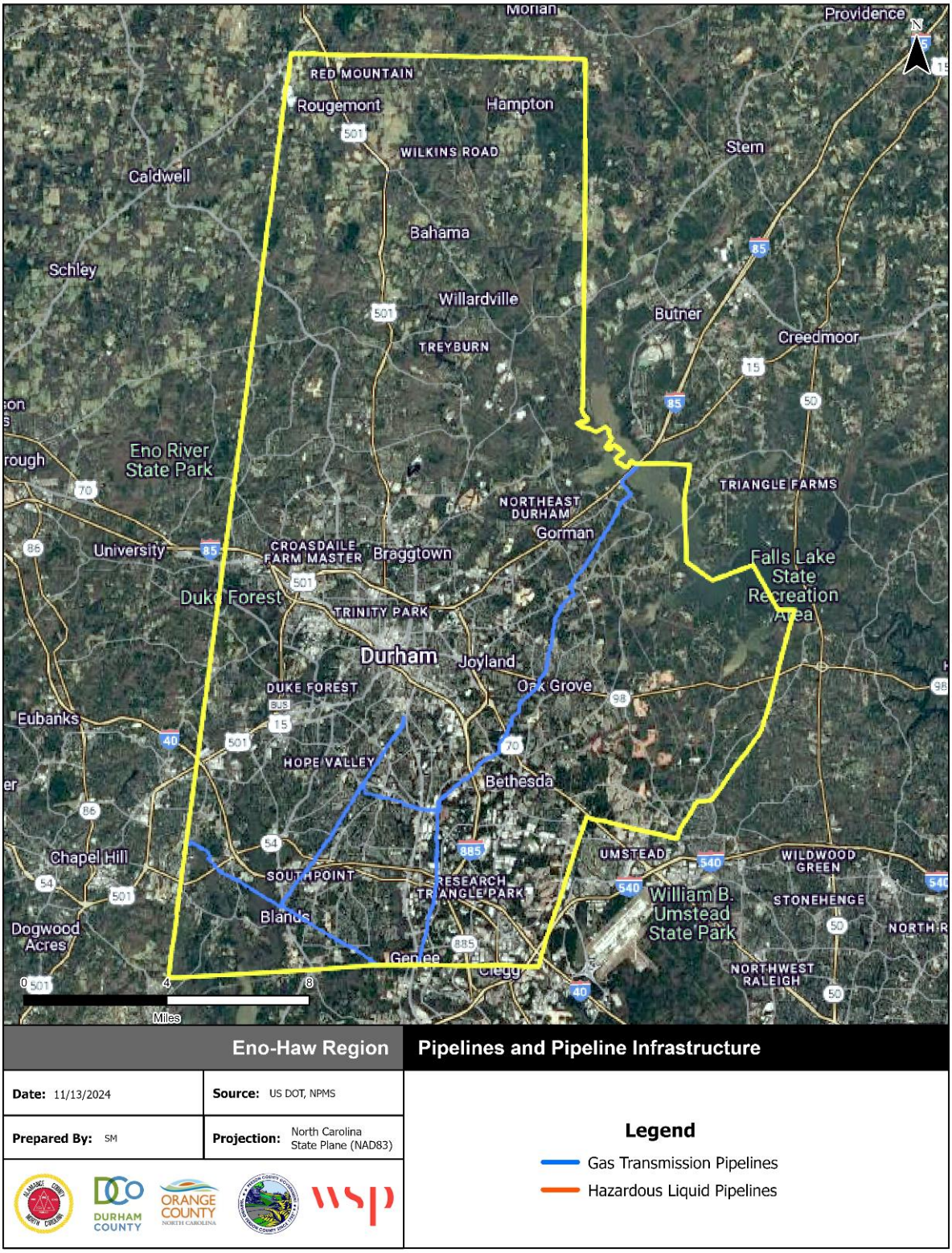
Source: EPA Toxic Release Inventory

Figure 4.48 – Pipelines and Pipeline Infrastructure in Alamance County



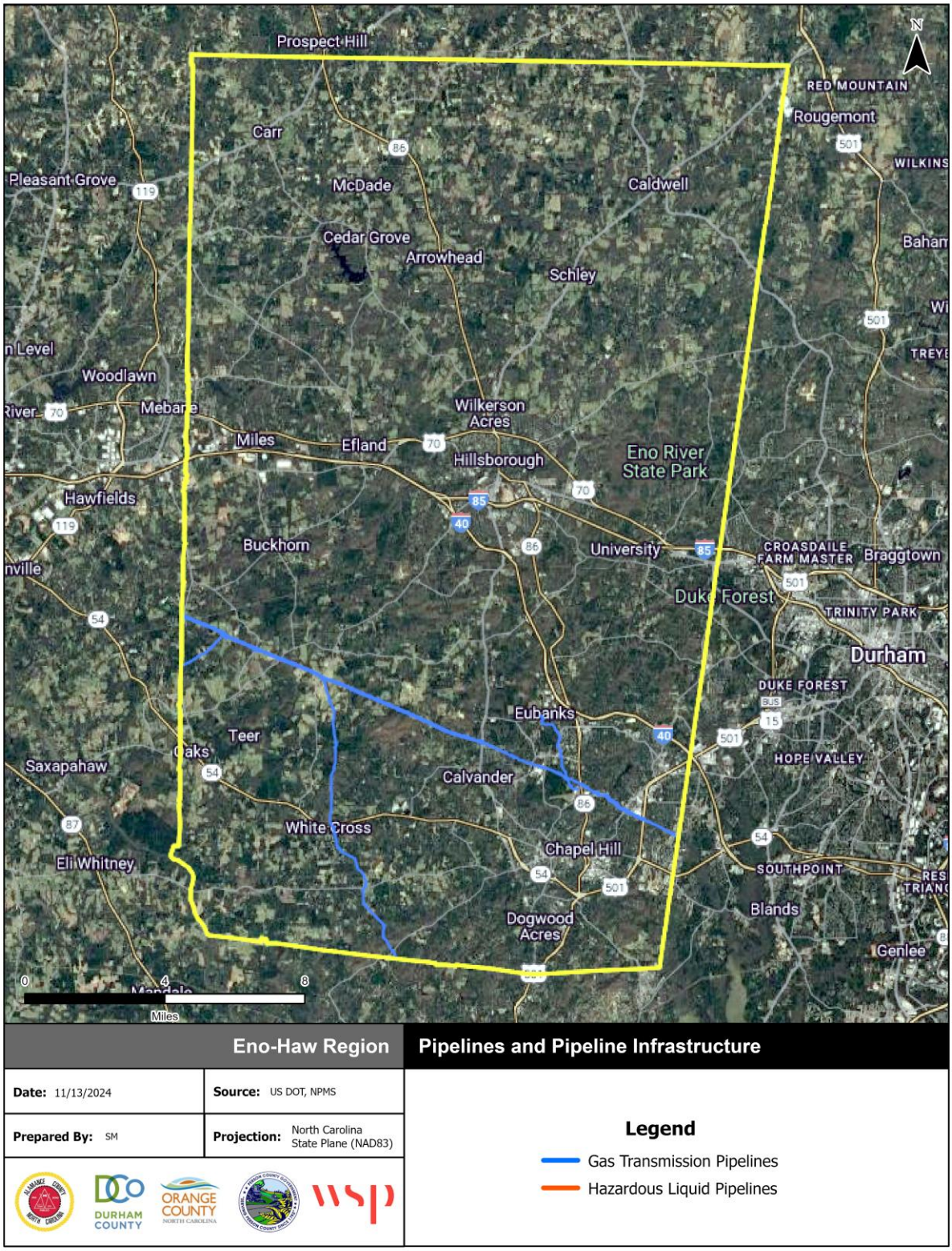
Source: US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System

Figure 4.49 – Pipelines and Pipeline Infrastructure in Durham County



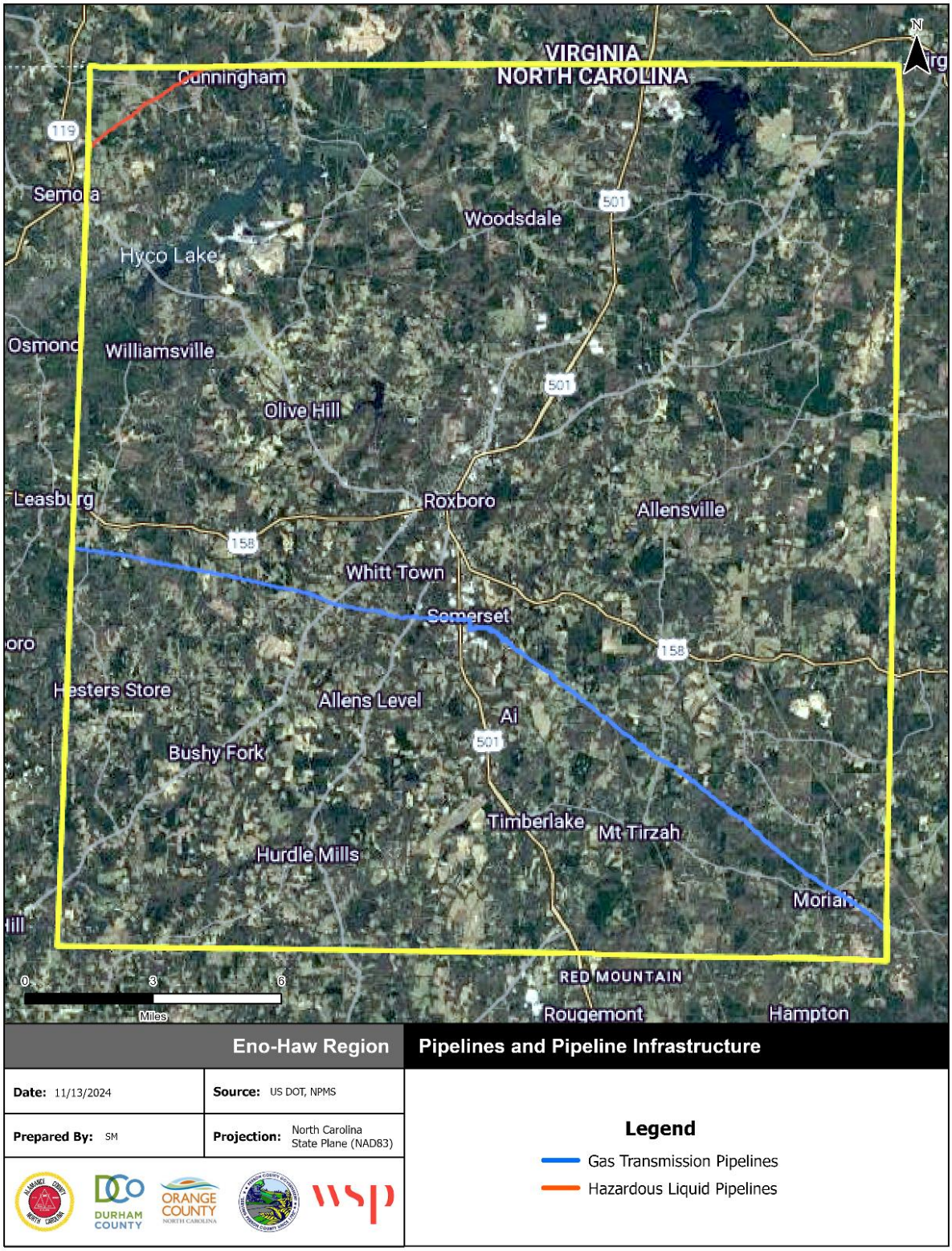
Source: US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System

Figure 4.50 – Pipelines and Pipeline Infrastructure in Orange County



Source: US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System

Figure 4.51 – Pipelines and Pipeline Infrastructure in Person County



Source: US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System

EXTENT

The magnitude of a hazardous materials incident can be defined by the material type, the amount released, and the location of the release. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), which records hazardous material incidents across the country, defines a "serious incident" as 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.

Impact: 1 – Minor

HISTORICAL OCCURRENCES

The Eno-Haw Region experiences several hazardous materials incidents every year. The USDOT's PHMSA maintains a database of reported hazardous materials incidents since 1989. According to PHSMA records, there were 760 recorded releases in the Eno-Haw Region from 1990 to 2023. These releases are listed in Table 4.115. Of these events, twenty (2.6%) were flagged as serious incidents. In total, these events caused an estimated $ 1,193,891 in damages.

Of the total incidents to occur in the Eno-Haw Region, 66.2 percent occurred in Durham County, 29.2 percent in Alamance County, 3.2 percent in Orange County, and 1.4 percent in Person County.

Table 4.115 – Reported Hazardous Materials Incidents by County 1990-2023

Year	Alamance	Durham	Orange	Person	Region Total
1990	1	0	0	0	**1**
1991	3	5	0	0	**8**
1992	0	3	0	0	**3**
1993	2	2	0	2	**6**
1994	2	4	1	0	**7**
1995	1	4	1	0	**6**
1996	0	9	0	0	**9**
1997	0	7	1	2	**10**
1998	2	7	0	1	**10**
1999	10	16	0	0	**26**
2000	8	11	1	1	**21**
2001	81	38	3	1	**123**
2002	58	24	0	0	**82**
2003	1	9	2	1	**13**
2004	41	23	0	1	**65**
2005	0	11	0	0	**11**

Year	Alamance	Durham	Orange	Person	Region Total
2006	0	9	2	0	**11**
2007	0	6	4	0	**10**
2008	4	9	0	0	**13**
2009	1	7	1	0	**9**
2010	0	10	0	0	**10**
2011	0	14	1	0	**15**
2012	2	14	1	1	**18**
2013	2	8	1	0	**11**
2014	2	10	0	0	**12**
2015	0	10	1	0	**11**
2016	0	13	1	0	**14**
2017	0	9	2	1	**12**
2018	0	11	0	0	**11**
2019	0	21	0	0	**21**
2020	0	37	0	0	**37**
2021	0	46	0	0	**46**
2022	1	56	1	0	**58**
2023	0	40	0	0	**40**
Total	**222**	**503**	**24**	**11**	**760**
Avg/Year	**6.5**	**14.8**	**0.7**	**0.3**	**22.3**

Source: PHMSA Incident Reports, Office of Hazardous Materials Safety, Incident Reports Database Search

The most common materials spilled in the planning area are Class 3 (Flammable Combustible Liquids) and Class 8 (Corrosive). Figure 4.52**Error! Reference source not found.** describes all nine hazard classes.

Figure 4.52 – Hazardous Materials Classes

Source: U.S. Department of Transportation

PROBABILITY OF FUTURE OCCURRENCE

Based on historical occurrences, there have been 20 serious incidents of hazardous materials releases in the 34-year period from 1990 through 2023. Based on this historical data, there is a 59% annual chance of the planning area experiencing a damaging hazardous materials incident.

Probability: 3 – Likely

VULNERABILITY ASSESSMENT

PEOPLE

People near facilities storing or transporting hazardous materials are at higher risk of exposure to a release incident. Additionally, any individuals working with or transporting hazardous materials are also at heightened risk. Depending on the materials, they may pose certain health hazards. If hazardous materials contaminate soils or water supply, people may be at risk of exposure through food or water.

PROPERTY

The property impacts of a fixed hazardous facility, such as a chemical processing facility is typically localized to the property where the incident occurs. The impact of a small spill (i.e. liquid spill) may also be limited to the extent of the spill and remediated if needed. While cleanup costs from major spills can be significant, they do not typically cause significant long-term impacts to property.

Impacts of hazardous material incidents on critical facilities are most often limited to the area or facility where they occurred, such as at a transit station, airport, fire station, hospital, or railroad. However, they can cause long-term traffic delays and road closures resulting in major delays in the movement of goods and services. These impacts can spread beyond the planning area to affect neighboring counties, or vice-versa. While cleanup costs from major spills can be significant, they do not typically cause significant long-term impacts to critical facilities.

ENVIRONMENT

Hazardous material incidents may affect a small area at a regulated facility or cover a large area outside such a facility. Widespread effects occur when hazards contaminate the groundwater and eventually the municipal water supply, or they migrate to a major waterway or aquifer. Impacts on wildlife and natural resources can also be significant.

CONSEQUENCE ANALYSIS

Table 4.116 summarizes the potential detrimental consequences of hazardous materials incident.

Table 4.116 – Consequence Analysis – Hazardous Materials Incident

Category	Consequences
Public	Contact with hazardous materials could cause serious illness or death. Those living and working closest to hazardous materials sites face the greatest risk of exposure. Exposure may also occur through contamination of food or water supplies.
Responders	Responders face similar risks as the general public but a heightened potential for exposure to hazardous materials.

Category	Consequences
Continuity of Operations (including Continued Delivery of Services)	A hazardous materials incident may cause temporary road closures or other localized impacts but is unlikely to affect continuity of operations.
Property, Facilities and Infrastructure	Some hazardous materials are flammable, explosive, and/or corrosive, which could result in structural damages to property. Impacts would be highly localized.
Environment	Consequences depend on the type of material released. Possible ecological impacts include loss of wildlife, loss of habitat, and degradation of air and/or water quality.
Economic Condition of the Jurisdiction	Clean up, remediation, and/or litigation costs may apply. Long-term economic damage is unlikely.
Public Confidence in the Jurisdiction's Governance	A hazardous materials incident may affect public confidence if the environmental or health impacts are enduring.

4.5.15 INFECTIOUS DISEASE

HAZARD BACKGROUND

Public health emergencies can take many forms—disease epidemics, large-scale incidents of food or water contamination, or extended periods without adequate water and sewer services. There can also be harmful exposure to chemical, radiological, or biological agents, and largescale infestations of disease-carrying insects or rodents. The first part of this section focuses on emerging public health concerns and potential pandemics, while the second part addresses natural and human-caused air and water pollution.

Public health emergencies can occur as primary events by themselves, or they may be secondary to another disaster or emergency, such as tornado, flood, or hazardous material incident. For more information on those particular incidents, see Sections 4.5.8 (Tornado), 4.5.5 (Flood), and 0 (Hazardous Materials). The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people. Public health emergencies can be worldwide or localized in scope and magnitude.

The primary communicable, or infectious, disease addressed within this plan is influenza:

Influenza - Whether natural or manmade, health officials say the threat of a dangerous new strain of influenza (flu) virus in pandemic proportions is a very real possibility in the years ahead. Unlike most illnesses, the flu is especially dangerous because it is spread through the air. A classic definition of influenza is a respiratory infection with fever. Each year, flu infects humans and spreads around the globe. There are three types of influenza virus: Types A, B, and C. Type A is the most common, most severe, and the primary cause of flu epidemics. Type B cases occur sporadically and sometimes as regional or widespread epidemics. Type C cases are quite rare and hence sporadic, but localized outbreaks have occurred. Seasonal influenza usually is treatable, and the mortality rate remains low. Each year, scientists estimate which particular strain of flu is likely to spread, and they create a vaccine to combat it. A flu pandemic occurs when the virus suddenly changes or mutates and undergoes an ―antigenic shift, permitting it to attach to a person’s respiratory system and leave the body‘s immune system defenseless against the invader.

Additional diseases of public health concern include tuberculosis, Smallpox, St. Louis Encephalitis, Meningitis, Lyme disease, West Nile, SARS, Zika, and Ebola. These communicable diseases are introduced within this plan, but full vulnerability analyses are not included at this time.

Tuberculosis - Tuberculosis, or TB, is the leading cause of infectious disease worldwide. It is caused by a bacteria called Mycobacterium tuberculosis that most often affects the lungs. TB is an airborne disease spread by coughing or sneezing from one person to another. The World Health Organization (WHO) estimates that one-third of the world's population, approximately two billion people, has latent TB, which means people have been infected by TB bacteria but are not yet ill with the disease and cannot transmit the disease. In 2022, an estimated 10.6 million people fell ill with TB and 1.3 million died from the disease (including 167,000 people with HIV). Over 80% of TB deaths occur in low- and middle- income countries.

Smallpox - Smallpox is a contagious, sometimes fatal, infectious disease. There is no specific treatment for smallpox disease, and the only prevention is vaccination. Smallpox is caused by the variola virus that emerged in human populations thousands of years ago. It is generally spread by face- to-face contact or by direct contact with infected bodily fluids or contaminated objects (such as bedding or clothing). A person with smallpox is sometimes contagious with onset of fever, but the person becomes most contagious with the onset of rash. The rash typically develops into sores that spread over all parts of the body. The infected person remains contagious until the last smallpox scab is gone. Smallpox outbreaks have occurred periodically for thousands of years, but the disease is now largely eradicated after a

worldwide vaccination program was implemented. After the disease was eliminated, routine vaccination among the general public was stopped. The last case of smallpox in the United States was in 1949.

St. Louis Encephalitis - In the United States, the leading type of epidemic flaviviral Encephalitis is St. Louis encephalitis (SLE), which is transmitted by mosquitoes that become infected by feeding on birds infected with the virus. SLE is the most common mosquito-transmitted pathogen in the United States. There is no evidence to suggest that the virus can be spread from person to person.

Meningitis- Meningitis is an infection of fluid that surrounds a person's spinal cord and brain. High fever, headache, and stiff neck are common symptoms of meningitis, which can develop between several hours to one to two days after exposure. Meningitis can be caused by either a viral or bacterial infection; however, a correct diagnosis is critically important, because treatments for the two varieties differ. Meningitis is transmitted through direct contact with respiratory secretions from an infected carrier. Primary risk groups include infants and young children, household contact with patients, and refugees. In the United States, periodic outbreaks continue to occur, particularly among adolescents and young adults. About 2,600 people in the United States get the disease each year. Generally, 10 to 14 percent of cases are fatal, and 11 to 19 percent of those who recover suffer from permanent hearing loss, mental retardation, loss of limbs, or other serious effects. Two vaccines are available in the United States.

Lyme Disease - Lyme disease was named after the town of Lyme, Connecticut, where an unusually large frequency of arthritis-like symptoms was observed in children in 1977. It was later found that the problem was caused by bacteria transmitted to humans by infected deer ticks, causing an average of more than 16,000 reported infections in the United States each year (however, the disease is greatly under-reported). Lyme disease bacteria are not transmitted from person to person. Following a tick bite, 80 percent of patients develop a red —bullseye rash accompanied by tiredness, fever, headache, stiff neck, muscle aches, and joint pain. If untreated, some patients may develop arthritis, neurological abnormalities, and cardiac problems, weeks to months later. Lyme disease is rarely fatal. During early stages of the disease, oral antibiotic treatment is generally effective, while intravenous treatment may be required in more severe cases.

West Nile Virus - West Nile virus is a flavivirus spread by infected mosquitoes and is commonly found in Africa, West Asia, and the Middle East. It was first documented in the United States in 1999. Although it is not known where the U.S. virus originated, it most closely resembles strains found in the Middle East. It is closely related to St. Louis encephalitis and can infect humans, birds, mosquitoes, horses, and other mammals.

Most people who become infected with West Nile virus will have either no symptoms or only mild effects. However, on rare occasions, the infection can result in severe and sometimes fatal illness. There is no evidence to suggest that the virus can be spread from person to person.

An abundance of dead birds in an area may indicate that West Nile virus is circulating between the birds and mosquitoes in that area. Although birds are particularly susceptible to the virus, most infected birds survive. The continued expansion of West Nile virus in the United States indicates that it is permanently established in the Western Hemisphere.

Coronaviruses – Coronaviruses are a large family of viruses found in both animals and humans and are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS), Severe Acute Respiratory Syndrome (SARS), and Novel Coronavirus (COVID- 19). Coronaviruses can cause respiratory infections and can lead to serious illnesses, like pneumonia, and can be deadly. Typical coronavirus symptoms include fever, cough, headache, runny nose, and sore throat. MERS was first reported in 2012 in Saudi Arabia and spread to more than 25 countries. It produced symptoms that often progressed to pneumonia and 30-40 percent of cases were fatal. SARS emerged in 2002 and spread to more than two dozen countries. It caused acute respiratory distress and had a mortality rate of about 10 percent.

The most significant recent coronavirus, COVID-19, first emerged in Wuhan, China in 2019 and rapidly spread across the world. According to CDC data, as of February 2022, there had been over 78.5 million cases of COVID-19 reported in the United States. COVID-19 spreads when an infected person breathes out droplets and very small particles that contain the virus. These droplets and particles can be breathed in by other people or land on their eyes, noses, or mouth. Symptoms include fever, cough, shortness of breath, fatigue, loss of taste and smell, and more. Symptoms range from mild to severe illness and typically appear between 2-14 days after exposure to the virus.

Severe Acute Respiratory Syndrome - Severe acute respiratory syndrome (SARS) is a respiratory illness that has recently been reported in Asia, North America, and Europe. Although the cause of SARS is currently unknown, scientists have detected in SARS patients a previously unrecognized coronavirus that appears to be a likely source of the illness. In general, humans infected with SARS exhibit fevers greater than 100.4 F, headaches, an overall feeling of discomfort, and body aches. Some people also experience mild respiratory symptoms. After two to seven days, SARS patients may develop a dry cough and have trouble breathing. The primary way that SARS appears to spread is by close person-to-person contact; particularly by an infected person coughing or sneezing contaminated droplets onto another person, with a transfer of those droplets to the victim's eyes, nose, or mouth.

Zika Virus - Discovered in the Zika forest of Uganda in 1947, the Zika virus is a member of the flavivirus family. It is transmitted to humans through the bite of an infected Aedes species mosquito (Ae. aegypti and Ae. albopictus). Zika virus can also be transmitted from an infected pregnant woman to her baby during pregnancy and can result in serious birth defects, including microcephaly. Less commonly, the virus can be spread through intercourse or blood transfusion. However, most people infected with the Zika virus do not become sick.

Ebola - Previously known as Ebola hemorrhagic fever, is a rare and deadly disease caused by infection with one of the Ebola virus species. It was first discovered in 1976 near the Ebola River in what is now the Democratic Republic of the Congo. Since then, outbreaks have appeared sporadically in Africa.

Warning Time: 1 – More than 24 hours

Duration: 4 – More than one week

LOCATION

Infectious disease outbreaks can occur anywhere in the planning area, especially where there are groups of people in close quarters.

Spatial Extent: 4 – Large

EXTENT

When on an epidemic scale, diseases can lead to high infection rates in the population causing isolation, quarantine, and potential mass fatalities. An especially severe influenza pandemic or other major disease outbreak could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines.

Table 4.117 describes the World Health Organization's six main phases to a pandemic flu as part of their planning guidance.

Table 4.117 – World Health Organization's Pandemic Flu Phases

Phase	Description
1	No animal influenza virus circulating among animals have been reported to cause infection in humans.

Phase	Description
2	An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a specific potential pandemic threat.
3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level breakouts.
4	Human-to-human transmission of an animal or human-animal influenza reassortant virus able to sustain community-level breakouts has been verified.
5	The same identified virus has caused sustained community-level outbreaks in two or more countries in one WHO region.
6	In addition to the criteria defined in Phase 5, the same virus has caused sustained community-level outbreaks in at least one other country in another WHO region.
Post-Peak Period	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels.
Post-Pandemic Period	Levels of influenza activity have returned to levels seen for seasonal influenza in most countries with adequate surveillance.

Source: World Health Organization

Impact: 3 – Critical

HISTORICAL OCCURRENCES

PUBLIC HEALTH EMERGENCIES – INFLUENZA PANDEMICS

Since the early 1900s, four lethal pandemics have swept the globe: Spanish Flu of 1918-1919; Asian Flu of 1957-1958; Hong Kong Flu of 1968-1969; and Swine Flu of 2009-2010. The Spanish Flu was the most severe pandemic in recent history. The number of deaths was estimated to be 50-100 million worldwide and 675,000 in the United States. Its primary victims were mostly young, healthy adults. The 1957 Asian Flu pandemic killed about 70,000 people in the United States, mostly the elderly and chronically ill. The 1968 Hong Kong Flu pandemic killed 34,000 Americans. The 2009 Swine Flu caused 12,469 deaths in the United States. These historic pandemics are further defined in the following paragraphs along with several "pandemic scares".

SPANISH FLU (H1N1 VIRUS) OF 1918-1919

In 1918, when World War I was in its fourth year, another threat began that rivaled the war itself as the greatest killer in human history. The Spanish Flu swept the world in three waves during a two-year period, beginning in March 1918 with a relatively mild assault.

The first reported case occurred at Camp Funston (Fort Riley), Kansas, where 60,000 soldiers trained to be deployed overseas. Within four months, the virus traversed the globe, as American soldiers brought the virus to Europe. The first wave sickened thousands of people and caused many deaths (46 died at Camp Funston), but it was considered mild compared to what was to come. The second and deadliest wave struck in the autumn of 1918 and killed millions. At Camp Funston alone, there were 14,000 cases and 861 deaths reported during the first three weeks of October 1918.

Outbreaks caused by a new variant exploded almost simultaneously in many locations including France, Sierra Leone, Boston, and New York City, where more than 20,000 people died that fall. The flu gained

its name from Spain, which was one of the hardest hit countries. From there, the flu went through the Middle East and around the world, eventually returning to the United States along with the troops.

Of the 57,000 Americans who died in World War I, 43,000 died as a result of the Spanish Flu. At one point, more than 10 percent of the American workforce was bedridden. By a conservative estimate, a fifth of the human race suffered the fever and aches of influenza between 1918 and 1919 and 20 million people died. At the height of the flu outbreak during the winter of 1918-1919, at least 20% of North Carolinians were infected by the disease. Ultimately, 10,000 citizens of the state succumbed to this disease.

ASIAN FLU (H2N2 VIRUS) OF 1957-1958

This influenza pandemic was first identified in February 1957 in the Far East. Unlike the Spanish Flu, the 1957 virus was quickly identified, and vaccine production began in May 1957. A number of small outbreaks occurred in the United States during the summer of 1957, with infection rates highest among school children, young adults, and pregnant women; however, the elderly had the highest rates of death. A second wave of infections occurred early the following year, which is typical of many pandemics.

HONG KONG FLU (H3N2 VIRUS) OF 1968-1969

This influenza pandemic was first detected in early 1968 in Hong Kong. The first cases in the United States were detected in September 1968, although widespread illness did not occur until December. This became the mildest pandemic of the twentieth century, with those over the age of 65 the most likely to die. People infected earlier by the Asian Flu virus may have developed some immunity against the Hong Kong Flu virus. Also, this pandemic peaked during school holidays in December, limiting student-related infections.

PANDEMIC FLU THREATS: SWINE FLU OF 1976, RUSSIAN FLU OF 1977, AND AVIAN FLU OF 1997 AND 1999

Three notable flu scares occurred in the twentieth century. In 1976, a swine-type influenza virus appeared in a U.S. military barracks (Fort Dix, New Jersey). Scientists determined it was an antigenically drifted variant of the feared 1918 virus. Fortunately, a pandemic never materialized, although the news media made a significant argument about the need for a Swine Flu vaccine.

In May 1977, influenza viruses in northern China spread rapidly and caused epidemic disease in children and young adults. By January 1978, the virus, subsequently known as the Russian Flu, had spread around the world, including the United States. A vaccine was developed for the virus for the 1978–1979 flu season. Because illness occurred primarily in children, this was not considered a true pandemic.

In March 1997, scores of chickens in Hong Kong‘s rural New Territories began to die—6,800 on three farms alone. The Avian Flu virus was especially virulent, and made an unusual jump from chickens to humans. At least 18 people were infected, and six died in the outbreak. Chinese authorities acted quickly to exterminate over one million chickens and successfully prevented further spread of the disease. In 1999, a new avian flu virus appeared. The new virus caused illness in two children in Hong Kong. Neither of these avian flu viruses started pandemics.

SWINE FLU (H1N1 VIRUS) OF 2009–2010

This influenza pandemic emerged from Mexico in 2009. The first U.S. case of H1N1, or Swine Flu, was diagnosed on April 15, 2009. The U.S. government declared H1N1 a public health emergency on April 26. By June, approximately 18,000 cases of H1N1 had been reported in the United States. A total of 74 countries were affected by the pandemic.

The CDC estimates that 43 million to 89 million people were infected with H1N1 between April 2009 and April 2010. There were an estimated 8,870 to 18,300 H1N1 related deaths. On August 10, 2010, the World Health Organization (WHO) declared an end to the global H1N1 flu pandemic.

CORONAVIRUS DISEASE (COVID-19), 2019-2024

COVID-19 was caused by severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2). First identified in Wuhan, China in December 2019, the virus quickly spread throughout China and then globally. In the United States, COVID-19 was first identified in late January in Washington State and rapidly spread throughout the Country, with large epicenters on both the east and west coasts. On March 13, 2020 the U.S. enters a nationwide emergency and by March 15, 2020 U.S. states begin to shut down to prevent the spread of COVID-19. Almost a year later the U.S. has administered over 100 million vaccinations. In June 2021 the first major variant, the Delta variant, becomes dominant in the U.S. which kicks off a third wave of infections during the summer of 2021. By December 20, 2021, Omicron, the second and most dominant variant in the U.S., had been detected in most U.S. states and territories. The Omicron variant spread more easily than the original virus that caused COVID-19 and the Delta variant.

According to the Johns Hopkins Coronavirus Resource Center, from the start of the pandemic to March 2023, there were over 103 million confirmed cases of COVID-19 in the U.S. resulting in over 1.1 million deaths. In North Carolina, there were over 3.4 million confirmed cases and 28,432 deaths due to COVID-19. Johns Hopkins stopped collecting data as of March 10, 2023. The COVID-19 virus has transitioned to endemic but maintains dual seasonality, with cases peaking twice a year.

PUBLIC HEALTH EMERGENCIES – OTHER PANDEMICS

ST. LOUIS ENCEPHALITIS, 1964-2005

Between 1964 and 2005, there were 4,651 confirmed cases of SLE in the United States. It should be noted, however, that less than 1 percent of SLE infections are clinically apparent, so the vast majority of infections remain undiagnosed. Illnesses range from mild headaches and fever to convulsions, coma, and paralysis. The last major outbreak of SLE occurred in the Midwest from 1974 to 1977, when over 2,500 cases were reported in 35 states. The most recent outbreak of St. Louis encephalitis was in 1999 in New Orleans, Louisiana, with 20 reported cases. The disease is generally milder in children than in adults, with the elderly at highest risk for severe illness and death. Approximately 3 to 30 percent of cases are fatal; no vaccine against SLE exists. In 2014, two U.S. cases were reported and were the first human cases since 2002.

MENINGITIS, 1996-1997, 2005

During 1996 and 1997, 213,658 cases of meningitis were reported, with 21,830 deaths, in Africa. According to the North Carolina Division of Public Health, an average of 20 reported cases of Meningitis occurred annually between 2005-2013 following the initial outbreak. In 2023, the CDC confirmed 438 cases of meningitis across the U.S. which is the largest number of cases reported since 2013.

LYME DISEASE, 2015

In the United States, Lyme disease is mostly found in the northeastern, mid-Atlantic, and upper north-central regions, and in several counties in northwestern California. In 2019, 93-percent of confirmed Lyme Disease cases were reported from 14 states: Connecticut, Delaware, Maine, Maryland, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin. Lyme disease is the most commonly reported vector-borne illness in the United States. According to the CDC, recent estimates based on insurance records suggest that approximately 476,000 Americans are diagnosed and treated with Lyme disease each year. This disease does not occur nationwide and is concentrated heavily in the northeast and upper Midwest. Between 2018 to 2022 the average incidence rate of Lyme disease in North Carolina was 2.82 confirmed and probable cases per 100,000 residents, which is significantly lower than the national average. In 2022, only Orange and Person Counties had confirmed cases of Lyme Disease within the Eno-Haw Region, two confirmed cases in Orange County and one case in Person County.

SEVERE ACUTE RESPIRATORY SYNDROME, 2003

During November 2002-July 2003, a total of 8,098 probable SARS cases were reported to the World Health Organization (WHO) from 29 countries. In the United States, only 8 cases had laboratory evidence of infection. Since July 2003, when SARS transmission was declared contained, active global surveillance for SARS disease has detected no person-to-person transmission. CDC has therefore archived the case report summaries for the 2003 outbreak. Across North Carolina, there was one confirmed SARS case – a man in Orange County tested positive in June 2003.

ZIKA VIRUS, 2015

In May 2015, the Pan American Health Organization issued an alert noting the first confirmed case of a Zika virus infection in Brazil. Since that time, Brazil and other Central and South America countries and territories, as well as the Caribbean, Puerto Rico, and the U.S. Virgin Islands have experienced ongoing Zika virus transmission. In August 2016, the Centers for Disease Control and Prevention (CDC) issued guidance for people living in or traveling to a 1-square-mile area Miami, Florida, identified by the Florida Department of Health as having mosquito-borne spread of Zika. In October 2016, the transmission area was expanded to include a 4.5-square-mile area of Miami Beach and a 1-squre mile area of Miami-Dade County. In addition, all of Miami-Dade County was identified as a cautionary area with an unspecified level of risk. As of the end of 2018, the CDC reported 74 cases of Zika across the United States. As of November 2024, there are no current local transmission of Zika virus in the continental U.S. or territories. The last cases of local Zika transmission by mosquitos in the continental U.S. were in Florida and Texas in 2016-17 and no reported cases from U.S. territories since 2019.

EBOLA, 2014-2016

Most recently, in March 2014, West Africa experienced the largest outbreak of Ebola in history. Widespread transmission was found in Liberia, Sierra Leone, and Guinea with the number of cases totaling 28,616 and the number of deaths totaling 11,310. In the United States, four cases of Ebola were confirmed in 2014 including a medical aid worker returning to New York from Guinea, two healthcare workers at Texas Presbyterian Hospital who provided care for a diagnosed patient, and the diagnosed patient who traveled to Dallas, Texas from Liberia. All three healthcare workers recovered. The diagnosed patient passed away in October 2014. In March 2016, the WHO terminated the public health emergency for the Ebola outbreak in West Africa.

PROBABILITY OF FUTURE OCCURRENCE

It is impossible to predict when the next pandemic will occur or its impact. The CDC continually monitors and assesses pandemic threats and prepares for an influenza pandemic. Novel influenza A viruses with pandemic potential include Asian lineage avian influenza A (H5N1) and (H7N9) viruses. These viruses have all been evaluated using the Influenza Risk Assessment Tool (IRAT) to assess their potential pandemic risk. Because the CDC cannot predict how severe a future pandemic will be, advance planning is needed at the national, state and local level; this planning is done through public health partnerships at the national, state and local level.

Today, a much larger percentage of the world's population is clustered in cities, making them ideal breeding grounds for epidemics. Additionally, the explosive growth in air travel means the virus could literally be spread around the globe within hours. Under such conditions, there may be very little warning time. Most experts believe we will have just one to six months between the time that a dangerous new influenza strain is identified and the time that outbreaks begin to occur in the United States. Outbreaks are expected to occur simultaneously throughout much of the nation, preventing shifts in human and material resources that normally occur with other natural disasters. These and many other aspects make influenza pandemic unlike any other public health emergency or community disaster.

Probability: 2 – Possible

CLIMATE CHANGE

According to the U.S. Global Change Research Program, the influences of climate change on public health is significant and varied. The influences range from the clear threats of temperature extremes and severe storms to less obvious connections related to insects. Climate and weather can also affect water and food quality in particular areas, with implications for public health.

Hot days can be unhealthy—even dangerous. High air temperatures can cause heat stroke and dehydration, and affect people's cardiovascular and nervous systems. Midwestern cities like St. Louis are vulnerable to heat waves, because many houses and apartments lack air conditioning, and urban areas are typically warmer than their rural surroundings. In recent decades, severe heat waves have killed hundreds of people across the Midwest. Heat stress is expected to increase as climate change brings hotter summer temperatures and more humidity. Certain people are especially vulnerable, including children, the elderly, the sick, and the poor.

Higher temperatures and wetter conditions tend to increase mosquito and tick activity, leading to an increased risk of zoonotic diseases. Mosquitos are known to carry diseases such as West Nile virus (WNV), La Crosse/California encephalitis, Jamestown Canyon virus, St. Louis encephalitis, and Eastern equine encephalitis. The two major concerns associated with warmer and wetter conditions are that the mosquito species already found in North Carolina and the diseases that they carry will become more prevalent, and that new species carrying unfamiliar diseases will start to appear for the first time.

Warmer winters with fewer hard freezes in areas that already see WNV-carrying mosquitos are likely to observe both a higher incidence of WNV and a longer WNV season, ultimately leading to an increase in human cases. Non-native mosquito species may move into North Carolina if the climate becomes more suitable for them, bringing with them diseases such as Jamestown Canyon virus, Chikungunya, and Dengue Fever.

Ticks are also well-known disease vectors in North Carolina, carrying pathogens such as Lyme disease, anaplasmosis, Ehrlichiosis, Powassan virus, and Babesiosis. Warmer, wetter weather can lead to an increase in algal blooms and declining beach health. An increase in flood events may also be associated with an increased incidence of mold problems in homes and businesses, as well as contamination of wells and surface waters due to sewer overflows and private septic system failures.

If these predictions come true, communities must contend with the human health impacts related to the increased prevalence of infectious diseases, heat waves, and changes in air and water quality. Public health officials will need to focus on spreading information and enacting pest and disease reduction. Floodprone communities will need to focus on continuously improving flood controls and mitigation strategies, including restricting building and chemical storage in floodplains, upgrading well and septic requirements, and providing water testing kits to residents.

VULNERABILITY ASSESSMENT

METHODOLOGIES AND ASSUMPTIONS

Vulnerability to infectious disease was assessed based on past occurrences nationally and internationally as well as publicly available information on these vulnerabilities, as well as attacks occurring in the region.

PEOPLE

Disease spread and mortality is affected by a variety of factors, including virulence, ease of spread, aggressiveness of the virus and its symptoms, resistance to known antibiotics and environmental factors. While every pathogen is different, diseases normally have the highest mortality rate among the very young, the elderly or those with compromised immune systems. As an example, the unusually deadly 1918 H1N1 influenza pandemic had a mortality rate of 20%. If an influenza pandemic does occur, it is likely that many age groups would be seriously affected. The greatest risks of hospitalization and death—as seen during the last two pandemics in 1957 and 1968 as well as during annual outbreaks of influenza—will be to infants, the elderly, and those with underlying health conditions. However, in the 1918 pandemic, most deaths occurred in young adults. Few people, if any, would have immunity to a new virus.

Approximately twenty percent of people exposed to West Nile Virus through a mosquito bite develop symptoms related to the virus; it is not transmissible from one person to another. Preventive steps can be taken to reduce exposure to mosquitos carrying the virus; these include insect repellent, covering exposed skin with clothing and avoiding the outdoors during twilight periods of dawn and dusk, or in the evening when the mosquitos are most active.

PROPERTY

For the most part, property itself would not be impacted by a human disease epidemic or pandemic. However, as concerns about contamination increase, property may be quarantined or destroyed as a precaution against spreading illness. Furthermore, staffing shortages could affect the function of critical facilities.

ENVIRONMENT

A widespread pandemic would not have an impact on the natural environment unless the disease was transmissible between humans and animals. However, affected areas could result in denial or delays in the use of some areas, and may require remediation.

CONSEQUENCE ANALYSIS

Table 4.118 summarizes the potential consequences of infectious disease.

Table 4.118 – Consequence Analysis – Infectious Disease

Category	Consequences
Public	Adverse impact expected to be severe for unprotected personnel and moderate to light for protected personnel.
Responders	Adverse impact expected to be severe for unprotected personnel and uncertain for trained and protected personnel, depending on the nature of the incident.
Continuity of Operations (including Continued Delivery of Services)	Danger to personnel in the area of the incident may require relocation of operations and lines of succession execution. Disruption of lines of communication and destruction of facilities may extensively postpone delivery of services.
Property, Facilities and Infrastructure	Access to facilities and infrastructure in the area of the incident may be denied until decontamination completed.

Category	Consequences
Environment	Incident may cause denial or delays in the use of some areas. Remediation needed.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

HAZARD SUMMARY BY JURISDICTION

The following table summarizes infectious disease hazard risk by jurisdiction. Infectious disease risk is uniform across the planning area; there is no variation in risk by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
All Jurisdictions	2	3	4	1	4	2.8	M

4.5.16 RADIOLOGICAL EMERGENCY

HAZARD BACKGROUND

A radiological incident is an occurrence resulting in the release of radiological material at a fixed facility (such as power plants, hospitals, laboratories, etc.) or in transit.

Radiological incidents related to transportation are described as an incident resulting in a release of radioactive material during transportation. Transportation of radioactive materials through North Carolina over the interstate highway system is considered a radiological hazard. The transportation of radioactive material by any means of transport is licensed and regulated by the federal government. As a rule, there are two categories of radioactive materials that are shipped over the interstate highways:

- Low level waste consists of primarily of materials that have been contaminated by low level radioactive substances but pose no serious threat except through long-term exposure. These materials are shipped in sealed drums within placarded trailers. The danger to the public is no more than a wide array of other hazardous materials.
- High level waste, usually in the form of spent fuel from nuclear power plants, is transported in specially constructed casks that are built to withstand a direct hit from a locomotive.

Radiological emergencies at nuclear power plants are divided into classifications. Table 4.119 shows these classifications, as well as descriptions of each.

Table 4.119 – Radiological Emergency Classifications

Emergency Classification	Description
Notification of Unusual Event (NOUE)	Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.
Alert	Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of hostile action. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guides (PAGs)
Site Area Emergency (SAE)	Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile action that results in intentional damage or malicious acts; 1) toward site personnel or equipment that could lead to the likely failure of or; 2) that prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.
General Emergency	Events are in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile action that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Warning Time: 4 – Less than 6 hours

Duration: 4 – More than one week

LOCATION

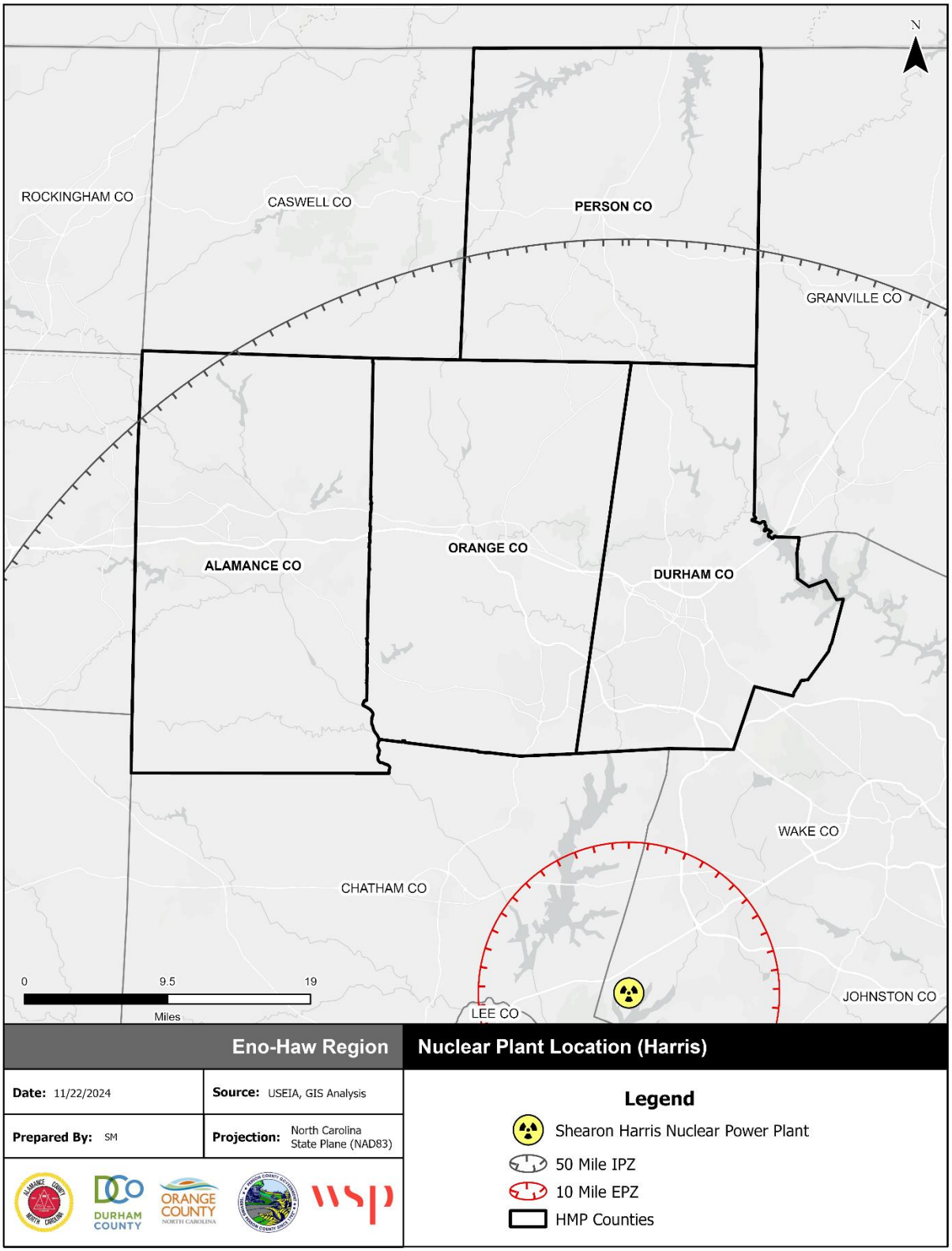
Harris Nuclear Plant, which is located in southwest Wake County south of the planning area, is a single-unit 928-megawatt power plant. The plant began commercial operation in 1987 and now employs approximately 800 people. Its reactor is a pressurized water reactor and the plant operates with a very high level of security. This is the location from which the most catastrophic nuclear accident might occur and will be the focal point of the nuclear analysis in this plan. However, it should also be noted that there is a 1-megawatt PULSTAR research reactor located on North Carolina State University's campus in downtown Raleigh. Although its impacts would potentially be less far-reaching than Harris Nuclear Plant's in the event of an accident, it should still be noted that the effects could be extremely detrimental.

The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants:

- **Emergency Planning Zone (EPZ)** – The EPZ is a 10-mile radius around nuclear facilities. It is also known as the Plume Exposure Pathway. Areas located within this zone are considered to be at highest risk of exposure to radioactive materials. Within this zone, the primary concern is exposure to and inhalation of radioactive contamination. Predetermined action plans within the EPZ are designed to avoid or reduce dose from such exposure. Residents within this zone would be expected to evacuate in the event of an emergency. Other actions such as sheltering, evacuation, and the use of potassium-iodide must be taken to avoid or reduce exposure in the event of a nuclear incident.
- **Ingestion Pathway Zone (IPZ)** – The IPZ is delineated by a 50-mile radius around nuclear facilities as defined by the federal government. Also known as the Ingestion Exposure Pathway, the IPZ has been designated to mitigate contamination in the human food change resulting from a radiological accident at a nuclear power facility. Contamination to fresh produce, water supplies, and other food produce may occur when radionuclides are deposited on surfaces.

Figure 4.53 shows the location of Harris Nuclear Plant and the approximate 10-mile Emergency Planning Zone (EPZ) buffer and 50-mile Ingestion Pathway Zone (IPZ) around the plant. While none of the counties or communities in the planning area fall into the 10-mile EPZ, areas of Alamance and Person counties, and the entirety of Orange and Durham counties are included in the 50-mile IPZ.

Figure 4.53 - Harris Nuclear Plant Location in Relation to Planning Area



Source: USEIA

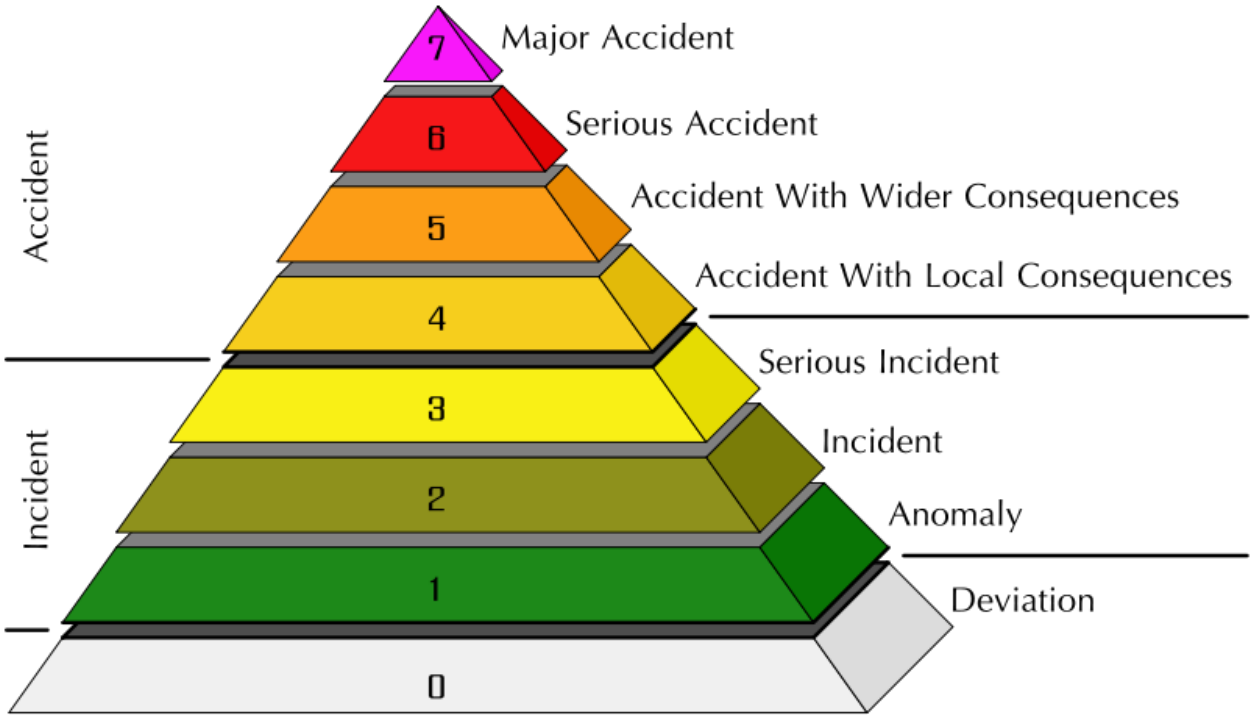
The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and this radius is the designated evacuation radius recommended by the Nuclear Regulatory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

Spatial Extent: 2 – Small

EXTENT

The International Atomic Energy Association (IAEA) developed the International Nuclear and Radiological Event Scale to quantify the magnitude of radiological events. This scale is logarithmic, meaning each increasing level represents a 10-fold increase in severity compared to the previous level.

Figure 4.54 – International Nuclear and Radiological Event Scale



Source: International Atomic Energy Association

Impact: 4 – Catastrophic

HISTORICAL OCCURRENCES

As reported in the 2023 State Hazard Mitigation Plan, Harris Nuclear Plant is one of only three plants in the country to have had no Nuclear Regulatory Commission findings as of November 2024. Therefore, there are no recent historical occurrences of any serious incidents at the Harris Plant. However, there have been events that warranted emergency declarations at both the Harris Nuclear Plant and the PULSTAR research reactor at North Carolina State University. Table 4.120 and Table 4.121 lists emergency declarations reported at the Harris Nuclear Plant and the PULSTAR research reactor between 1986 and 2023.

Table 4.120 - Emergency Declarations at Harris Nuclear Plant, 1986-2023

Emergency Declaration	Date	Description
Alert	08/12/1988	Loss of greater than 50% of main control board (MCB) alarms due to electrical problems; normal power supply to annunciator panel failed and did not transfer to its backup inverter.
Alert	10/09/1988	Fire on "B" Main Electrical Transformer; release of flammable gas in the Protected Area.
Unusual Event	11/28/1986	Loss of ERFIS computer system to display Safety Parameter Display System (SPDS) (55 lapsed minutes).
Unusual Event	11/29/1986	Loss of ERFIS computer system to display SPDS (58 lapsed minutes).
Unusual Event	11/30/1986	Loss of ERFIS computer system to display SPDS (48 lapsed minutes).
Unusual Event	12/03/1986	Loss of ERFIS computer system to display SPDS (27 lapsed minutes).
Unusual Event	12/11/1986	Safety Injection (an Emergency Core Cooling System) actuated while testing electronic circuitry.
Unusual Event	01/27/1987	Loss of ERFIS computer system to display SPDS (23 lapsed minutes).
Unusual Event	07/11/1987	Loss of ERFIS computer system to display SPDS (22 lapsed minutes).
Unusual Event	07/24/1987	Loss of ERFIS computer system to display SPDS (32 lapsed minutes).
Unusual Event	07/25/1987	Loss of ERFIS computer system to display SPDS (28 lapsed minute).
Unusual Event	02/04/1988	Fire within the Protected Area greater than 10 minutes; smoke observed coming from the motor for the reactor auxiliary building supply fan.
Unusual Event	10/06/1988	RCS leakage in excess of Tech Specs (unidentified leakage > 1.0 gpm).
Unusual Event	10/20/1988	RCS leakage in excess of Tech Specs; pressure operated relief valve opened and admitted RCS inventory to the pressurized relief tank (PRT).
Unusual Event	11/17/1988	Loss of ERFIS computer system to display SPDS for > 60 minutes.
Unusual Event	12/01/1988	Reactor coolant system (RCS) leakage in excess of Tech Specs (unidentified leakage > 1.0 gpm).
Unusual Event	12/16/1988	High level alarm on radiological effluent release monitor the (Treated Laundry and Hot Shower high level alarm was set just above background).
Unusual Event	03/13/1989	Loss of ERFIS computer system to display SPDS for > 60 minutes.
Unusual Event	01/24/1991	Plant shutdown required by Technical Specifications. Excessive leakage of a containment penetration; leakage discovered during surveillance testing.
Unusual Event	02/15/1991	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	03/05/1991	Plant shutdown required by Technical Specifications (testing of "A" Reactor Coolant Pump (RCP) electrical protection function).
Unusual Event	04/14/1992	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	02/06/1993	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	02/17/1994	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	07/22/1994	Loss of both emergency diesel generators - "B" diesel generator was being worked on; in accordance with test procedures, "A" diesel generator is required to be tested within 24 hours following having redundant diesel out-of-service; did not pass test.
Unusual Event	11/05/1995	Unplanned emergency core cooling system (ECCS) discharge to the reactor vessel; reactor trip and safety injection (SI) occurred during the performance of testing.

Emergency Declaration	Date	Description
Unusual Event	12/14/1995	Train derailment on site - while removing empty cask car from the Protected Area, the rail cars were moved onto the Engine Spur to allow passage of the CSX engine on adjacent Plant Spur; cask car shifted; 4 wheels of the car left the rails.
Unusual Event	01/22/1997	Security Event - while working Work Request and Authorization (WR&A), I&C Tech investigation found cut wire in a Turbine Building radiation monitor. Later determined to not be vandalism (i.e., not a security threat).
Unusual Event	04/02/2000	Loss of Emergency Response Facility Information System (ERFIS) computer system to display Safety Parameter Display System (SPDS) for more than 4 hours.
Unusual Event	08/23/2011	Seismic activity at the site due to a magnitude 5.8 earthquake near Mineral, VA.

Source: Nuclear Regulatory Commission

Table 4.121 - Emergency Declarations at the PULSTAR Research Reactor, 1986-2023

Emergency Declaration	Date	Description
None	12/13/2010	A radiography technician walked in front of a 30 REM per hour beam of radiation for 60 seconds due to a shutter being left open. This incident was reported to the Nuclear Regulatory Commission (NRC), but no assistance was required from the City of Raleigh or Wake County.
None	07/02/2011	PULSTAR shut down due to a 10 gallon per hour leak. No emergency was declared (less than 350 gallons per hour reporting threshold), and no action was required from the City of Raleigh or Wake County.
Unusual Event	08/23/2011	Seismic activity at the site due to a magnitude 5.8 earthquake near Mineral, VA.

Source: Nuclear Regulatory Commission

PROBABILITY OF FUTURE OCCURRENCE

Radiological hazards are highly unpredictable. Nuclear reactors present the possibility of catastrophic damages, yet the industry is highly regulated and historical precedence suggests an incident is unlikely.

Probability: 1 – Unlikely

VULNERABILITY ASSESSMENT

PEOPLE

People within the 50-mile EPZ are at risk of exposure through ingestion of contaminated food and water. Low levels of radiation are not considered harmful, but a high exposure to radiation can cause serious illness or death.

PROPERTY

A radiological incident could cause severe damage to the power station itself but would not cause direct property damage outside the station, especially with the distance between the reactor and the planning

area. However, property values could drop substantially if a radiological incident resulted in contamination of nearby areas.

ENVIRONMENT

A radiological incident could result in the spread of radioactive material into the environment, which could contaminate water and food sources and harm animal and plant life. These impacts are lessened the further an area is to the plant site.

CONSEQUENCE ANALYSIS

Table 4.122 summarizes the potential detrimental consequences of radiological incident.

Table 4.122 – Consequence Analysis – Radiological Incident

Category	Consequences
Public	High levels of radiation could cause serious illness or death. Those living and working closest to the nuclear plant would face the greatest risk of exposure.
Responders	Responders face potential for heightened exposure to radiation, which could cause severe chronic illness and death.
Continuity of Operations (including Continued Delivery of Services)	An incident at the nuclear plant could interrupt power generation and cause power shortages. Regular operations would likely be affected by the response effort an event would require.
Property, Facilities and Infrastructure	The plant itself could be damaged by a radiological incident. Nearby property and facilities could be affected by contamination.
Environment	Water supplies, food crops, and livestock within 50 miles of the nuclear plant could be contaminated by radioactive material in the event of a major incident.
Economic Condition of the Jurisdiction	The local economy could be affected if a radiological incident caused contamination of nearby areas. Property values and economic activity could decline as a result.
Public Confidence in the Jurisdiction's Governance	A radiological incident would likely cause severe loss of public confidence given that the hazard is human-caused and highly regulated. Public confidence can also be affected by false alarms.

4.5.17 TERRORISM / MASS CASUALTY

HAZARD BACKGROUND

There is no universal globally agreed-upon definition of terrorism. In a broad sense, terrorism is the use of violence and threats to intimidate or coerce, especially against civilians, in the pursuit of political aims.

For this analysis, this hazard encompasses the following sub-hazards: enemy attack, biological terrorism, agro-terrorism, chemical terrorism, conventional terrorism, cyber terrorism, radiological terrorism and public disorder. These hazards can occur anywhere and demonstrate unlawful force, violence, and/or threat against persons or property causing intentional harm for purposes of intimidation, coercion or ransom in violation of the criminal laws of the United States. These actions may cause massive destruction and/or extensive casualties. The threat of terrorism, both international and domestic, is ever present, and an attack can occur when least expected.

Enemy attack is an incident that could cause massive destruction and extensive casualties throughout the world. Some areas could experience direct weapons' effects: blast and heat; others could experience indirect weapons' effect. International political and military activities of other nations are closely monitored by the federal government and the State of North Carolina would be notified of any escalating military threats.

Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidations, coercion, or ransom is conventional terrorism. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the time duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences and incremental structural failures. Conventional terrorism can also include tactical assault or sniping from remote locations.

Biological terrorism is the use of biological agents against persons or property. Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point of line sources such as munitions, covert deposits and moving sprayers. Biological agents vary in the amount of time they pose a threat. They can be a threat for hours to years depending upon the agent and the conditions in which it exists.

Chemical terrorism involves the use or threat of chemical agents against persons or property. Effects of chemical contaminants are similar to biological agents.

Radiological terrorism is the use of radiological materials against persons or property. Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers or by the detonation of a nuclear device underground, at the surface, in the air or at high altitude.

Electronic attack using one computer system against another in order to intimidate people or disrupt other systems is a cyber-attack. All governments, businesses and citizens that conduct business utilizing computers face these threats. Cyber-security and critical infrastructure protection are among the most important national security issues facing our country today. The North Carolina State Bureau of investigation' Computer Crime Unit helps law enforcement across North Carolina solve sophisticated crimes involving digital evidence.

Mass demonstrations, or direct conflict by large groups of citizens, as in marches, protect rallies, riots, and non-peaceful strikes are examples of public disorder. These are assembling of people together in a manner to substantially interfere with public peace to constitute a threat, and with use of unlawful force or violence against another person, or causing property damage or attempting to interfere with, disrupting, or

destroying the government, political subdivision, or group of people. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target or institution. Most events are within the capacity of local law enforcement.

The Southern Poverty Law Center (SPLC) reports 50 active hate groups in North Carolina. Groups located statewide or within the Eno-Haw Region are listed in Table 4.123. The SPLC defines a hate group as any group with "beliefs or practices that attack or malign an entire class of people – particularly when the characteristics being maligned are immutable." It is important to note that inclusion on the SPLC list is not meant to imply that a group advocates or engages in violence or other criminal activity.

Table 4.123 – Hate Groups Active in North Carolina in 2023

Group	Type	Location
Moms for Liberty - Orange County, NC Chapter	Antigovernment General	Orange County
North Carolina Moms for America	Antigovernment General	
North Carolina Parents Involved in Education	Antigovernment General	
Tactical Civics - North Carolina	Antigovernment General	
GDL - North Carolina	Antisemitism	
III% United Patriots	Militia Movement	Statewide
Identity Dixie	Neo-Confederate	Statewide
Asatru Folk Assembly	Neo-Volkisch	Statewide
National Assembly	Sovereign Citizens Movement	Statewide
The American States Assembly	Sovereign Citizens Movement	Statewide
Active Club	White Nationalist	Statewide
National Justice Party - North Carolina	White Nationalist	Statewide
Patriot Front	White Nationalist	Statewide

Source: Southern Poverty Law Center, https://www.splcenter.org/hate-map

A branch of Moms for Liberty is located in Orange County, and it is likely that groups found statewide have a footprint in the region.

Warning Time: 4 – Less than 6 hours

Duration: 4 – More than one week

Generally, no warning is given for mass shootings. Duration is dependent on the parameters of the incident; while the incidents themselves are usually relatively short, residual impacts on the community can be long-lasting. This score takes into account a prolonged scenario with continuous impacts.

LOCATION

An active shooter incident could occur at any location across the region, but are more likely to target highly populated areas, critical infrastructure, or symbolic locations. Churches, schools and malls have all been the site of recent attacks nationwide.

Spatial Extent: 1 – Negligible

EXTENT

The extent of a shooting incident is tied to many factors, including the incident site, weapon(s), location, time of day, and other circumstances; for this reason, it is difficult to put assess a single definition or

conclusion of the extent of "terrorism." As a general rule, shooting incidents are targeted to where they can do the most damage and have the maximum impact possible, though this impact is tempered by the weapon used in the attack itself.

Impact: 4 – Catastrophic

HISTORICAL OCCURRENCES

According the non-profit Gun Violence Archive, 659 mass shootings across America in 2023 (defined as four or more people shot or killed in a single incident, not counting the shooter); 33 were recorded in North Carolina, resulting in 33 fatalities and 118 injuries. Examples of mass shooting incidents include:

Old Salisbury Road Shooting, Winston-Salem, NC, July 1988. A gunman shot nine passersby from the centerline of Old Salisbury Road; four people were killed.

Carthage Nursing Home Shooting, Carthage, NC, March 2009. A gunman opened fire at Pinelake Health and Rehabilitation nursing home. The shooter killed eight people and wounded a ninth.

University of North Carolina Shooting, Charlotte, NC, April 2019. A shooting on the last day of classes for the spring semester sent six people to the hospital, resulting in two fatalities.

Sudbury Road Shooting, Durham, NC, January 31, 2023. Two local gunman opened fire at a house located on Sudbury Rd shortly after 1 AM. One victim was pronounced dead at the scene while another later died from his injuries at the hospital. Two additional men were taking to a hospital but ultimately survived with non-life-threatening injuries.

The following additional incidents were also of concern to the planning committee, as they could have escalated to mass casualty events:

March 2006 – An alumnus drove a sport-utility vehicle through the Pit, a central gathering location on the UNC Chapel-Hill campus, with the intention of killing students, faculty, and staff. No one was killed in the attack, but nine people were injured.

August 2019 – The KKK held a rally in Hillsborough and later returned to spread propaganda and recruitment flyers throughout the Town. The rally and materials promoted racism, anti-gay statements, and other hate speech that has fueled other mass casualty events across the country in recent years.

January 2023 – On New Years Day a drive by shooting occurred outside of a Subway restaurant in the City of Durham. No one was killed in the attack, but one juvenile and four adults were injured with gunshot wounds.

PROBABILITY OF FUTURE OCCURRENCE

While difficult to estimate when a deliberate act like a shooting may occur, it can be inferred that the probability of an attack in any one area in the Region is very low at any given time. However, given the record of three incidents in the past 20 years that could have escalated to mass casualty events, the HMPC considers the probability of future incidents to be possible.

When identified, credible threats may increase the probability of an incident; these threats are generally tracked by law enforcement.

Probability: 2 – Possible

VULNERABILITY ASSESSMENT

PEOPLE

People can and do suffer direct impacts from a shooting incident, with the potential for both injuries and fatalities. The number of injuries and fatalities are variable, dependent on many factors surrounding the attack including the location, the number of type of weapons used, the shooter's skill with weapons, the amount of people at the location and law enforcement response time.

PROPERTY

The potential for damage to property is highly dependent on the type of attack. Buildings and infrastructure may be damaged. Impacts are highly localized to the target of the attack.

ENVIRONMENT

Most shooting attacks do not cause widespread damage to the environment.

CONSEQUENCE ANALYSIS

Table 4.124 summarizes the potential detrimental consequences of a mass shooter threat.

Table 4.124 – Consequence Analysis – Terrorism / Mass Shooter

Category	Consequences
Public	Injuries and fatalities are probable; these impacts would be highly localized to the attack. Widespread stress and psychological suffering may occur.
Responders	Responders face increased risks during an effort to stop an attack or rescue others while an attack is underway.
Continuity of Operations (including Continued Delivery of Services)	Critical infrastructure may be targeted by an attack; therefore, continuity of operations may be affected.
Property, Facilities and Infrastructure	Impacts depend of the type of attack. Building damage could occur during attack.
Environment	Incident specific; widespread environmental damage not likely.
Economic Condition of the Jurisdiction	The local economy could be disrupted, depending on the location and scale of an attack.
Public Confidence in the Jurisdiction's Governance	Loss of public confidence likely should an attack be carried out; additional loss of confidence and trust may result if response and recovery are not swift and effective

4.6 CONCLUSIONS ON HAZARD RISK

PRIORITY RISK INDEX

As discussed in Section 4.3 Risk Assessment Methodology and Assumptions, the Priority Risk Index was used to rate each hazard on a set of risk criteria and determine an overall standardized score for each hazard. For some hazards, PRI ratings vary by jurisdiction. In these cases, the overall PRI rating reflects the highest risk that applies to the region. The conclusions drawn from this process are summarized below by classifying hazards into three categories—high, moderate, or low risk—based on the assigned risk value. General assumptions for high, moderate, and low risk hazards are described below, and hazard risk ratings are summarized in Table 4.125.

- **High Risk** – Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread.
- **Medium Risk** – Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **Low Risk** – Minimal potential impact. The occurrence and potential cost of damage to life and property is negligible or nonexistent. This is not a priority hazard for mitigation projects.

Table 4.125 – Summary of Hazard Risk Classification

High Risk (> 3.0)	Excessive Heat Flooding Drought Hurricane & Tropical Storm Critical Infrastructure Failure Severe Winter Storm
Moderate Risk (2.0 – 2.9)	Dam Failure Tornadoes & Thunderstorms Wildfire Cyber Threat Civil Unrest Hazardous Materials Incident Infectious Disease Terrorism / Mass Casualty Radiological Emergency
Low Risk (< 2.0)	Earthquake Landslide

Note: Low risk hazards are not prioritized for mitigation.

Table 4.126 summarizes the degree of risk assigned to each identified hazard using the PRI method. Where PRI ratings varied by jurisdiction, the range is shown. Additionally, where a hazard encompasses several sub-hazards, the PRI rating for each sub-hazard is provided.

Table 4.126 – Summary of PRI Results

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Dam Failure[1]	Unlikely-Possible	Limited-Critical	Negligible	Less than 6 hrs	Less than 1 week	1.8-2.4
Drought[1]	Likely	Limited-Critical	Large	More than 24 hrs	More than 1 week	2.8-3.1
Earthquake	Unlikely	Minor	Large	Less than 6 hrs	Less than 6 hrs	1.9
Excessive Heat	Highly Likely	Critical	Large	More than 24 hrs	Less than 1 week	3.3
Flooding[1]	Likely-Highly Likely	Critical	Small-Moderate	6 to 12 hrs	Less than 1 week	2.8-3.3
Hurricane & Tropical Storm[1]	Likely	Critical-Catastrophic	Large	More than 24 hrs	Less than 24 hrs	2.9-3.2
Landslide	Unlikely	Minor	Negligible	6 to 12 hrs	Less than 6 hrs	1.2
Severe Winter Storm	Highly Likely	Critical	Large	More than 24 hrs	More than 1 week	3.0
Thunderstorm: Hail	Highly Likely	Minor	Negligible	Less than 6 hrs	Less than 6 hours	2.2
Thunderstorm: Lightning[2]	Highly Likely	Minor	Negligible	Less than 6 hrs	Less than 6 hours	2.2
Thunderstorm: Winds[1, 2]	Highly Likely	Minor-Limited	Large	Less than 6 hrs	Less than 6 hours	2.6-2.9
Tornado[2]	Likely	Critical	Small	Less than 6 hrs	Less than 6 hours	2.7
Wildfire[1]	Possible-Likely	Limited	Moderate	Less than 6 hrs	Less than 1 week	2.5-2.8
Civil Disturbance	Possible	Limited	Small	Less than 6 hrs	Less than 1 week	2.3
Critical Infrastructure Failure	Likely	Critical	Moderate	Less than 6 hrs	More than 1 week	3.2
Cyber Threat	Possible	Limited	Small	Less than 6 hrs	More than 1 week	2.4
Hazardous Substances	Likely	Minor	Negligible	Less than 6 hrs	Less than 24 hrs	2.0
Infectious Disease	Possible	Critical	Large	More than 24 hrs	More than 1 week	2.8
Radiological Emergency	Unlikely	Catastrophic	Small	Less than 6 hrs	More than 1 week	2.7
Terrorism/Mass Casualty	Possible	Catastrophic	Negligible	Less than 6 hrs	More than 1 week	2.8

[1]Note: PRI ratings for this hazard vary by jurisdiction. The range of ratings are shown here.

[2]Note: This is a sub-hazard of the Tornadoes & Thunderstorms hazard. The overall hazard rating is an average of these sub-hazards.

5 CAPABILITY ASSESSMENT

This section discusses the capability of the Eno-Haw region to implement hazard mitigation activities. It consists of the following four subsections:

5.1 Overview
5.2 Conducting the Capability Assessment
5.3 Capability Assessment Findings
5.4 Conclusions on Local Capability

5.1 OVERVIEW

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

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

The capability assessment completed for the Eno-Haw region serves as a critical planning step toward developing an effective mitigation strategy. Coupled with the risk assessment, the capability assessment helps identify and target effective goals, objectives, and mitigation actions that are realistically achievable under given local conditions.

5.2 CONDUCTING THE CAPABILITY ASSESSMENT

This capability assessment was originally developed using feedback from the HMPC through a detailed Local Capability Self-Assessment worksheet. The self-assessment requested information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the region's ability to implement hazard mitigation actions. Other indicators included information related to the region's fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes, and existing education and outreach programs that can be used to promote mitigation. Community representatives were also asked to comment on the current political climate with respect to hazard mitigation, an important consideration for any local planning or decision-making process.

The self-assessment results provided an extensive and consolidated inventory of existing local plans, ordinances, programs, and resources in place or under development. In completing the self-assessment, local officials were also asked to rate their jurisdiction's specific capabilities. The survey instrument

thereby not only helps accurately assess the degree of local capability, but it also serves as a good source of introspection for counties and local jurisdictions that want to improve their capabilities. Identified gaps, weaknesses, or conflicts can be recast as opportunities for specific actions to be proposed as part of the mitigation strategy.

The information provided in response to the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology was then applied to quantify each jurisdiction's overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation. Additional points were added based on the jurisdiction's self-assessment of their own planning and regulatory capability, administrative and technical capability, fiscal capability, education and outreach capability, and political capability.

Using this scoring methodology, a total score and an overall capability rating of "High," "Moderate," or "Limited" could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. In combination with the narrative responses provided by local officials, the results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

5.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this plan to provide insight into the relevant capacity of the Eno-Haw region to implement hazard mitigation activities. All information is based upon the input provided by local government officials through the Local Capability Self-Assessment and subsequent updates by the planning team and the HMPC.

5.3.1 PLANNING AND REGULATORY CAPABILITY

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

Table 5.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the Eno-Haw region. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A plus sign (+) indicates that a jurisdiction is covered for that item under a county-implemented version. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Hazard Mitigation Plan. This information will help identify opportunities to address gaps, weaknesses, or conflicts with other initiatives and integrate the implementation of this plan with existing planning mechanisms where appropriate.

Table 5.1 – Relevant Plans, Ordinances, and Programs

Jurisdiction	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Plan	Emergency Operations Plan	SARA Title III Plan	Radiological Emergency Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Transportation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Site Plan Review Requirements	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	Community Wildfire Protection Plan	National Flood Insurance Program	Community Rating System
Alamance County	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	
City of Burlington	✓	✓	✓	✓	✓	✓	+	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
City of Graham	✓	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	
City of Mebane	+	✓			✓	+	+	+	+	+	+	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Elon	✓	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	
Town of Green Level	✓	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	
Town of Haw River	✓	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	
Town of Ossipee	✓	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+	+			
Town of Swepsonville	✓	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	
Village of Alamance	✓	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	
Durham County	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
City of Durham	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
Orange County	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Town of Carrboro	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Town of Chapel Hill	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Town of Hillsborough	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	+	✓	✓	✓	✓	✓		✓	✓		✓	
Person County	✓	✓				✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓			✓	✓		✓	
City of Roxboro	✓	✓			✓	✓	+	+	✓	+	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	

Source: Local Capability Assessment Survey

Based upon the responses summarized in the above table, jurisdictions in the Eno-Haw Region could improve regulatory capability by developing post-disaster redevelopment ordinances. Additionally, the Region could work cooperatively to develop a Community Wildfire Protection Plan (CWPP); however, the basics of a CWPP are now included in this plan update.

A more detailed discussion on the region's planning and regulatory capability follows, along with the incorporation of additional information based on the narrative comments provided by local officials in response to the survey questionnaire.

5.3.1.1 EMERGENCY MANAGEMENT

Hazard mitigation is widely recognized as one of the four primary phases of emergency management, as is shown in Figure 5.1. In reality, mitigation is interconnected with all other phases and is an essential component of effective preparedness, response, and recovery. Opportunities to reduce potential losses through mitigation practices are most often implemented before a disaster event, such as through the elevation of flood-prone structures or by regular enforcement of policies that regulate development. However, mitigation opportunities can also be identified during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane. Furthermore, incorporating mitigation during the long-term recovery and redevelopment process following a disaster event is what enables a community to become more resilient.

Figure 5.1 – The Four Phases of Emergency Management

Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As such, the Local Capability Self-Assessment asked several questions across a range of emergency management plans to assess the region's willingness to plan and their level of technical planning proficiency.

HAZARD MITIGATION PLAN

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

— All participating jurisdictions previously participated in and adopted the 2020 Eno-Haw Regional Hazard Mitigation Plan.

DISASTER RECOVERY PLAN

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

- 14 of the 18 participating jurisdictions have a disaster recovery plan either in place or under development. (6 jurisdictions have one in place; 8 covered under a county plan)

EMERGENCY OPERATIONS PLAN

An emergency operations plan outlines responsibilities and how resources will be deployed during and following an emergency or disaster.

- All participating jurisdictions have an emergency operations plan either in place or are covered under a county plan.

CONTINUITY OF OPERATIONS PLAN

A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

- 15 of the 18 participating jurisdictions have a continuity of operations plan either in place or are covered under a county plan.

5.3.1.2 GENERAL PLANNING

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

COMPREHENSIVE/GENERAL PLAN

A comprehensive land use plan, or general plan, establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically, a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- All participating jurisdictions have a comprehensive land use plan in place or are covered by county planning efforts. Some communities are currently in the process of updating their comprehensive plans.

CAPITAL IMPROVEMENTS PLAN

A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- All participating jurisdictions have a capital improvements plan in place or are covered by county capital improvements planning.

HISTORIC PRESERVATION PLAN

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

— All but one of the participating jurisdictions have a historic preservation plan in place or are covered by a county plan.

ZONING ORDINANCE

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

— All participating jurisdictions have a zoning ordinance in place.

SUBDIVISION ORDINANCE

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

— All participating jurisdictions have a subdivision ordinance in place.

BUILDING CODES, PERMITTING, AND INSPECTIONS

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

— All participating jurisdictions have building codes in place.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program, developed by the Insurance Services Office, Inc. (ISO). In North Carolina, the North Carolina Department of Insurance assesses the building codes in effect in a particular community and how the community enforces its building codes, with special emphasis on mitigation of losses from natural hazards. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The expectation is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses, and as a result should have lower insurance rates.

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

5.3.1.3 FLOODPLAIN MANAGEMENT

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

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

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

Table 5.2.

provides NFIP policy and claim information for each participating jurisdiction in the Eno-Haw region.

All but one jurisdiction in the region participate in the NFIP and will continue to comply with all required provisions of the program. Floodplain management is managed through zoning ordinances, building code restrictions, and the county and municipal building inspection programs. The jurisdictions will coordinate with NCEM and FEMA to develop maps and regulations related to Special Flood Hazard Areas within their jurisdictional boundaries and, through a consistent monitoring process, will design and improve their floodplain management program in a way that reduces the risk of flooding to people and property.

COMMUNITY RATING SYSTEM

An additional indicator of floodplain management capability is active participation in the Community Rating System (CRS). The CRS is an incentive-based program that encourages communities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP. Each of the CRS mitigation activities is assigned a point value. As a community earns points and reaches identified thresholds, they can apply for an improved CRS class. Class ratings, which range from 10 to 1 and increase on 500-point increments, are tied to flood insurance premium reductions. Every class improvement earns an additional 5 percent discount for NFIP policyholders, with a starting discount of 5 percent for Class 9 communities and a maximum possible discount of 45 percent for Class 1 communities.

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

- Durham County, the City of Durham, and Orange County participate in the Community Rating System. Each community's CRS Class is shown in Table 5.2.

Table 5.2 – NFIP and CRS Information

Jurisdiction	Date of Initial FIRM or FHBM	CRS Class	Current Effective Map Date
Alamance County	01/03/75	-	11/17/17
City of Burlington	06/21/74	-	11/17/17
City of Graham	07/11/75	-	11/17/17
City of Mebane	11/05/80	-	11/17/17
Town of Elon	06/05/89	-	11/17/17
Town of Green Level	12/22/98	-	11/17/17
Town of Haw River	07/18/75	-	11/17/17
Town of Ossipee*	09/06/06	-	11/17/17
Town of Swepsonville	01/03/75	-	11/17/17
Village of Alamance	01/03/75	-	11/17/17
Durham County	01/25/74	8	07/19/22
City of Durham	01/25/74	7	07/19/22
Orange County	06/16/78	6	12/06/19
Town of Carrboro	02/22/74	-	11/17/17
Town of Chapel Hill	06/21/74	-	10/19/18
Town of Hillsborough	05/19/78	-	11/17/17
Person County	02/10/78	-	12/06/19
City of Roxboro	01/13/78	-	12/06/19
Total	-	-	-

Source: FEMA NFIP Policy Statistics via NCEM Risk Management Tool; revised by HMPC
*Communities not currently participating in the NFIP.

FLOOD DAMAGE PREVENTION ORDINANCE

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

— All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. All counties and all but one municipality participating in this hazard mitigation plan also participate in the NFIP and they all have adopted flood damage prevention regulations and have appointed floodplain administrators to oversee enforcement and implementation of the ordinance.

Each community's flood damage prevention regulations and designated Floodplain Administrator are outlined in Table 5.3.

FLOODPLAIN MANAGEMENT PLAN

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

— 16 of the 18 participating jurisdictions have a floodplain management plan in place or are covered by a county plan.

OPEN SPACE MANAGEMENT PLAN

An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state, and to expand or connect areas in the public domain such as parks, greenways, and

other outdoor recreation areas. In many instances open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- 15 of the 18 participating jurisdictions have an open space management plan in place or are covered by a county plan.

STORMWATER MANAGEMENT PLAN

A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- 17 of the 18 participating jurisdictions have a stormwater management plan in place or are covered by a county plan.

SUBSTANTIAL DAMAGE PROCEDURES

The NFIP requires that participating communities regulate and enforce substantial damage and substantial improvement procedures. Properties in communities that participate in the NFIP that are determined to be "substantially damaged" following a flood event must be brought into compliance with the local flood damage prevention ordinance. Determination of substantial damage is a coordinated effort between emergency management, police and fire departments, and permitting departments such as planning and building inspections departments.

Substantial damage estimating procedures for participating jurisdictions are detailed below in Table 5.3.

When identifying and enforcing substantial damage and substantial improvement requirements during permitting, all NFIP participating communities follow the process outlined below:

For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the Floodplain Administrator, in coordination with the Building Official, shall follow the procedures outlined below:

- Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made;
- Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure;
- Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; and
- Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the NC Building Code and the flood damage prevention ordinance is required.

Table 5.3 – Floodplain Management and Substantial Damage/Improvement (SD/SI) Procedures

Jurisdiction	Applicable local floodplain management regulations	Designated officials for SD/SI determinations and staff training	Processes used by the community to make SD/SI determinations	Communication procedures for SD/SI requirements
Alamance County	Maintains a countywide flood damage ordinance and participates in the NFIP	Alamance County Planning Director designated as the Floodplain Administrator. Alamance County Emergency Management Coordinator supports post-event damage assessment and SD determinations.	– SD/SI is determined during the permitting process by Floodplain Administrator and Building Official by comparing the cost of repairs or improvements to the market value of the structure and determining whether the proposed work constitutes SI or repair of SD. – Following a major event, damage assessment teams are coordinated by Alamance County Emergency Management. Structures in the floodplain with significant damage are evaluated for SD determinations. Damage estimates are compared to market value from Assessor's Office and properties deemed substantially damaged are flagged with door hangers and tracked by Building Department.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified when they apply for a permit and compliance with building codes and flood prevention ordinance required.
City of Burlington	Maintains a local flood damage prevention ordinance and participates in the NFIP.	City of Burlington Director of Inspections designated as the Floodplain Administrator. City Emergency Management Director support post-event SD management activities.	– SD/SI is determined during the permitting process by Floodplain Administrator and Building Official by comparing the cost of repairs or improvements to the market value of the structure and determining whether the proposed work constitutes SI or repair of SD. – Post-event, the City coordinates with Alamance County Emergency Management to conduct damage assessments. Properties determined to be substantially damaged are tracked for enforcement in the permitting system.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified when they apply for a permit and compliance with building codes and flood prevention ordinance required.
City of Graham	Maintains a local flood damage prevention ordinance and participates in the NFIP.	City of Graham Planning Director designated as the Floodplain Administrator.	– SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure and determining whether the proposed work constitutes SI or repair of SD. – Post-event, the City coordinates with Alamance County Emergency Management to conduct damage assessments. Properties determined to be substantially damaged are tracked for enforcement in the permitting system.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required.

Jurisdiction	Applicable local floodplain management regulations	Designated officials for SD/SI determinations and staff training	Processes used by the community to make SD/SI determinations	Communication procedures for SD/SI requirements
City of Mebane	Maintains flood damage prevention regulations as part of the unified development ordinance and participates in the NFIP.	City of Mebane Zoning Administrator designated as the Floodplain Administrator.	— SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event, the City coordinates with Alamance County Emergency Management to conduct damage assessments. Properties determined to be substantially damaged are tracked for enforcement in the permitting system.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified when they apply for a permit and compliance with building codes and flood prevention ordinance required.
Town of Elon	Maintains a local flood damage prevention ordinance and participates in the NFIP.	The Town Manager designated as Floodplain Administrator.	— SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event determinations are coordinated with Alamance County Emergency Management following County procedures.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required.
Town of Green Level	Maintains a local flood damage prevention ordinance and participates in the NFIP.	The Town Administrator designated as Floodplain Administrator.	SD/SI is identified and enforced during permitting. Post-event SD determinations are coordinated with Alamance County Emergency Management following County procedures.	SD/SI requirements are communicated to applicants during permitting process.
Town of Haw River	Maintains a local flood damage prevention ordinance and participates in the NFIP.	The County Building Inspector designated as Floodplain Administrator.	SD/SI is identified and enforced during permitting. Post-event SD determinations are coordinated with Alamance County Emergency Management following County procedures.	SD/SI requirements are communicated to applicants during permitting process.
Town of Ossipee*	Community does not participate in NFIP.	N/A	N/A	N/A
Town of Swepsonville	Maintains a local flood damage prevention ordinance and participates in the NFIP. Alamance County oversees Swepsonville's floodplain ordinance.	The Alamance County Planning Director designated as Floodplain Administrator for Town of Swepsonville.	— SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event determinations are coordinated with Alamance County Emergency Management following County procedures.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required.

Jurisdiction	Applicable local floodplain management regulations	Designated officials for SD/SI determinations and staff training	Processes used by the community to make SD/SI determinations	Communication procedures for SD/SI requirements
Village of Alamance	Maintains a local flood damage prevention ordinance and participates in the NFIP.	Floodplain Administrator	— SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event determinations are coordinated with Alamance County Emergency Management following County procedures.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required.
Durham County	Maintains a local flood damage prevention ordinance and participates in the NFIP and is a CRS community (class 8).	The Durham City-County Planning Director designated as Floodplain Administrator.	— SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Following a hazard event, Durham County Emergency Management coordinates damage assessment teams with staff from multiple departments. Following an initial window survey, structures in the floodplain with significant damage are further evaluated and damages are estimated. Damage estimates are compared to the structure's market value according to the Assessor's Office. Properties determined to be substantially damaged are flagged with door hangers and tracked in the permitting system for subsequent enforcement during permitting.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required.
City of Durham	Maintains a local flood damage prevention ordinance and participates in the NFIP and is a CRS community (class 7).	The Durham City-County Planning Director designated as Floodplain Administrator.	See Durham County procedures.	See Durham County procedures.

Jurisdiction	Applicable local floodplain management regulations	Designated officials for SD/SI determinations and staff training	Processes used by the community to make SD/SI determinations	Communication procedures for SD/SI requirements
Orange County	Maintains local flood damage prevention regulations in the unified development ordinance and participates in the NFIP and is a CRS community (class 6).	The Planning Director designated as Floodplain Administrator.	— SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Following a major event, damage assessment teams are coordinated by Orange County Emergency Management. Initial damage assessment teams conduct windshield surveys. Structures in the floodplain with significant damage are further evaluated for SD determinations. Damage estimates are compared to market value from the Tax Assessor. Properties that are determined to be substantially damaged are tracked in the permitting system by Building Inspections.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and unified development ordinance required.
Town of Carrboro	Maintains local flood damage prevention regulations in the land use ordinance and participates in the NFIP.	The Land Use Administrator designated as Floodplain Administrator	— SD/SI determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event determinations are coordinated with Orange County Emergency Management following County procedures.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and land use ordinance required.
Town of Chapel Hill	Maintains a local flood damage prevention ordinance and participates in the NFIP.	The Town Manager designated as Floodplain Administrator	— SD/SI is determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event, the Town coordinates with Orange County Emergency Management to conduct damage assessments. Properties determined to be substantially damaged are tracked for enforcement in the permitting system.	N/A

Jurisdiction	Applicable local floodplain management regulations	Designated officials for SD/SI determinations and staff training	Processes used by the community to make SD/SI determinations	Communication procedures for SD/SI requirements
Town of Hillsborough	Maintains a local flood damage prevention ordinance and participates in the NFIP.	The Planning Director designated as Floodplain Administrator.	— SD/SI is determined during permitting by Floodplain Administrator with Building Official coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event determinations are coordinated with Orange County Emergency Management following County procedures.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required.
Person County	Maintains a local flood damage prevention ordinance and participates in the NFIP.	The Zoning Administrator designated as Floodplain Administrator. Person County Building Inspections support enforcement during permitting and post-event.	— SD/SI is determined during permitting by Floodplain Administrator with Building Inspections coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Following a major event, damage assessment teams are coordinated by Person County Emergency Management. Structures in the floodplain with significant damage are evaluated for SD determinations. Damage estimates are compared to market value from the Tax Assessor and properties deemed substantially damaged are tracked using Survey 123. Enforcement is handled during permitting.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required.
City of Roxboro	Maintains a flood damage prevention ordinance and participates in the NFIP.	City of Roxboro has a contract for services with Person County Building Inspections, who make SD/SI determinations and report back to the City of Roxboro Planning and Development Department.	— SD/SI is determined during permitting by Floodplain Administrator with Building Inspections coordination for all properties in the floodplain by comparing the cost of repairs or improvements to the market value of the structure. — Post-event determinations are coordinated with Person County Inspections Department following County procedures.	If work constitutes substantial improvement or repair of substantial damage, Person County Building Inspections reports the determination to City of Roxboro Planning and Development Department. Applicants are notified of ordinance requirements.

5.3.2 ADMINISTRATIVE AND TECHNICAL CAPABILITY

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

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

Table 5.4 provides a summary of the Local Capability Self-Assessment results for the region with regard to relevant staff and personnel resources. A checkmark indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

Note that while all but one jurisdiction are participants in the NFIP, several jurisdictions in Alamance County do not have a local floodplain manager. In these cases, due to the limited capacity of these small jurisdictions, Alamance County is the designated floodplain administrator for the jurisdiction.

Table 5.4 – Relevant Staff/Personnel Resources

Jurisdiction	Planners with knowledge of land development and land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Building Official	Emergency manager	Floodplain manager	Land surveyors	Scientist familiar with the hazards of the community	Staff with education or expertise to assess the community vulnerability to hazards	Personnel skilled in Geographic Information Systems (GIS) and/or HAZUS	Resource development staff or grant writers	Maintenance programs to reduce risk	Warning systems/services	Mutual Aid Agreements
Alamance County	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
City of Burlington	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
City of Graham	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
City of Mebane	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Town of Elon	✓	✓	✓	✓	✓	✓			✓			✓		✓
Town of Green Level		✓		✓		✓								✓
Town of Haw River	✓	✓		✓								✓		✓
Town of Ossipee														✓
Town of Swepsonville														✓
Village of Alamance	✓													✓
Durham County	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
City of Durham	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Orange County	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓
Town of Carrboro	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓
Town of Chapel Hill	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓
Town of Hillsborough	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓
Person County	✓		✓	✓	✓	✓			✓	✓	✓		✓	✓
City of Roxboro	✓		✓						✓		✓	✓	✓	✓

Source: Local Capability Assessment Survey

5.3.3 FISCAL CAPABILITY

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

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

Table 5.5 provides a summary of the results for the region with regard to relevant fiscal resources. A checkmark indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

Table 5.5 – Relevant Fiscal Resources

Jurisdiction	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation Bonds	Revenue Bonds	Special Tax Bonds	Other
Alamance County	✓			✓	✓	✓	✓		✓		
City of Burlington	✓	✓	✓	✓	✓	✓					
City of Graham				✓	✓						
City of Mebane	✓	✓			✓		✓				
Town of Elon				✓	✓						
Town of Green Level				✓	✓						
Town of Haw River				✓	✓						
Town of Ossipee				✓	✓						
Town of Swepsonville				✓	✓						
Village of Alamance				✓	✓						
Durham County	✓	✓			✓		✓	✓	✓		✓
City of Durham	✓	✓			✓		✓	✓	✓		✓
Orange County	✓	✓	✓	✓	✓	✓		✓	✓	✓	
Town of Carrboro	✓	✓	✓	✓	✓	✓		✓	✓	✓	
Town of Chapel Hill	✓	✓	✓	✓	✓	✓		✓	✓	✓	
Town of Hillsborough	✓				✓	✓		✓	✓	✓	✓
Person County	✓	✓			✓	✓		✓	✓		
City of Roxboro	✓		✓		✓	✓					

Source: Local Capability Assessment Survey

Within the past five years, several communities in the Eno-Haw Region submitted applications for BRIC and/or HMGP grant funding to increase fiscal resources for mitigation. The following projects were selected for funding through the BRIC program:

- City of Burlington – May's Lake Regional Stormwater Project
- City of Mebane – Sewer Rehab Projects
- The Town of Chapel Hill – Chapel Hill Transit Zero-Emissions Fleet & Facilities Resilience Plan
- Town of Hillsborough – River Pumping Station Relocation from Floodway
- Town of Hillsborough – Resilient Regional Water Supply Project

Additionally, the City of Durham received HMGP funding for several acquisition projects.

5.3.4 EDUCATION AND OUTREACH CAPABILITY

This type of local capability refers to education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Examples include natural disaster or safety related school programs; participation in community programs such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns such as a Tornado Awareness Month.

Table 5.6 provides a summary of the results for the region with regard to relevant education and outreach resources. A checkmark indicates that the given resource is locally available for hazard mitigation purposes.

Table 5.6 – Education and Outreach Resources

Jurisdiction	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Natural disaster or safety related school programs	StormReady certification	Firewise Communities certification	Public-private partnership initiatives addressing disaster-related issues	Other
Alamance County		✓	✓	✓	✓	✓	
City of Burlington	✓	✓	✓	✓		✓	
City of Graham			✓				
City of Mebane		✓	✓				
Town of Elon			✓				
Town of Green Level			✓				
Town of Haw River			✓				
Town of Ossipee			✓				

Jurisdiction	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Natural disaster or safety related school programs	StormReady certification	Firewise Communities certification	Public-private partnership initiatives addressing disaster-related issues	Other
Town of Swepsonville			✓				
Village of Alamance			✓				
Durham County	✓	✓	✓	✓			
City of Durham	✓	✓	✓	✓			
Orange County	✓	✓	✓	✓		✓	
Town of Carrboro	✓	✓	✓				
Town of Chapel Hill	✓	✓	✓			✓	
Town of Hillsborough	✓	✓					
Person County		✓		✓	✓		
City of Roxboro	✓	✓					

Source: Local Capability Assessment Survey

5.3.5 MITIGATION CAPABILITY

This type of local capability refers to the mitigation strategies and actions that are developed by the communities in this plan.

Table 5.7 provides a summary of the results for the planning area with regard to relevant mitigation resources. A checkmark (✓) indicates that the given resource is locally available for hazard mitigation purposes.

Table 5.7 – Mitigation Resources

Jurisdiction	Do you apply for mitigation grant funding?	Do you perform reconstruction projects?	Do you perform building elevations?	Do you perform acquisitions?
Alamance County	✓			
City of Burlington	✓			
City of Graham				
City of Mebane				
Town of Elon				
Town of Green Level				

Jurisdiction	Do you apply for mitigation grant funding?	Do you perform reconstruction projects?	Do you perform building elevations?	Do you perform acquisitions?
Town of Haw River				
Town of Ossipee				
Town of Swepsonville				
Village of Alamance				
Durham County	✓	✓	✓	✓
City of Durham	✓	✓	✓	✓
Orange County	✓	✓	✓	✓
Town of Carrboro	✓	✓	✓	✓
Town of Chapel Hill				
Town of Hillsborough	✓			
Person County	✓	✓		
City of Roxboro	✓			

Within the last five years, the City of Durham completed one property acquisition funded through HMGP and has another acquisition nearly completed, also funded through HMGP.

5.3.6 POLITICAL CAPABILITY

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

The Local Capability Self-Assessment was used to capture information on political capability of the region. Survey respondents were asked to rate political support as they perceive it and identify general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements.

HMPC representatives from many participating jurisdictions responded that political leaders are at least potentially willing to implement mitigation measures. In Person County and Roxboro, respondents noted mixed support and that current leaders have not been faced with a hazard event requiring immediate implementation of mitigation. Therefore, leaders here may not be motivated to pursue mitigation.

A few participating jurisdictions noted having local standards that exceed state requirements, which exemplifies local political will to implement mitigation. For example, the Town of Hillsborough has standards in its flood damage prevention ordinance and fire prevention ordinance that exceed state standards.

5.3.7 LOCAL SELF-ASSESSMENT RATING

Staff representatives from each of the participating communities were asked to rate their community's perceived capability across each of the capability categories and overall, as either "limited," "moderate," or "high." Table 5.8 summarizes the self-assessment ratings for each community in the Eno-Haw Region.

Table 5.8 – Self-Assessment of Capability

Jurisdiction	Plans, Ordinances, Codes and Programs	Administrative and Technical Capability	Fiscal Capability	Education and Outreach Capability	Mitigation Capability	Political Capability	Overall Capability
Alamance County	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Burlington	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Graham	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Mebane	High	High	High	Moderate	Limited	Moderate	Moderate
Town of Elon	Moderate	Moderate	Limited	Limited	Limited	Limited	Moderate
Town of Green Level	Moderate	Moderate	Limited	Limited	Limited	Limited	Moderate
Town of Haw River	Moderate	Moderate	Limited	Limited	Limited	Limited	Moderate
Town of Ossipee	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Swepsonville	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Village of Alamance	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Durham County	High	High	Moderate	Moderate	Moderate	Limited	Moderate
City of Durham	High	High	Moderate	Moderate	Moderate	Limited	Moderate
Orange County	High	High	Moderate	High	High	Moderate	Moderate
Town of Carrboro	High	High	Moderate	High	High	Moderate	Moderate
Town of Chapel Hill	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Hillsborough	Moderate	Moderate	Moderate	Limited	Limited	Moderate	Moderate
Person County	Moderate	Moderate	Moderate	Limited	Moderate	Limited	Moderate
City of Roxboro	Moderate	Limited	Limited	Moderate	Limited	Limited	Limited

Source: Local Capability Assessment Survey

5.4 CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to results of the Local Capability Assessment Survey. This methodology attempts to assess the overall level of capability of the Eno-Haw region to implement hazard mitigation actions.

Table 5.9 shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information provided by local officials in response to the Local Capability Self-Assessment. According to the assessment, the average local capability score for all responding jurisdictions is 85, which falls into the Moderate capability ranking. This score indicates that there has been little change in overall capability over the last five years since the previous plan.

Table 5.9 – Capability Assessment Results

Jurisdiction	Overall Capability Score	Overall Capability Rating
Alamance County	105	High
City of Burlington	109	High
City of Graham	74	Moderate
City of Mebane	91	Moderate
Town of Elon	67	Low
Town of Green Level	62	Low
Town of Haw River	63	Low
Town of Ossipee	56	Low
Town of Swepsonville	56	Low
Village of Alamance	57	Low
Durham County	107	High
City of Durham	107	High
Orange County	114	High
Town of Carrboro	105	High
Town of Chapel Hill	103	High
Town of Hillsborough	93	Moderate
Person County	78	Moderate
City of Roxboro	78	Moderate

Source: Local Capability Assessment Survey, NCEM Risk Management Tool

As previously discussed, one of the reasons for conducting a capability assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified, for each jurisdiction, in the tables found throughout this section. The participating jurisdictions used the capability assessment as part of the basis for the mitigation actions that are identified in Section 7; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their mitigation actions.

6 MITIGATION STRATEGY

Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the process for developing the mitigation strategy for the Eno-Haw Regional Hazard Mitigation Plan. It describes how the Region met the requirements for Planning Step 6 (Set Goals), Planning Step 7 (Review Possible Activities), and Planning Step 8 (Draft an Action Plan). This section includes the following sub-sections:

6.1 Goals and Objectives
6.2 Identification & Analysis of Mitigation Activities

6.1 GOALS AND OBJECTIVES

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

Goal setting builds upon the findings of Section 4, which documents the hazards and associated risks that threaten the Eno-Haw Region, and Section 5, which evaluates each jurisdiction's capacity of the to reduce the impact of hazards. The intent of goal setting is to identify areas where feasible actions can be taken or improvements to existing capabilities can be made so that community vulnerability to hazards is reduced. Goals also guide the review of possible mitigation measures. This plan needs to make sure that recommended actions are consistent with what is appropriate for the Region. Mitigation goals need to reflect community priorities and should be consistent with other local plans.

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad-based policy type statements, long term and represent global visions. Goals help define the benefits that the plan is trying to achieve.
- **Objectives** are short term aims that, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

6.1.1 COORDINATION WITH OTHER PLANNING EFFORTS

The goals of this plan need to be consistent with and complement the goals of other local planning efforts. The primary planning documents that the goals of this plan should complement and be consistent with are the participating jurisdictions' comprehensive plans. Comprehensive plans are important because they are developed and designed to guide future growth within their communities so they encompass long-term strategies and can be critical to reducing long term vulnerabilities. Keeping the Hazard Mitigation Plan and Comprehensive Plans consistent ensures that land development is done with awareness and understanding of hazard risk and that mitigation projects complement rather than contradict community development objectives.

6.1.2 GOAL SETTING

At the third planning meeting, the HMPC reviewed and discussed the goals and objectives from the 2020 plan. The HMPC largely approved of the existing goals. Objective 3.1 was revised to encompass general capability improvement efforts, Objective 4.1 was revised for clarity, and Objective 4.2 was revised to incorporate the protection of existing property from hazard impacts. All other goals and objectives remained unchanged.

The revised and reaffirmed goals of this plan update are detailed below in Section 6.1.3.

6.1.3 RESULTING GOALS AND OBJECTIVES

The HMPC agreed upon four general goals for this planning effort and included specific objectives in support of each goal. The refined goals and objectives are as follows:

Goal 1 – Change, enhance, or adopt plans, ordinances, policies, regulations, and other local tools and mechanisms to better facilitate risk reduction activities and improve overall resiliency.

Objective 1.1: Strive to ensure that development occurs in such a way as to protect wetlands, floodplains, erosion control measures, and other natural features that serve to reduce hazard risk.

Objective 1.2: Pursue policies that incorporate hazard mitigation into new development and post-disaster redevelopment.

Goal 2 – Protect the public health, safety and welfare by increasing training, education, and public awareness of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.

Objective 2.1: Implement a public awareness campaign to educate citizens of possible hazards and mitigation options.

Objective 2.2: Pursue strategies and technologies to improve warning and notification of hazard events and ensure that emergency services are adequate to protect public health and safety.

Goal 3 – Improve technical, administrative, financial, and political capability to implement effective mitigation projects and respond to hazards.

Objective 3.1: Improve operations for hazards and emergencies that cause disruptions to traffic, release times, power outages, sheltering, and communications, and increase mitigation capability.

Objective 3.2: Improve regular regional communication and foster the creation of more multi-jurisdictional regional planning efforts related to risk reduction and resiliency.

Goal 4 – Implement structure and infrastructure projects to improve public safety, reduce risk to vulnerable populations, and protect buildings, transportation, and other critical and essential functions of the Eno-Haw Region.

Objective 4.1: Strive to keep infrastructure extensions out of known hazardous areas in order to actively discourage development in high risk areas.

Objective 4.2: Retrofit or otherwise protect existing property, critical facilities, and infrastructure against damages.

6.2 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIVITIES

Requirement §201.6(c)(3)(ii): [The mitigation strategy section shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

To identify and select mitigation projects that support the mitigation goals and objectives, the risks and vulnerabilities associated with all hazards identified and evaluated in Section 4 Risk Assessment were evaluated for mitigation opportunities. The identification of mitigation actions for technological and human-caused hazards was left to the discretion of each jurisdiction. The HMPC analyzed viable mitigation options that supported the identified goals and objectives, addressed key problems, risks, or vulnerabilities, and aligned with other local plans and efforts.

The HMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process but are also applicable to multi-hazard mitigation:

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information and Outreach

The HMPC was also provided with examples of potential mitigation actions for each of the above categories. The HMPC was instructed to consider both future and existing buildings in evaluating possible mitigation actions. Facilitated discussions took place to examine and analyze the options. The HMPC also considered which actions from the previous plan that were not already completed should be continued in this action plan.

More details on mitigation alternatives considered by the HMPC are provided in Appendix C.

6.2.1 PRIORITIZATION PROCESS

In the process of identifying continuing and new mitigation actions, the HMPC was asked to consider a set of prioritization criteria to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. Criteria were grouped into three categories: Suitability, Risk Reduction, and Cost. The criteria for the prioritization process included the following:

- **Suitability**
  - Appropriateness of Action
  - Community Acceptance
  - Technical and Administrative Feasibility
  - Environmental Impact
  - Legal Conformance

  - Consistency with Existing Plans and Other Community Goals
- **Risk Reduction**
  - Scope of Benefits
  - Potential to Save Lives
  - Importance of Benefits
  - Level of Inconvenience or Unintended Consequence
  - Losses Avoided
  - Number of People to Benefit
- **Cost**
  - Estimate of Upfront Cost
  - Estimate of Ongoing Cost
  - Benefit to Cost Ratio
  - Financing Availability
  - Affordability
  - Elimination of Repetitive Damages

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority, as reflected in the prioritization criteria above. For each action, the HMPC considered the benefit-cost analysis in terms of:

- Ability of the action to address the problem
- Contribution of the action to save life or property
- Available technical and administrative resources for implementation
- Availability of funding and perceived cost-effectiveness

The consideration of these criteria helped to prioritize and refine mitigation actions but did not constitute a full benefit-cost analysis. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

Using these prioritization criteria, the HMPC assigned each action a ranking of High, Medium, or Low priority. The prioritization ranking for each mitigation action considered by the HMPC is provided in Section 7 Mitigation Action Plans.

7 MITIGATION ACTION PLANS

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include an] action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This section provides the mitigation action plans for each participating jurisdiction. The plans are organized as follows:

- Table 7.1 – Mitigation Action Plan, Alamance County
- Table 7.2 – Mitigation Action Plan, City of Burlington
- Table 7.3 – Mitigation Action Plan, City of Graham
- Table 7.4 – Mitigation Action Plan, City of Mebane
- Table 7.5 – Mitigation Action Plan, Town of Elon
- Table 7.6 – Mitigation Action Plan, Town of Green Level
- Table 7.7 – Mitigation Action Plan, Town of Haw River
- Table 7.8 – Mitigation Action Plan, Town of Ossipee
- Table 7.9 – Mitigation Action Plan, Town of Swepsonville
- Table 7.10 – Mitigation Action Plan, Village of Alamance
- Table 7.11 – Mitigation Action Plan, Durham County-Durham City
- Table 7.12 – Mitigation Action Plan, Orange County
- Table 7.13 – Mitigation Action Plan, Town of Carrboro
- Table 7.14 – Mitigation Action Plan, Town of Chapel Hill
- Table 7.15 – Mitigation Action Plan, Town of Hillsborough
- Table 7.16 – Mitigation Action Plan, Person County
- Table 7.17 – Mitigation Action Plan, City of Roxboro

Note that Durham County and the City of Durham opted to coordinate on a joint mitigation action plan. Additionally, several actions pursued by multiple Alamance County jurisdictions are consolidated into the Alamance County Mitigation Action Plan. These projects will provide mitigation to all applicable jurisdictions, but the County is serving as the lead party responsible for implementation. Person County and the City of Roxboro previously coordinated on a joint mitigation action plan but have opted to work independently for this plan update.

Table 7.1 – Mitigation Action Plan, Alamance County

Action #	Action Description	Applicable Jurisdictions	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention										
P-1	Create or Update Community Wildfire Protection Plans in each fire district.	Alamance County, Town of Green Level, Town of Ossipee, Town of Swepsonville, Village of Alamance	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
P-2	Review methods of school construction to ensure that all new schools are constructed to the maximum cost feasible standards of wind resistance, flood resistance, and access so that they can be used as shelters for evacuees during and after natural hazard events.	Alamance County	All Hazards	1.2	Medium	Alamance County Inspections Department	General Fund	2025-2030	Carry Forward	No progress made due to administrative limitations. Our Inspections department will follow all guidelines on new projects.
P-3	Review the subdivision regulations and make appropriate changes to encourage alternatives to placing lots in flood-prone areas and to minimize impervious surface coverings, if necessary.	Alamance County	Flooding	1.2	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	Planning is still working on this. Progress is being made by adding details to subdivision regulations in flood prone areas.
Property Protection										
PP-1	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Alamance County	Flooding	4.2	Low	Alamance County Emergency Management, Alamance County Planning Department	General Fund	2025-2030	Carry Forward	EM monitors flood prone areas.
PP-2	Monitor structures affected by flood and track damages and repair costs. If damages and repair costs are high relative to the value of the structure, consider mitigation including elevation, acquisition, or floodproofing.	Alamance County	Flooding	4.2	High	Alamance County Emergency Management, Alamance County Planning Department	General Fund	2025-2030	Carry Forward	No progress was made on this project. The County will continue to monitor county properties which are or may be impacted by flooding events. No structures were impacted by flooding since last plan.
PP-3	Monitor recreational facilities located in the floodplain and evaluate flood resistance of county structures.	Alamance County	Flooding	4.2	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	No progress was made on this project. The County will monitor the county properties which are or may be impacted by flooding events.
PP-4	Monitor reservoirs for potential flooding problems and note any unexpected flooding issues.	Alamance County	Flooding	4.2	High	Alamance County Emergency Management	Staff time	2025-2030	Carry Forward	No progress was made on this project. The County will coordinate with Municipal watershed owners and operators to monitor levels and control of the dams and gates for flooding.
PP-5	Assess the need for Critical County Offices to bury overhead power, and data lines.	Alamance County	Severe Winter Weather		Medium	Alamance County Emergency Management	County	2025-2030	New	

Action #	Action Description	Applicable Jurisdictions	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Structural Projects										
SP-1	Seek funding to the retrofit of critical facilities and County-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	Alamance County	All Hazards	4.2	Medium	Alamance County Buildings and Inspections Department, Alamance County Planning Department, Alamance County Emergency Management	State grants, UHMA grants, other federal grants	2025-2030	Carry Forward	No progress was made on this project due to limited funding. Will evaluate resilience needs and look for grants and resource funding to retrofit county facilities.
SP-2	Implement drainage improvement projects to reduce flood risk.	Alamance County	Flooding	4.2	Medium	Alamance County Planning Department, Alamance County Emergency Management	State grants, UHMA grants, other federal grants	2025-2030	New	
Public Education & Awareness										
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM). This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcements from the Alamance County Inspections Department when builders and developers apply for permits.	Alamance County, Town of Green Level, Town of Haw River, Town of Swepsonville	Flooding	2.1	Medium	Alamance County Emergency Management	General Fund	2025-2030	Carry Forward	No progress was made on this project due to limited staff resources.
PEA-2	Encourage citizens and businesses/industries to develop emergency preparedness plans.	Alamance County, Town of Green Level	All Hazards	2.1	Medium	Alamance County Emergency Management; Alamance County LEPC	LEPC	2025-2030	Carry Forward	County EM has been working directly with local chemical facilities on developing Emergency Response Plans for 1st responder response. Also, Website, and social media campaigns have been completed with an all-hazards preparedness approach.
PEA-3	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	Alamance County	All Hazards	2.1	Medium	Alamance County Emergency Management	To be determined	2025-2030	Carry Forward	No progress made on this project due to limited staff. Plan to add this to the Emergency Management website.
PEA-4	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	Alamance County	All Hazards	2.1	Medium	Alamance County Emergency Management	To be determined	2025-2030	Carry Forward	We have shared information via our website pertaining to preparation and planning for disasters. We have also created a social media campaign to target all hazards preparedness.

Action #	Action Description	Applicable Jurisdictions	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-5	Discourage the public and developers from developing property in flood zones.	Alamance County	Flooding	1.2	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	Planning Department Staff makes citizens aware of the additional compliance of developing in a flood zone.
PEA-6	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Alamance County	Flooding	2.1	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	No progress made on this project due to limited staff.
PEA-7	Maintain GIS system at www.alamance-nc.com. From this site anyone from a private citizen, builder, insurance company, etc. can see if a property is located in the 1-percent-annual-chance (100-year) floodplain.	Alamance County, Town of Haw River, Town of Ossipee, Town of Swepsonville, Village of Alamance	Flooding	2.1	Medium	Alamance County GIS Department	General Fund	2025-2030	Carry Forward	The County Land Use plan is in progress and a land-use GIS layer is expected as a deliverable once the plan is complete.
PEA-8	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	Alamance County,	Flooding	2.1	Medium	Alamance County Planning Department	To be determined	2025-2030	Carry Forward	In Progress. Implementation delayed due to limited staff resources.
PEA-9	Educate citizens to listen for the watches and warnings issued by the National Weather Service	Alamance County, Town of Green Level, Town of Haw River, Town of Ossipee, Village of Alamance	All Hazards	2.2	Medium	Alamance County Emergency Management	County	2025-2030	Carry Forward	The County has utilized our website and social media outlets to share information to the public and local municipalities on listening to and having a warning system in the home. The County is now working with hearing impaired and distributing hearing impaired weather alert radios devices to those who request them.
PEA-10	Maintain Alamance County Communications' capability to monitor weather conditions and advise all emergency services regarding watches and warnings.	Alamance County,	Flooding	2.2	Medium	Alamance County Emergency Management	County	2025-2030	Carry Forward	We have updated our Nixle alert system and are promoting personnel to sign up for the service. Will continue to monitor and push weather information to PSAP's and other Emergency Services in the county to keep them aware of impending weather.
PEA-11	Conduct focused public outreach events to educate the public on hazards faced by our community, and how they can properly prepare themselves and their family.	Alamance County	All Hazards	2.1	Medium	Alamance County Emergency Management	County	2025-2030	New	

Table 7.2 – Mitigation Action Plan, City of Burlington

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Implementation Status Comments
Prevention									
P-1	Discourage the public and developers from developing property in flood zones.	Flooding	1.2	Medium	City of Burlington Building and Inspections	General fund	2025-2030	Carried Forward	This is ongoing as determined in Planning and Zoning ordinances. The City works with developers and property owners on a case-by-case basis.
P-2	Adopt policy prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist.	Flooding	1.2	Medium	City of Burlington Building and Inspections	General fund	2025-2030	Carried Forward	This activity is ongoing. This is not an adopted policy, but the City of Burlington Floodplain Manager oversees construction and acquisition of property in flood-prone areas. It is not the policy of the City to place critical systems in areas subject to flooding.
P-3	Expand the City's Geographic Information System (GIS) capabilities to include more hazard specific information.	All Hazards	1.2	Medium	City of Burlington GIS Division	Staff time	2025-2030	Carried Forward	This activity is ongoing and continually evaluated for effectiveness and modified as needed. Current capability includes the ability to define hazard areas from historical data as well as the ability to project potential areas of concern. GIS and EM are looking at ways to enhance dashboards to provide a common operating picture. Also, looking at products that are able to combine current and forecasted weather to create real-time flood modeling. The City will also continue to monitor opportunities to enhance GIS technologies and appropriate datasets for hazard mitigation planning.
P-4	Continue the City's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	City of Burlington Building and Inspections	General fund	2025-2030	Carried Forward	The City maintained active participation in the NFIP.
P-5	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	City of Burlington Fire Department, City of Burlington Water Department	Staff time	2025-2030	Carried Forward	This activity is ongoing based on regular maintenance schedules and is continually evaluated for effectiveness and modified as needed.
P-6	Develop a detailed hazard assessment for dams in Alamance County and add to county hazard mitigation plan.	Dam Failure	3.2	Medium	City of Burlington Office of Emergency Management	Local, County	2025-2030	Carried Forward	Dam Emergency Action Plans were updated in 2024/2025.
P-7	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor structures affected by flood and track damages and repair costs. If damages and repair costs are high relative to the value of the structure, consider mitigation including elevation, acquisition, or floodproofing.	Flooding	4.2	High	City of Burlington Office of Emergency Management, City Planning Department	General fund	2025-2030	Carried Forward	This activity was implemented as needed following hazard events. The City has the capability to conduct damage assessments with assistance from the County and the State.
PP-2	Monitor recreational facilities located in the floodplain and evaluate flood resistance of city structures.	Flooding	4.2	Medium	City of Burlington, City Planning Department	General fund	2025-2030	Carried Forward	No progress made due to limited administrative resources.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Implementation Status Comments
PP-3	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	1.1	High	City of Burlington	N/A	2025-2030	Carried Forward	All reservoirs and water sources located throughout the city have been processed by various companies (i.e. dam review, etc.). City of Burlington reservoirs are assessed each year for potential problems as well as security issues.
Structural Projects									
SP-1	Retrofit critical facilities and City-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	City of Burlington Building and Inspections, Office of Emergency Management, City Planning Department	Internal staff time	2025-2030	Carried Forward	No progress made due to fiscal limitations. The City will continue to seek opportunities to implement retrofits as needed.
SP-2	Install backup generators or quick connect hook ups for mobile generators on any newly constructed county/town critical facilities.	All Hazards	4.2	Medium	City of Burlington Building and Inspections, Office of Emergency Management, City Planning Department	Local, State grants, UHMA grants, other federal grants	2025-2030	Carried Forward	Some generators have been replaced (PD) or repaired (City Hall). Additional needs remain, such as adding an additional transfer switch to the generator at city hall so that should there be a failure in the main generator, a generator could be sourced and integrated seamlessly.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City of Burlington Office of Emergency Management, City Planning Department	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	City of Burlington Fire Department	Staff time	2025-2030	Carried Forward	This activity is implemented annually.
Public Education & Awareness									
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM).	Flooding	1.2	Medium	City of Burlington Building and Inspections, City of Burlington Office of Emergency Management	General fund	2025-2030	Carried Forward	No progress made due to limited staff resources.
PEA-2	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	City of Burlington Office of Emergency Management	Staff time	2025-2030	Carried Forward	In Progress. The City gives presentations to HOAs and neighborhood groups and distributes literature.
PEA-3	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	City of Burlington Office of Emergency Management, Burlington Office of Public Information	Staff time	2025-2030	Carried Forward	This activity is ongoing and continually evaluated for effectiveness and modified as needed. Recent outreach methods include giving presentations and maintaining a presence at public events.
PEA-4	Maintain documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Low	City of Burlington, Alamance County Planning Department	N/A	2025-2030	Carried Forward	This activity is ongoing. The City will continue to support maintaining these materials at local libraries and government offices.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Implementation Status Comments
PEA-5	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	Flooding	2.1	Low	City of Burlington, City Planning Department	Unknown	2025-2030	Carried Forward	No new resources were developed due to limited staff and fiscal resources.
PEA-6	Educate citizens to listen for the watches and warnings issued by the National Weather Service.	All Hazards	2.2	Medium	City of Burlington Office of Emergency Management	County	2025-2030	Carried Forward	The City of Burlington Office of Emergency Management conducted annual presentations to Burlington Housing authority, Burlington Senior center, and Burlington Community network and has maintained a presence at local community events such as the annual Carousel Festival. Presentations include NWS information as well as inclement and hazardous weather planning/preparation.

Table 7.3 – Mitigation Action Plan, City of Graham

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Propose a policy prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist. Presently, most critical facilities located in the floodplain are waste pump stations because they must be located at low elevations because the handle gravity flowing sewage.	Flooding	1.2	Medium	City of Graham Public Works Department	General fund	2030	Carried Forward	Flood damage prevention regulations are included in the City of Graham Development Ordinance. Graham will consider future revisions to include critical facility protection and other higher standards.
P-2	Consider expanding the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Alamance County GIS Department	Staff time, General fund	2030	Carried Forward	Graham has centralized our Floodplain permitting and Elevation Certificates such that they are ready when requested. Further integration opportunities will be evaluated.
P-3	Continue City of Graham's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	Graham complied with the most recent update of the regulations and maps.
P-4	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	City of Graham Fire Department	Staff time	2030	Carried Forward	No progress reported due to administrative barriers. Timeline based on Rating Schedule dictated by Office of State Fire Marshal.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor recreational facilities located in the floodplain and evaluate flood resistance of county structures.	Flooding	4.2	Medium	City of Graham Public Works Department	Staff time	2025-2030	Carried Forward	Graham will continue to monitor and identify specific mitigation needs.
PP-2	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	City of Graham/ Alamance County EM	General fund	2025-2030	Carried Forward	Graham will continue to monitor and identify specific mitigation needs.
PP-3	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	City of Graham Public Works Department, Planning Department	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	City Buildings and Inspections Department, City Planning Department, City Emergency Services	Local, State grants, federal grants	2025-2030	Carried Forward	No completed projects to report. The City will continue to identify and implement retrofits as needed.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	City Buildings and Inspections Department, City Planning Department, City Emergency Services	Local, State grants, federal grants	2025-2030	Carried Forward	No new progress to report. Additional facilities to be identified.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City Planning Department, City Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	No progress to report. Fire Chief will coordinate with State Forester and reestablish this link.
ES-2	Coordinate with the North Carolina Department of Transportation (NCDOT) to maintain adequate and effective snow and ice removal plans by the towns/cities and NCDOT. "Adequate" means that all major thoroughfares are cleared and remain clear within 12 hours of last snowfall.	Severe Winter Weather	2.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	The City continues to coordinate with NCDOT and is attempting to take over some primary routes.
Public Education & Awareness									
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM). This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcements from the Alamance County Inspections Department when builders and developers apply for permits.	Flooding	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	The City of Graham works with Alamance County to ensure that developers are up-to-date when applying for permits and by attending workshops. City staff attends CFP trainings, and reviews all NFIP regulations.
PEA-2	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	No progress reported due to limited staff resources. The City will maintain an Emergency Preparedness page on the City website in conjunction with the County to help inform local residents.
PEA-3	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	No progress reported due to limited staff resources. The City will maintain an Emergency Preparedness page on the City website in conjunction with the County to help inform local residents.
PEA-4	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	The usage of NIXLE has increased awareness of the frequency of hazards. The City will continue to push notifications regarding hazardous weather over this and other media.
PEA-5	Discourage the public and developers from developing property in flood zones.	All Hazards	1.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	Graham will continue to educate the public about the 2' freeboard requirement.
PEA-6	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	Documents are made available at City Hall.

Table 7.4 – Mitigation Action Plan, City of Mebane

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Maintain Shelter Agreements with the County Emergency Services	All Hazards	2.2	Medium	Alamance County/ City	General Fund	2025-2030	Carried Forward	The City has a contract with Alamance County Emergency Services and will assess the contract as-needed.
P-2	Continue the City of Mebane's participation in the National Flood Insurance Program	Flooding	1.2	Medium	City	Staff Time	2025-2030	Carried Forward	The City has maintained compliance with the NFIP and will continue to do so as part of plan review and permitting process.
P-3	Monitor Reservoirs, Lakes, and Streams for Potential Flooding Problems and Note any Unexpected Flooding Issues	Flooding	1.2	Medium	City	Staff Time	2025-2030	Carried Forward	City has checked culverts and streams along outfalls ahead of large predicted storm events and cleared debris as necessary to prevent flooding. The City of Mebane began a construction project to replace the Lake Michael Dam Spillway in 2024.
P-4	Review All Fire Districts Coverage to Ensure there are Adequate Quantities of Water for Fire Fighting Purposes and that all Water Points are Maintained on a Regular Basis	Wildfire	2.2	Medium	City	Staff Time	2025-2030	Carried Forward	OSFM conducted ISO inspections in 2022. Will review with OSFM upon next inspection.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor Structures Affected by Flood and Track Damages and Repair Costs.	Flooding	4.2	Low	City	Hazard Mitigation Grants	2025-2030	Carried Forward	No progress to report due to low priority. City owned structures will be monitored and tracked. Private structures will be tracked by building permits.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	City	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to retrofit critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	City	State Grants, UHMA Grants, other federal grants	2025-2030	Carried Forward	As buildings are upgraded, we will look into retrofitting facilities with the latest technology. Many facilities have backup generators installed and low water consumption fixtures.
SP-2	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed county/town critical facilities	All Hazards	4.2	Medium	City	Local, State Grants, UHMA Grants, other federal grants	2025-2030	Carried Forward	Backup generators have now been installed at nearly all existing facilities. All new construction facilities will be evaluated as part of plan review.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City	State grants, UHMA grants, other federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Emergency Services									
ES-1	Meet Annually with State Forester for Alamance County to Improve Coordination of Wildfire Control and Response	Wildfire	3.2	Medium	City	Staff Time	2025-2030	Carried Forward	No progress due to limited staff resources. Fire department to meet annually with State forester to coordinate Wildfire Control and Response.
Public Education & Awareness									
PEA-1	Encourage Familiarity with National Flood Insurance Program (NFIP)	Flooding	2.1	Medium	Planning, Zoning and Inspections	Staff Time	2025-2030	Carried Forward	No new progress to report due to limited administrative resources. Will continue existing outreach as part of plan review and permitting process.
PEA-2	Encourage Citizens and Businesses to Develop Emergency Preparedness Plans	All Hazards	2.1	Medium	City	Staff Time	2025-2030	Carried Forward	Relevant City departments will continue to work with the Public Information Officer to produce videos and post information on the website encouraging development of emergency preparedness plans. In 2024 and 2025, the City of Mebane has produced educational videos related to emergency preparedness and response.
PEA-3	Encourage Homeowners to Review Insurance Policies as Part of an Overall Family Disaster Plan	All Hazards	2.1	Medium	City	Staff Time	2025-2030	Carried Forward	Educational material is posted on website/handouts
PEA-4	Increase Awareness of the Natural Hazards Potential to Officials, Public and Industry	All Hazards	2.1	Medium	City	Staff Time	2025-2030	Carried Forward	Code Red information is placed on the City's website. Citizens are informed by Code Red notifications as hazards arise. The City of Mebane hired a Public Information Officer in 2022 and is actively using CodeRed and other tools to share information.
PEA-5	Provide Local Real Estate Agents with Handouts that Will Advise Potential Buyers to Investigate the Flood Hazards for the Property Under Consideration	Flooding	2.1	Low	City	Staff Time	2025-2030	Carried Forward	Planning department provides information to agents and developers.

Table 7.5 – Mitigation Action Plan, Town of Elon

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Consider adopting a policy prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist. Presently, most critical facilities located in the floodplain are waste pump stations because they must be located at low elevations because the handle gravity flowing sewage.	Flooding	1.2	Medium	Town of Elon Public Works Department, Town of Elon Planning Department	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. The Town of Elon Public Works along with Town of Elon Planning(TRC) coordinate an inventory of all public facilities and identify the facilities that are within the 100 year floodplain-if any.
P-2	Expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Alamance County, Town of Elon	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. The Town of Elon works in conjunction with Alamance Co. GIS in computer based driven software on this.
P-3	Continue Town of Elon's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. Elon actively participates in the NFIP for its citizens.
P-4	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Alamance County, Town of Elon Fire Department	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. Town of Elon contracts with 3rd party testing company to model and project needed water supplies for firefighting and domestic use on a yearly basis to keep up with growth and to help with FD ISO rating. Estimated cost $10,000.
P-5	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	All Hazards	1.2	Medium	Town of Elon	N/A	2025-2030	Carried Forward	Completed and continuing ongoing implementation. Town participated with Alamance Co EM on flood mapping. Mapping was completed in 2015-2016.
P-6	Direct Town of Elon to assess how it can better incorporate hazard mitigation plan goals and objectives into its planning and implementation of its duties with the County's plans.	All Hazards	1.2	Medium	Alamance County/Town of Elon	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. The Town of Elon Planning department has adopted the Land Management Ordinance which incorporates the use of the Flood Damage Prevention Ordinance and the Jordan Lake Riparian Buffer Ordinance at TRC.
P-7	Develop and implement policies to enhance the urban tree canopy in ways that protect pedestrians and bicyclists from heat and pollution exposure through the use of the Land Management Ordinance requirements for street trees and parking lot landscaping.	Excessive Heat	1.2	Medium	Town of Elon	Staff Time	2025-2030	New	
P-8	Integrate climate change planning and solutions into emergency planning and preparedness, with a focus on heat and flooding.	All Hazards	1.2	Medium	Town of Elon	Staff Time	2025-2030	New	
P-9	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	1.2	Medium	Town of Elon, Alamance County	N/A	2025-2030	Carried Forward	Completed and continuing ongoing implementation. No new flood risks were identified in the last five years, but the Town and the County will continue to monitor for any new potential flood issues within the area.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Elon	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	General Fund, Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	The Towns TRC committee together with plans review have been able to review and approve all new construction builds from 2015-2020 particularly with new construction at Elon University with backup generators (where applicable and required by the NC Fire Code) along with fire resistant materials, wind retrofits and upgrades, as well as 911 communications requirements in buildings for effective radio transmissions. The Town Hall has recently installed a generator to increase resiliency. As of 2025 the Town has also partnered with Waste Reduction Partners to conduct an energy audit on municipal buildings. Currently the Town Hall and Fire Station 8 been audited as of February 2025.
SP-2	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Planning Department, Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Strive to ensure future development occurs in a manner that protects floodplains, streams, wetlands, and other natural features which work to reduce flood hazard susceptibility and continue to enforce existing regulations pertaining to stormwater management and erosion control standards contained within the Town of Elon Land Management Ordinance, Jordan Lake Riparian Buffer Ordinance, and Flood Damage Prevention Ordinance	Flooding	1.1	High	Town of Elon	Staff Time	2025- 2030	New	
NRP-2	Implement the tree preservation and landscaping standards outlined in the Town of Elon Land Management Ordinance to preserve the tree canopy and reduce urban heat island effect.	Excessive Heat	1.1	Medium	Town of Elon	Staff Time	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Alamance County, Town of Elon Fire Department	NA	2025-2030	Carried Forward	The Town of Elon FD conducts monthly meeting with the local arson task force and topics such as wildland fires are discussed occasionally with local FS Rep.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
ES-2	Coordinate with the North Carolina Department of Transportation (NCDOT) to maintain adequate and effective snow and ice removal plans by the towns/cities and NCDOT. "Adequate" means that all major thoroughfares are cleared and remain clear within 12 hours of last snowfall.	Severe Winter Weather	2.2	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	The Town's Public Works Department provided completed snow removal from the Towns streets during every snow storm from 2015-2020. This was for any storm which produced enough precipitation to cover the roads and maintained them clear.
Public Education & Awareness									
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM). This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcements from the Alamance County Inspections Department when builders and developers apply for permits.	Flooding	1.2	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	The Town of Elon along with Alamance County provides this information during the Town's Technical Review Committee meetings with contractors, architects, etc. The Town continues to provide this information to the institutions with the most development activity such as Elon University, Blakey Hall and Twin Lakes Retirement Centers. A link to the Flood Damage Prevention Ordinance has been placed on the Town's website.
PEA-2	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	The Town will continue to coordinate efforts to meet with the major institutions and businesses (Elon University, Twin Lakes, Blakey Hall, Labcorp, Carolina Biological, Sonoco, and Engineering Controls) to encourage continued development of their plans as their operations expand.
PEA-3	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The Town of Elon FD's Emergency Management currently maintains an updated preparedness page on their website. This information will continue to be updated periodically to help inform town residents.
PEA-4	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	In the Town of Elon FD preparedness page on the Town's website and a link also is added to the Alamance Co. Emergency Preparedness website.
PEA-5	Maintain hazard mitigation plan and floodplain information on the Town's website (www.elonnc.com).	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The website carries you to the Hazard Mitigation Plan, NFIP website, and flood damage prevention ordinance (which is already in the Planning Departments documentation for download).
PEA-6	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	Town of Elon, Alamance County	General Fund	2025-2030	Carried Forward	The Town of Elon is the FEMA repository for all related documents within its jurisdiction. The Town also works closely in conjunction with Alamance County concerning flooding issues.
PEA-7	Maintain GIS system at www.alamance-nc.com. From this site anyone from a private citizen, builder, insurance company, etc. can see if a property is located in the 1-percent-annual-chance (100-year) floodplain.	Flooding	2.1	Medium	Alamance County	Staff Time	2025-2030	Carried Forward	The Town provides a link on the Town's website to the County's GIS. The Town will continue to maintain this link.
PEA-8	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	Flooding	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The Town provides links or info to the County GIS and NC FRIS website.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-9	Educate citizens to listen for the watches and warnings issued by the National Weather Service	Flooding	2.2	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The Town of Elon in conjunction with Alamance Co. inform the residents via website as well as the countywide emergency alert system, Nixle, of upcoming warnings and watches.
PEA-10	During extreme heat and severe winter weather, organize community check-ins on elderly and sensitive populations. Program can be run at the neighborhood level through buddy systems where neighbors are aware of and check on those at risk of health impacts.	Excessive Heat, Severe Winter Weather	2.2	Medium	Town of Elon	Staff Time	2025-2030	New	
PEA-11	Develop a community-wide communications and outreach program on how to prepare and recover from climate hazards. The program may focus on a target population or a target hazard, or may be more broad.	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	New	
PEA-12	Identify and plan for the use of municipal and county facilities (e.g., library, community buildings) as temporary shelter from storms or as cooling centers. Consider partnering with area nonprofits and faith-based organizations to help run the shelters during storms and extreme heat.	All Hazards	3.1	Medium	Town of Elon	General Fund and Partnerships with local non-profits	2025-2030	New	

Table 7.6 – Mitigation Action Plan, Town of Green Level

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Review the subdivision regulations and make appropriate changes to encourage alternatives to placing lots in flood-prone areas and to minimize impervious surface coverings, if necessary.	Flooding	1.2	Medium	Town of Green Level	Local	2025-2030	Carried Forward	No progress was made due to administrative limitations.
P-2	Discourage the public and developers from developing property in flood zones.	Flooding	1.2	Medium	Town of Green Level	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
P-3	Expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database	Flooding	1.2	Low	Alamance County	Local, County	2025-2030	Carried Forward	The Town maintains ECs, but they are not yet made available on the County's GIS website.
P-4	Continue the Town of Green Level's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Green Level	Local, County	2025-2030	Carried Forward	The Town has remained an active participant in the NFIP.
P-5	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Green Level, Town of Haw River	Local, County	2025-2030	Carried Forward	No progress was made due to administrative limitations.
P-6	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	All Hazards	1.2	Medium	Town of Green Level	Local, County	2025-2030	Carried Forward	County land development plan was completed and adopted in 2020. Flood hazard and land use mapping remains to be completed.
Property Protection									
PP-1	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Low	Town of Green Level	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	No progress was made due to limited administrative and fiscal resources.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	No progress was made due to limited administrative and fiscal resources.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town Planning Department, Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Town of Green Level, Town of Haw River	Local, County	2025-2030	Carried Forward	No progress was made due to limited staff resources.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Public Education & Awareness									
PEA-1	Encourage residents to sign up for the countywide emergency notification system. Greater awareness of hazard events will help make residents more aware of their risks and encourage them to take preparedness and property protection actions to mitigate their individual hazard risk.	All Hazards	2.1	Medium	Town of Green Level	Local	2025-2030	Carried Forward	Green Level has an updated website and will work to incorporate links and information encouraging residents to sign up for the countywide emergency notification system.

Table 7.7 – Mitigation Action Plan, Town of Haw River

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Alamance County GIS Department	Local, County	2025-2030	Carried Forward	The Town of Haw River maintains ECs and will work in conjunction with Alamance County GIS Department to make them available in a computer database.
P-2	Continue Town of Haw River's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Town of Haw River has participated in the NFIP Program since 07/18/1975.
P-3	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Haw River Fire Department	Local, County	2025-2030	Carried Forward	Water/fire flow study completed in 2021. Maintenance and monitoring efforts will continue.
P-4	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor recreational facilities located in the floodplain and evaluate flood resistance of county structures.	Flooding	4.2	Medium	Town of Haw River Public Works Department	Local, County	2025-2030	Carried Forward	Red Slide Park is in the floodplain and experiences regular flooding and has been closed on several occasions. Regular monitoring will continue.
PP-2	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Town of Haw River	Local, County	2025-2030	Carried Forward	The Town will continue to monitor flooding problems.
PP-3	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Haw River	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	The Town of Haw River will continue to look for grant money regarding upgrading critical facilities to improve resilience to all hazards and to improve energy usage.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	Ongoing. The Haw River Police Department purchased a generator in 2021 using grant money. The Town will continue to upgrade pump stations to install generators when possible.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town Planning Department, Town Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Town of Haw River Fire Department	Local, County	2025-2030	Carried Forward	This has been performed annually with the Haw River Fire Chief and the Alamance County Fire Marshall's office.
Public Education & Awareness									
PEA-1	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Haw River Fire Department has continued to work with business owners on developing emergency response plans.
PEA-2	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Haw River, Alamance County	Local	2025-2030	Carried Forward	The Haw River Fire Department continued to work with homeowners on developing family emergency plans.
PEA-3	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Haw River Fire Department continued to promote awareness on natural hazards through education at local schools.
PEA-4	Discourage the public and developers from developing property in flood zones.	All Hazards	1.2	Medium	Town of Haw River	Local	2025-2030	Carried Forward	No progress to report due to limited administrative capability. The Town of Haw River reviews all new development through the TRC process.
PEA-5	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	Alamance County, Town of Haw River	Local, County	2025-2030	Carried Forward	The Town of Haw River works in conjunction with Alamance County GIS Department on this, and the Town is the repository for all flood documents
PEA-6	Encourage residents to sign up for the countywide emergency notification system. Greater awareness of hazard events will help make residents more aware of their risks and encourage them to take preparedness and property protection actions to mitigate their individual hazard risk.	All Hazards	2.1	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Town of Haw River will continue to work in conjunction with Alamance County on this.

Table 7.8 – Mitigation Action Plan, Town of Ossipee

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	No progress was made due to limited administrative resources.
P-2	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	All Hazards	1.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	The County land use plan update was completed. Mapping for Ossipee remains to be done.
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	No progress was made due to limited administrative resources.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Ossipee	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town of Ossipee	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	No progress was made due to lack of funding.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town of Ossipee	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	The Town has a new Town Hall and will seek funding to secure a backup generator.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Ossipee	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	No progress was made due to limited administrative resources.
Public Education & Awareness									
PEA-1	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Ossipee	Local	2025-2030	Carried Forward	No progress was made due to administrative limitations.
PEA-2	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Ossipee	Local	2025-2030	Carried Forward	No progress was made due to administrative and technical limitations.
PEA-3	Encourage residents to sign up for the countywide emergency notification system. Greater awareness of hazard events will help make residents more aware of their risks and encourage them to take preparedness and property protection actions to mitigate their individual hazard risk.	All Hazards	2.1	Medium	Town of Ossipee	Local	2025-2030	Carried Forward	The Town of Ossipee will work with Alamance County on this effort.

Table 7.9 – Mitigation Action Plan, Town of Swepsonville

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Review the subdivision regulations and make appropriate changes to encourage alternatives to placing lots in flood-prone areas and to minimize impervious surface coverings, if necessary.	Flooding	1.2	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to administrative limitations
P-2	Continue Town of Swepsonville's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	The Town has maintained compliance with NFIP requirements for continued participation.
P-3	Develop specific regulations that prohibit dumping in the county's watersheds	Flooding	1.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to administrative limitations
P-4	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Swepsonville	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Town of Swepsonville	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Swepsonville	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town of Swepsonville	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to staff and funding limitations.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town of Swepsonville	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to staff and funding limitations.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Swepsonville	State grants, federal grants	2025-2030	New	
Public Education & Awareness									
PEA-1	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-2	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-3	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-4	Discourage the public and developers from developing property in flood zones.	All Hazards	1.2	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-5	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.

Table 7.10 – Mitigation Action Plan, Village of Alamance

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Continue to expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Village of Alamance	Local, County	2025-2030	Carried Forward	The Village will work to compile and provide ECs to the County.
P-2	Continue the Village of Alamance's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Village of Alamance	Local	2025-2030	Carried Forward	The Village has maintained compliance with the NFIP
P-3	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Village of Alamance	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations.
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Village of Alamance	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Village of Alamance	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Village-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Village of Alamance	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to administrative and fiscal limitations.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Village of Alamance	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to administrative and fiscal limitations.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City Planning Department, City Emergency Services	State grants, federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Village of Alamance	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations.
Public Education & Awareness									
PEA-1	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Village of Alamance	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
PEA-2	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Village of Alamance	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
PEA-3	Maintain hazard mitigation plan and floodplain information on the Village's website.	All Hazards	2.1	Medium	Village of Alamance	Local	2025-2030	Carried Forward	The Village has an updated website and will work to incorporate hazard mitigation and floodplain information.

Table 7.11 – Mitigation Action Plan, Durham County-Durham City

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed County or City critical facilities	All Hazards	4.2	Medium	Buildings and Inspections Department, Planning Department, Emergency Services, Public Works	Local, State grants, UHMA grants, other federal grants	2025-2030	Carried Forward	Emergency Services will continue to seek funding for back-up generators.
PP-2	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	County Engineering and Environmental Services, Public Works	Local, State grants, UHMA grants, other federal grants	2025-2030	New	Acquisition and elevation projects were completed and are in progress in the City.
Natural Resource Protection									
NRP-1	Identify and obtain additional properties to increase protected open space as a land-use tool to reduce adverse impacts from floods.	Flooding	1.2	Medium	City-County Planning Department, Public Works	HMGP or BRIC with local or State match	2025-2030	Carried Forward	Acquisition projects were completed and are in progress in the City. City and County will work to identify more properties to pursue additional acquisitions.
NRP-2	Complete one (1) stream restoration project to reduce flooding risk by restoring or enhancing stream channels to improve natural flow and capacity of streams, allowing them to better handle increased water volume during storms.	Flooding	1.1, 4.2	Medium	County Engineering and Environmental Services; Stormwater and Erosion Control Division	County Stormwater Utility fee	2025-2030	New	The Stormwater and Erosion Control Division is working on this plan now and plan to begin construction in 2026.
Structural Projects									
SP-1	Seek funding to retrofit critical facilities and City- and County-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Buildings and Inspections Department, Planning Department, Emergency Services, Public Works	Local, State grants, UHMA grants, other federal grants	2025-2030	Carried Forward	The City and County will work to identify existing facilities in need of retrofits. Emergency Services will continue to seek funding for those retrofits. The County is currently prioritizing suggestions from an assessment done to reduce the carbon footprint and increase energy efficiency throughout the buildings.
SP-2	Complete at least one (1) stormwater management project. The stormwater management project will include either a new stormwater control measure (SCM) to treat previously untreated impervious area or retrofit an existing SCM to increase runoff capture and treatment.	All Hazards	4.1, 4.2	Moderate	County Engineering and Environmental Services; Stormwater and Erosion Control Division, Public Works	County Stormwater Utility fee	2025-2030	New	

Table 7.12 – Mitigation Action Plan, Orange County

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Incorporate relevant HMP priorities into drafted 2050 Land Use Plan for adoption; in the meantime, continue implementation of the Orange County 2030 Comprehensive Plan.	All Hazards	1.1	Medium	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	This action has been revised to incorporate priorities into the drafted 2050 Land Use Plan. Implementation of the 2030 Comprehensive Plan is ongoing.
P-2	Continue participation in the Community Rating System (CRS) and annual recertification in order to increase public safety, reduce property damage, avoid economic loss, and allow for a decrease in flood insurance premiums for Orange County residents.	Flooding, Hurricane & Tropical Storm	1.1	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	The CRS re-certification period runs from August 1st to August 1st for each fiscal year. Staff works with CRS every July to submit our annual CRS recertification application. Orange County's 2024 CRS rating was a score of Class 6, which qualifies our constituents for a 20% discount in FEMA flood insurance premiums. Staff hopes to maintain our relatively high CRS score for FY25, with potential eventual score increase (perhaps to Class 5), once staff is able to procure Certified Floodplain Manager (CFM) status.
P-3	Continue to enforce floodplain regulations through the county's Special Flood Hazard Area (SFHA) Overlay District contained within the Orange County Unified Development Ordinance and continue training efforts for the Certified Floodplain Manager (CFM).	Flooding, Hurricane & Tropical Storm	1.2	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	Orange County underwent a successful Floodplain Management program (NFIP) audit by the NC Department of Public Safety (NCDPS) in June 2023. Current feedback from NCDPS is that the program is in full compliance; with only a few minor deficiencies noted, of which staff is aware of and actively working to address into FY25. Staff hopes to procure Certified Floodplain Manager (CFM) status in FY25.
P-4	Continue to collaborate and support municipal mitigation strategies	All Hazards	3.2	Medium	Orange County Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County remains committed to supporting municipal mitigation strategies. Orange County Emergency Management is assisting UNC Chapel Hill with a generator project funded through the Hazard Mitigation Grant Program (HMGP) from Hurricane Florence. Additionally, Orange County Emergency Management is supporting the Town of Carrboro in applying for HMGP funding for a property acquisition related to flood damage from Hurricane Helene.
P-5	Climate Action Plan	All Hazards	2.1	High	Orange County Sustainability	General Fund (existing staff salaries), CIP, Federal and State grants	2023-2032	New	The Orange County Climate Action Plan was adopted in November 2023 and is currently in implementation. The plan addresses climate mitigation strategies as well as resilience and adaptation.
P-6	Continue to develop, review, update, and implement recommendations in local and regional plans to improve the reliability, redundancy, and resiliency of water resources (water, wastewater, reclaimed water).	All Hazards	3.1	Medium	OWASA, Orange County Planning and Inspections Department	CIP and Operating Budgets	2025-2030	Carried Forward	Moving into FY25, Orange County continues to coordinate with City of Mebane and Town of Hillsborough and commit active County CIP funds for relevant public water/sewer system extensions, where applicable. Currently, the County has no active public water/sewer extension projects in the queue with remaining public utilities (i.e., City of Durham, OAWS, OWASA) that are geographically capable of serving County constituents. OWASA remains committed to ensuring the reliability, redundancy, and resiliency of the water resources that sustain the water supply for our customers and community

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-7	Home weatherization for low-to-Medium income residents.	Excessive Heat, Severe Winter Weather	4.2	Medium	Orange County Housing Department, Orange County Home Preservation Coalition	General Fund (existing staff salaries), grants	2025-2030	New	
P-8	Tree giveaway program.	Excessive Heat	4.2, 2.1	Medium	Orange County Sustainability	General Fund (existing staff salaries), grants	2025-2030	New	
P-9	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Continue enforcement of the North Carolina State Building Code.	All Hazards	1.2	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	Currently operating under the 2018 edition of the NC State Building Codes and 2017 edition of the National Electrical Code. The updated codes were adopted in 2025 with implementation occurring in 2026 or later.
PP-2	Continue participation in the National Flood Insurance Program (NFIP) to reduce the impact of a future flood event, mitigate effects of flooding, and allow citizens to be eligible for affordable flood insurance.	Flooding, Hurricane & Tropical Storm	1.2	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	Orange County underwent a successful Floodplain Management program (NFIP) audit by the NC Department of Public Safety (NCDPS) in June 2023. Current feedback from NCDPS is that the program is in full compliance; with only a few minor deficiencies noted, of which staff is aware of and actively working to address into FY25. Staff hopes to procure Certified Floodplain Manager (CFM) status in FY25. Orange County's 2024 CRS rating was a score of Class 6, which qualifies our constituents for a 20% discount in FEMA flood insurance premiums. Staff hopes to maintain our relatively high CRS score for FY25, with potential eventual score increase (perhaps to Class 5), once staff is able to procure CFM status.
PP-3	Identify potential flood hazards of critical infrastructure and mitigation measures to address.	Flooding, Hurricane & Tropical Storm	4.2	High	OWASA	CIP and Operating Budgets	2025-2030	Carried Forward	OWASA is developing a Climate Action Plan in 2025 to identify vulnerabilities and outline mitigation measures to address the highest climate risks, including flood hazards of critical infrastructure.
PP-4	Explore expanding situational awareness tools and strategies for increased monitoring of local hazards such as installation of additional stream gauges	All Hazards	2.2	Medium	Emergency Services, OWASA	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County has collaborated with NC Dam Safety to assess local stream and dam gauges. To enhance situational awareness, CONTRAIL access has been granted to all fire chiefs with dam gauges in their jurisdiction.
PP-5	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	Orange County Planning and Inspections Department	Local, State grants, Federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Natural Resource Protection									
NRP-1	Strive to ensure future development occurs in a manner that protects floodplains, streams, wetlands, and other natural features which work to reduce flood hazard susceptibility and continue to enforce existing regulations pertaining to stormwater management and erosion control standards contained within the Orange County Unified Development Ordinance.	Flooding, Hurricane & Tropical Storm	1.1	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	Moving into FY25, Orange County's ongoing stance (as defined in the UDO) is no new development within the SFHA, barring extraneous/rare circumstances in which a property owner has fully justified that there are no feasible alternatives for by-right development. Substantial improvements to existing structures within the SFHA are permitted; however, any/all construction (new construction and/or or substantial improvements) will continue to require complete floodproofing per FEMA standards. Staff will continue to require No-Rise studies for any fill within the SFHA, and staff will continue to process CLOMR/LOMR applications per regulatory requirements.
Structural Projects									
SP-1	Explore the possibility of retrofitting critical facilities to harden against high winds and lightning.	All Hazards	4.2	Medium	Emergency Services, Asset Management	Unified hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	Orange County will continue to identify opportunities to protect critical facilities from wind and lightning.
SP-2	Conduct a cost-benefit review during the planning and design phase of construction of new government owned facilities or critical facilities to determine the feasibility of equipping the facility with back-up generators, lightening protection, high wind protection, and/or 361 compliant tornado shelters.	All Hazards	4.2	Medium	Emergency Services, Asset Management	Unified hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	This is being completed on a case-by-case basis with each new facility and major retrofit.
SP-3	Continue to identify and explore possibility of improving or retrofitting existing critical facilities with on site energy generation.	All Hazards	4.2	Medium	Emergency Services, Asset Management, OWASA	Unified hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	Orange County, in partnership with the Central Pines Regional Council, is applying for a grant to assess generator specifications for existing County facilities and estimate associated costs.
SP-4	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Emergency Services, Planning and Inspections Department	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Engage with regional stakeholders in comprehensive emergency response planning including Complex Coordinated Terror Attack response and Mass Casualty Incident response planning.	All Hazards	3.2	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County continues to provide ASIM training to onboarding EMS personnel and others upon request. Emergency Services initially began the application process for an Assistance to Firefighters Grant (AFG) to fund mass casualty incident (MCI) equipment and training but has instead incorporated it into the 2023-2024 budget. Additionally, Orange County Emergency Services is in the initial planning phase of developing a comprehensive MCI plan. Following the 2019 Regional Complex Coordinated Terrorist Attack (CCTA) Plan, Orange County, in partnership with Durham and Wake counties, hosted a series of trainings to strengthen identified capabilities.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
ES-2	Continue to provide warming/cooling centers during extreme temperatures.	Excessive Heat, Severe Winter Weather	2.2	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	New	
ES-3	Explore a box fan giveaway program for residents without central air conditioning.	Excessive Heat	2.1, 2.2	Medium	Orange County Social Services/Aging	General Fund (existing staff salaries)	2025-2030	New	
ES-4	Develop a comprehensive Emergency Operations Plan update with integration of all three municipal Emergency Operations Plans.	All Hazards	3.1	High	Emergency Services	State grants, UHMA grants, other federal grants	2025-2027	New	
ES-5	Develop a Countywide Tactical Interoperable Communications Plan, addressing both voice communication and data.	All Hazards	3.1	Medium	Emergency Services	General Funds (existing staff salaries)	2025-2030	New	
ES-6	Improve situational awareness and interagency coordination during hazard events by using mobile geospatial tools that support real-time data sharing, location tracking, and operational overlays that can support both public safety and non-public safety assets.	All Hazards	3.1	Medium	Emergency Services	General Funds (existing staff salaries)	2025-2030	New	
Public Education & Awareness									
PEA-1	Provide education and outreach to Orange County residents in multiple languages before, during, and after a hazardous weather event and maintain a link to the Eno-Haw Regional Hazard Mitigation Plan on Orange County's Website.	All Hazards	2.1	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County continues to host and sponsor Community Emergency Response Team (CERT) training, offering two CERT basic training courses annually and meeting regularly with the CERT Council. Orange County Emergency Services partners with Orange County Cooperative Extension to host an annual summer camp that enhances youth resilience to hazards. Additionally, Orange County Emergency Management collaborates with NCEM to host the Emergency Management Experience, an all-girls summer camp focused on careers in emergency management and first response. Orange County remains committed to public education on hazard risks and has developed a multilingual repository of preparedness information. In 2024, the County updated the Ready Orange website to support easy translation into multiple languages and to clearly communicate hazard information and preparedness measures. Emergency Management continues to leverage social media and other platforms to educate residents about natural hazards, including the creation of multilingual preparedness graphics for targeted outreach and social media use. Efforts are ongoing to ensure all communications, especially OC Alert notifications, use plain language for accessibility and clarity.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-2	Engage in regional events, activities, and training opportunities related to natural hazards in order to improve communication, enhance, partnerships, and improve planning efforts with other local jurisdictions.	All Hazards	3.2	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County actively participates in local and regional exercises. In 2023, Orange County Emergency Services partnered with OWASA to conduct a dam failure tabletop exercise. Currently, Emergency Services is engaged in a Threat and Hazard Identification and Risk Assessment (THIRA) to identify capability gaps related to various hazards. Additionally, in 2021, Orange County hosted a full-scale active shooter exercise at UNC Hillsborough
PEA-3	Provide staff support and information on Orange County's website to provide education and assistance to residents experiencing floodplain, stormwater, and erosion control issues.	Flood, Hurricane and Tropical Storm	2.1	Medium	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	Updated information was posted in 2024 at Floodplain Protection | Orange County, NC. Information also available on https://www.orangecountync.gov/3427/Floods
PEA-4	Continue to support strategies identified in Orange County's Climate Action Plan	All Hazards	3.2	Medium	Orange County Sustainability	Multiple	2023-2050	New	Information on the Climate Action Plan and current progress can be found at https://www.orangecountync.gov/3096/Climate-Action-Plan
PEA-5	Provide utility bill assistance to income eligible residents.	Excessive Heat, Winter Weather	3.2	Medium	Orange County Housing	General Fund (existing staff salaries)	2025-2030	New	
PEA-6	Conduct periodic heat mapping to understand which parts of Orange County are most vulnerable to excessive heat.	Excessive Heat	3.2	Medium	Orange County Sustainability	General Fund (existing staff salaries)	2025-2030	New	
PEA-7	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	2.2	Medium	Orange County Sustainability, Emergency Services	General Fund (existing staff salaries)	2025-2030	New	

Table 7.13 – Mitigation Action Plan, Town of Carrboro

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	The Town of Carrboro, as a member of the Orange County hazard Mitigation Planning Team, will coordinate with Orange County to reevaluate and update its hazard mitigation planning component at least once every five years or sooner as deemed appropriate by the Orange County Planning Director	All Hazards	1.2	High	Town of Carrboro	Self-funded	2025-2030	Carried Forward	Actively participating in update process with local government partners in Eno-Haw Region.
P-2	The Town of Carrboro intends to submit a Community Rating System (CRS) application to the ISO for a flood insurance rating that will benefit owners of flood-prone properties	Flooding	1.2	Medium	Town of Carrboro - Planning Department	N/A	2025-2030	Carried Forward	The Town is still interested in submitting a CRS application to ISO. The Town is assessing current programs and will conduct further research to determine if applying for the CRS is in the best interest of the community;
P-3	The Town of Carrboro will continue to monitor ongoing efforts by the State and the US Army Corps of Engineers to complete new floodplain mapping for the planning area. Local staff resources will be needed to implement and encourage the completion of these activities.	Flooding	1.1	High	Town of Carrboro - Planning Department	N/A	2025-2030	Carried Forward	The Town's Stormwater Utility was established in 2017, and the Stormwater Division created in 2018. The Planning Department and GIS administrator ensure local floodplain maps are updated. The Town also utilizes the Flood Risk Information System as needed.
P-4	Establish comprehensive framework for plans, policies, and regulations pertaining to land use, generally, and the relationship to natural hazard mitigation	All Hazards	1.2	Medium	Town of Carrboro - Planning Department	Self-funded	2025-2030	Carried Forward	Incorporated into Carrboro Connects Comprehensive Plan which was adopted on 7 June 2022. Will continue in this area with the implementation of a new Unified Development Ordinance.
P-5	Establish framework for assessing urban wildfire risk, communicating with the public on measures that can reduce risk.	Wildfire	2.1	Medium	Town of Carrboro - Fire Department	Self-funded; outside grants if available	2025-2030	Carried Forward	Will partner with other local fire departments, the Orange County Fire Marshal's Office, and the North Carolina Forestry Service to assess and mitigate wildfire hazards with a concentration on the Wildland Urban Interface (WUI).
P-6	Explore opportunities to pilot cool pavement.	Excessive Heat	1.2	Medium	Town of Carrboro – Sustainability Division	TBD	2025-2030	New	Piloted cool pavement titanium dioxide additive to pavement resurfacing in several neighborhoods in 2024 using NC DOT Powell Bill Funding.
P-7	Home weatherization for low-to-moderate income residents.	Excessive Heat, Severe Winter Weather	4.2	Medium	Town of Carrboro – Housing and Community Services	Self-funded; outside grants if available	2025-2030	New	Work with Orange County Housing and other partner agencies to continue weatherization of homes in the community.
P-8	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Town of Carrboro – Fire Department	Self-funded; outside grants if available	2025-2030	New	Will partner with other local fire departments, the Orange County Fire Marshal's Office, and the North Carolina Forestry Service to assess and mitigate wildfire hazards with a concentration on the Wildland Urban Interface (WUI).

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Property Protection									
PP-1	Seek funding to retrofit critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, solar and battery electric storage systems, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town of Carrboro - Planning Department	Self-funded; outside grants if available	2025-2030	Carried Forward	The Town will continue to assess facilities and seek funding sources related to needs identified.
PP-2	Manage watersheds and stormwater by promoting active maintenance of stormwater infrastructure, reducing impacts of increased impervious surfaces, and minimizing impact to waterways.	Flooding, Hurricane & Tropical Storm, Landslide	1.2	High	Town of Carrboro - Stormwater Division	Self-funded; outside grants if available	2025-2030	Carried Forward	Action Revised. The Town of Carrboro established a Stormwater Utility Fee in 2017 to fund stormwater services/operations and provide residential and commercial assistance for stormwater related issues by expanding technical assistance, outreach, and other program components. The Town has an active MS4 permit and is subject to requirements, including post-construction stormwater control measures. Stormwater control measures are often designed to exceed state minimum requirements.
PP-3	Look for opportunities to mitigate repetitive loss structures, and to increase resilience by ensuring critical infrastructure is not in locations susceptible to flooding.	Flooding	4.2	Medium	Town of Carrboro - Planning Department	Local, State grants, Federal grants	2025-2030	New	This mitigation measure includes pursuing the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damaged properties. Currently in discussions with one property owner and expect the process to begin in earnest in 2025. This mitigation measure also includes the possibility of relocating Carrboro Public Works.
Natural Resource Protection									
NRP-1	Development of greenways and parklands dedicated to public use along streams and utility easements. The Town will seek to secure funding from federal, state, and local sources to implement the Town's greenway system, which will in turn mitigate flood hazards.	Flood	1.1	Medium	Town of Carrboro - Planning Department	Federal and county grants, and Town funded.	2025-2030	Carried Forward	Phase 1B/Homestead-Chapel Hill High School Multi-use Path is completed. The Morgan Creek and Jones Creek greenway projects are expected to begin construction in 2025/2026. The Town will continue to develop greenways along streams to protect natural resources.
NRP-2	Protect and conserve land with environmental and natural hazard mitigation value as open space.	Flooding, Hurricane & Tropical Storm, Landslide	1.1	High	Town of Carrboro - Planning Department	Self-funded; outside grants if available	2025-2030	Carried Forward	Implementation underway for several projects and multiple approaches including land use regulations for developments, policy analysis/framework for comprehensive planning, and grant funding for repetitive loss properties.
NRP-3	Coordinate with OWASA for planning for long-term and emergency water supply measures.	All Hazards	1.1	High	Town of Carrboro – Fire Department	Self-funded	2025-2030	New	
Structural Projects									
SP-1	Require new developments to install electric, cable, and telephone wires underground to increase critical infrastructure resilience.	All Hazards	1.2	Medium	Town of Carrboro - Planning Department	N/A	2025-2030	Carried Forward	The Town of Carrboro will continue to require new developments to install electric, cable, telephone wires underground to the extent allowed by local utilities—Duke Power/Piedmont Electric Coop.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
SP-2	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Carrboro - Stormwater Division	State grants, federal grants	2025-2030	New	The Town has Capital Projects included in the adopted Capital Improvement Plan to implement public projects within the jurisdiction to manage stormwater within the community.
Emergency Services									
ES-1	Provide misting tents and cold-water giveaways at fire stations during extreme heat days.	Excessive Heat	2.2	Medium	Town of Carrboro Fire	General fund	2025-2030	New	Partial implementation in-progress. Will work to formalize actions based on pre-established thresholds.
ES-2	Develop a comprehensive Emergency Operations Plan update with integration of all three municipal Emergency Operations Plans.	All Hazards	3.1	High	Town of Carrboro – Fire Department	State grants, UHMA grants, other federal grants	2025-2027	New	
ES-3	Work with partners across Orange County on the development a Countywide Tactical Interoperable Communications Plan, addressing both voice communication and data.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2025-2030	New	Research phase. Current plan is to implement mesh network or a similar technology for communications redundancy.
ES-4	Improve situational awareness and interagency coordination during hazard events by using mobile geospatial tools that support real-time data sharing, location tracking, and operational overlays that can support both public safety and non-public safety assets.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2025-2030	New	Supporting Orange County Emergency Services efforts to transition to a new CAD system that will provide geospatial capabilities. Working with local response partners to enhance capabilities. Currently planning to implement Team Accountability Kit (TAK) for to increase situational awareness and improve inter-agency operations.
ES-5	Develop a unified damage assessment process.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2025-2030	New	Work with local and regional response partners to enhance capabilities for damage assessment and tracking on a local and regional level.
ES-6	Develop a Continuity of Operations Plan (COOP) for the Town of Carrboro.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2027-2030	New	Begin the COOP planning process after completion of the comprehensive EOP update.
ES-7	Engage in regional events, activities, and training opportunities related to natural hazards to improve communication, enhance partnerships, and improve planning efforts both within the across jurisdictions.	All Hazards	3.2	Medium	Town of Carrboro – Fire Department	General Fund (existing staff salaries)	2025-2030	New	Engage with local, regional, state, and federal emergency management services to increase capabilities and enhance interoperability.
ES-8	Identify and implement strategies, processes, and procedures to enhance hazardous materials leak and spill response capabilities.	Hazardous Materials	3.1	Medium	Town of Carrboro – Fire Department	General Fund (existing staff salaries)	2025-2030	New	
Public Education & Awareness									
PEA-1	Maintenance and implementation of adopted (2017) Community Climate Action Plan	All Hazards	1.2	High	Town of Carrboro - Sustainability Division	Self-funded; grants, other revenue as available	2025-2030	Carried Forward	Includes implementation of 2014 Energy and Climate Protection Plan. Will serve as coordinating focus of actions underscoring Town's emphasis on building community resilience. Could potentially be included under Structural Projects, Prevention and Property Protection as well.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-2	Create and maintain web-based resources for hazard risk, mitigation, and preparedness information.	All Hazards	1.2	High	Town of Carrboro – Fire Department	Self-funded	2025-2030	Carried Forward	A web page was created during the 2020-2025 implementation phase. Will update the page and add additional resources in the next implementation phase. This action item also includes utilization of social media and other web-based tools for public education.
PEA-3	Conduct periodic heat mapping to understand which parts of Carrboro are most vulnerable to excessive heat.	Excessive Heat	3.2	Medium	Town of Carrboro - Sustainability Division	General Fund	2025-2030	New	Partnering with UNC to conduct heat mapping in 2025.
PEA-4	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	2.2	Medium	Town of Carrboro - Sustainability Division	General Fund (existing staff salaries)	2025-2030	New	Working with Orange County and other local partners to develop and implement a comprehensive Heat Action Plan.
PEA-5	Encourage and educate private property owners regarding Nature-Based Hazard Mitigation nutrient management.	Flooding, Hurricane & Tropical Storm, Landslide	2.1	Medium	Town of Carrboro - Stormwater Division	Self-funded	2025-2030	New	Conducted 90 property assessments and are developing conservation plans for those properties. Goal is to complete approximately 50 assessments and associated conservation plans annually.
PEA-6	Provide increased public outreach before, during, and after a natural hazard or emergency.	All Hazards	2.2	High	Town of Carrboro – Fire Department	General Fund (existing staff salaries)	2025-2030	New	

Table 7.14 – Mitigation Action Plan, Town of Chapel Hill

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Consider creative zoning options.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.2	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. ToCH continues to try to engage with developers to pursue creative zoning options including-conditional zoning which allows flexible and open conversations.-The Blue Hill District and the Innovative, Light Industrial Conditional Zoning District are other examples of creative zoning options. The Town Council and Town staff review zoning requirements and making adjustments as needed to achieve hazard mitigation goals. For example, developers now commonly volunteer to design their stormwater management to meet the 100-year storm, up from the 25-year storm.
P-2	Encourage mixed-use development forms.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. ToCH continues to emphasize mixed-use redevelopment in the downtown and in future focus areas, as per the comprehensive plan. In 2021, the Town adopted a new future land use map called "Charting Our Future.". This initiative charts a course for mixed-use and compact development along major transportation corridors.
P-3	Establish a growth management protocol to maintain sufficient infrastructure capacity.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.1	Medium	Town of Chapel Hill	N/A	2025-2030	Carried Forward	In Progress. The Town will continue existing growth management protocols to maintain sufficient infrastructure capacity including the Town's urban services district and the rural buffer, both of which continue to guide development decisions within the municipal boundaries. In 2021, the Town adopted a new future land use map called "Charting Our Future.". This initiative charts a course for mixed-use and compact development along major transportation corridors.
P-4	Improve the Development Review Process	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Planning Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. This continues to be an ongoing effort since 2009. The Town is in the process of a complete rewrite of the development ordinance, which will include a comprehensive review of the Development Review Process.
P-5	Continue to enforce the stormwater management regulations through the Town's Land Use Management Ordinance and the floodplain regulations through the town's Flood Damage Prevention Ordinance. Continue training initiatives to maintain the Certified Floodplain Manager (CFM) registrations.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Stormwater Division	Stormwater Fund (existing staff salaries)	2025-2030	Carried Forward	The Town has made updates to the stormwater management regulations that modernize and streamline our rules, including a design standard that moved from the 25-year storm to the 100-year storm for large new construction. The Town now has a Certified Floodplain Manager and will continue to support training.
P-6	Continue to participate in county-wide collaborative efforts and mitigation strategies	All Hazards	3.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Engage in regular Emergency Management meetings, training, and data sharing to strengthen community resilience and organizational response to hazards.
P-7	Continue enforcement of the North Carolina State Building Code.	All Hazards	1.2	Medium	Town of Chapel Hill - Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town continues to enforce the building code by maintaining a staff with multiple trade certifications for all forms of development.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-8	Continue participation in the National Flood Insurance Program (NFIP) to allow citizens to be eligible for affordable flood insurance.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Stormwater Division	Stormwater Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town continues to administer its Flood Damage Prevention Ordinance, consistent with federal and state regulations, to maintain compliance with the National Flood Insurance Program.
P-9	Explore expanding situational awareness tools and strategies for increased monitoring of local hazards	All Hazards	2.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. In collaboration with ESRI consultants, we continue to work on building and enhancing dashboard viewers to monitor real-time conditions and aid in the decision-making process.
P-10	Pursue grants and other resources to support tree planting.	Excessive Heat	4.2	Medium	Town of Chapel Hill – Parks & Recreation, Office of Sustainability & Resilience	Grants, donations, general fund	2025-2030	New	
P-11	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Develop a network of greenways with regional connections.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill - Parks and Recreation and Planning Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town continues to implement the Mobility Plan, which will create a future Chapel Hill where you don't need a car to get around. This work also includes planning for Everywhere-to-Everywhere greenways. The Town is also in the process of updating the Parks Master Plan, which will integrate greenway and other off-road connections with the Town's parks system.
PP-2	Preserve open space in residential developments through the application of conservation development principles.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2050	Carried Forward	In Progress. The Town is in the process of rewriting the development ordinance, which will include an evaluation of conservation measures like tree and habitat protection.
PP-3	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	Town of Chapel Hill - Planning Department/ Managers Office	Local, State grants, Federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Manage watersheds, stormwater, and water quality and seek funding to design and construct projects on the subwatershed study reports' priority project lists, which have been identified and approved by the Town Council.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill - Stormwater Division	Stormwater Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. In 2014, the Town Council adopted the Stormwater Master Plan, which included a recommendation for conducting subwatershed studies. These studies evaluate existing conditions and identify problems – failing/undersized infrastructure, drainage and flooding, water quality, and stream conditions – then develop integrated watershed plans for improvements based on a full build-out condition, using zoning and land use plans. The Town has completed several of these studies and will continue to implement the identified improvement strategies in accordance with Council's direction.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
NRP-2	Strive to ensure future development occurs in a manner that protects floodplains, streams, wetlands, and other natural features which work to reduce flood hazard susceptibility and continue to enforce existing regulations.	Flooding, Hurricane & Tropical Storm	1.1	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town's future land use map includes a resiliency map series that identifies important climate stressors like flooding and extreme heat. Town is now in the process rewriting our development ordinance, which will include an evaluation of resiliency standards and regulations that can help to mitigate hazard impacts on new development and redevelopment.
NRP-3	Coordinate with OWASA on long-term water supply planning and local conservation measures.	Drought, Extreme Heat	1.1	Medium	Town of Chapel Hill Office of Sustainability & Resilience	OWASA	2025-2030	Carried Forward	In progress. The Town continues to work closely with OWASA as it updates its emergency and long-range water supply plan.
NRP-4	Strategically preserving, acquiring, or protecting additional open spaces to provide environmental buffer. Work to implement open space recommendations as outlined in the Recreation Standards and Needs Assessment included as a component of the Comprehensive Parks Plan, adopted 5/29/2013. (https://www.townofchapelhill.org/town-hall/departments-services/parks-recreation/planning-and-development/comprehensive-parks-plan-adopted-may-29-2013).	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill	N/A	2025-2030	Carried Forward	In Progress. ToCH has open space standards in the ordinances for residential property. In addition, there are environmental resections for development town-wide. The Town has adopted the Jordan Watershed Stormwater Management for New Develop ordinance in an effort to further protect land with environmental value. The Town is also in the process of updating the Parks Master Plan, which will evaluate opportunities for protecting open space.
NRP-5	Encourage public and private partnerships to restore and maintain the Town's environmental resources.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill	N/A	2025-2030	Carried Forward	In Progress. These types of partnerships are negotiated on a case-by-case basis. As an example, the town worked with UNC Healthcare at Eastowne to preserve a natural area as part of the development approval.
Structural Projects									
SP-1	Continue to identify and explore possible retrofits to critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, back up generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, anchoring fixed building equipment.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.2	Medium	Town of Chapel Hill - Public Works	General Fund (existing staff salaries) / Unified Hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	No progress made due to funding limitations.
SP-2	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed county/town critical facilities.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.2	Medium	Town of Chapel Hill	Local, State grants, other federal grants	2025-2030	Carried Forward	No progress made due to funding limitations.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
SP-3	Coordinate with utility partners and property owners regarding the use of microgrids and other forms of distributed energy to provide backup power to critical facilities.	Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.2	Medium	Town of Chapel Hill Office of Sustainability & Resilience	General Fund, Utilities, Developers, Federal Grants (DOE)	2020-2025	Carried Forward	In progress. Town is actively planning for solar and battery storage upgrades to critical facilities over the next five years.
SP-4	Coordinate with OWASA to enhance the capacity of regional water system interconnects, as needed.	Drought, Excessive Heat	4.2	Medium	Town of Chapel Hill Office of Sustainability & Resilience	OWASA	2020-2025	Carried Forward	In progress. The Town continues to work closely with OWASA on water system interconnects.
SP-5	Coordinate with OWASA to limit the impacts of water supply leaks through infrastructure planning, maintenance and design.	Critical Infrastructure Failure	4.2	Medium	Town of Chapel Hill Office of Sustainability & Resilience	OWASA	2020-2025	Carried Forward	In progress. The Town continues to work closely with OWASA as it maintains and upgrades critical infrastructure.
SP-6	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Chapel Hill Public Works	State grants, federal grants	2025-2030	New	
Emergency Services									
ES-1	Engage in regional events, activities, and training opportunities related to natural hazards in order to improve communication, enhance, partnerships, and improve planning efforts both within the Town and with other local jurisdictions.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	3.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town of Chapel Hill Office of Emergency Management (EM) routinely engages with emergency management services in surrounding jurisdictions and participates in joint meetings, planning sessions, and briefings with other agencies and jurisdictions. The Town has maintained an agreement for a countywide alert system.
ES-2	Identify and implement strategies to increase swift water rescue capacity.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	3.1	Medium	Town of Chapel Hill - Fire Department	Emergency Management Performance Grant (EMPG)	2025-2030	Carried Forward	In Progress. The Town is part of the NC Task Force 8 Team assigned by the State of North Carolina and has certified several staff within the Fire Department for swift water rescue. The department will continue to advance this work going forward.
ES-3	Engage with regional and county stakeholders in comprehensive emergency response planning including Complex Coordinated Terror Attack response and Mass Casualty Incident response planning.	All Hazards	3.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Public safety agencies undergo regular training, and currently, all municipalities in the county are revising a comprehensive Emergency Operations Plan. This revision includes annexes addressing regional responses, mass casualty incidents (MCIs), and responses to terror attacks.
ES-4	Connect unhoused populations to services/resources during extreme temperatures.	Excessive Heat, Severe Winter Weather	2.2	Medium	Town of Chapel Hill Police Department (CARE team, Crisis Unit)	General Fund (existing staff salaries)	2025-2030	New	
Public Education & Awareness									
PEA-1	Encourage low-impact development for addressing stormwater quality and quantity concerns.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Planning Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Low Impact Design (LID) is encouraged throughout the Town. The central theme of these regulations is to encourage "low-impact design" that disperses pavement into small modules, and replicates the natural hydrological system of the site." LUMO Article 5 Design and Development Standards). The Town will explore ways of modernizing these and similar measures as part of rewriting of our land development regulations.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-2	Provide education and outreach to Chapel Hill residents in multiple languages in order to increase awareness of natural hazard potential in the town.	All Hazards	2.1	Medium	Town of Chapel Hill - Emergency Management Division and Communications and Public Affairs	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town's community connections team conducts neighborhood-scale engagement throughout the year that includes information about hazards with translation services.
PEA-3	Strive to improve communication and outreach in multiple languages to Town of Chapel Hill residents before, during, and after hazard weather event with the county's website, press releases, social media accounts in order to keep residents informed and improve public safety in and around the Town.	All Hazards	2.1	Medium	Town of Chapel Hill - Emergency Management Division and Communications and Public Affairs	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Unified hazardous weather messaging continues to be shared across multiple forms of social media and printed flyers as appropriate, and exploring the use of mass notification platforms and automated translation technologies continues.
PEA-4	Conduct periodic heat mapping to understand which parts of Chapel Hill are most vulnerable to excessive heat.	Excessive Heat	3.2	Medium	Town of Chapel Hill Office of Sustainability and Resilience and Technology Solutions	General Fund (existing staff salaries)	2025-2030	New	
PEA-5	Install water level and rain gauge sensors to provide early warning alerts for downstream flooding.	Flooding	2.2	High	Town of Chapel Hill Public Works, Office of Emergency Preparedness and Risk Management, Office of Sustainability and Resilience	General Fund (existing staff salaries), Stormwater Fees	2025-2030	New	
PEA-6	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	2.2	Medium	Town of Chapel Hill Office of Sustainability and Resilience in collaboration with Orange County	General Fund (existing staff salaries)	2025-2030	New	

Table 7.15 – Mitigation Action Plan, Town of Hillsborough

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Work with State efforts to study hydrology and maps/designate any new flood prone areas	Flooding	1.1	High	Town of Hillsborough Planning Department	N/A	2025-2030	Carry Forward	New flood maps and GIS maps were drawn for much of our jurisdiction as of 2017, but the northwest, south, and southwest areas of town continue to utilize 2007 FIRM panels.
P-2	Ensure public safety is prioritized through investing in building trust and legitimacy with the community	All Hazards	2.1	Medium	Town of Hillsborough Police Department	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-3	Coordinate with community organizations to prepare for and respond to emergencies together.	All Hazards	2.2	Medium	Town of Hillsborough Police Department, Communications	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-4	Ensure employee safety through regular maintenance of facilities and by establishing an open-door policy, conducting hazard assessments, and addressing staff concerns in a timely manner.	All Hazards	3.1	Medium	Safety and Risk Management	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-5	Revise the Urban Service Boundary to reflect a 2040 actual water and sewer capacity and availability with already identified improvement as well as incorporate preferred future land use and growth patterns.	Drought	1.1	High	Town of Hillsborough Water Distribution and Wastewater Collection, Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-6	Update the Water and Sewer Management, Planning and Boundary Agreement and Central Orange Coordinated Area Land Use Plan to reflect revisions represented in the Comprehensive Sustainability plan.	Drought	3.2	High	Town of Hillsborough Water Distribution and Wastewater Collection, Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-7	Rewrite the Unified Development Ordinance to reflect current development trends and patterns to incorporate sustainability, environmental and climate best practices, economic resiliency measures, and equity in development and redevelopment as well as meet water and sewer system-wide needs. Incorporate additional hazard mitigation measures in the new UDO.	All Hazards	1.1, 1.2, 4.1	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023. This action has been updated here to reflect the Town's ongoing UDO rewrite, which is scheduled to conclude in 2027.
P-8	In the UDO rewrite, ensure development review processes are clear, responsive, predictable, and equitable while ensuring flexibility within design. Include requirement to obtain capacity assurance and Water and Sewer Extension Contract prior to rezoning or annexation requests.	Drought	1.1	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-9	Clarify the roles and responsibilities of internal town department reviewers, appointed boards, and the town board in the development review process. Evaluate building staff capacity by transferring floodplain administration to Stormwater and Environmental Services.	All Hazards	4.3	Medium	Town of Hillsborough Planning and Economic Development, Administrative Services, and Town Board	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023. This action has been updated here to reflect internal discussions regarding floodplain administration.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-10	Update Town drought policy and monitor drought conditions to best protect water supplies.	Drought	1.1, 1.2	Medium	Town of Hillsborough Stormwater and Environmental Services, Water Distribution and Wastewater Collection	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-11	Develop and adopt reforestation plans for town-owned and town-maintained properties.	All Hazards	1.1	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-12	Develop and adopt forest management plans and policies for town-owned and maintained properties.	All Hazards	1.1	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-13	Map critical environmental and sensitive areas and significant landforms, such as slopes, ridges, streams, and wetlands, to inform other plans and development decisions.	All Hazards	1.1	Medium	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-14	Develop and adopt a green infrastructure policy for town projects	All Hazards	1.2	High	Town of Hillsborough Public Space and Sustainability, Public Works	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-15	Develop and adopt a tree preservation policy for town-owned and town-maintained properties.	All Hazards	1.1	High	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-16	Advocate for and endorse regulations that advance best management practices for development projects.	Flooding	1.2	Medium	Town of Hillsborough Planning and Economic Development, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-17	Employ land suitability analysis to guide built environment policy and development decisions.	All Hazards	1.1, 1.2	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-18	Develop and adopt regulations that limit development to slopes that are 3 to 1 or gentler.	Landslide	1.1	Medium	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-19	Update recommended and prohibited plants list to incorporate drought-tolerant, deer resistant, and climate hardy species.	Drought, Excessive Heat	2.1	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-20	Assess renewable energy generation potential (i.e., generating capacity) for solar photovoltaics and wind energy projects on town-owned properties and identify priority sites for planning and implementation.	Critical Infrastructure Failure	4.2	High	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-21	Implement a water conservation and efficiency program marketed towards residents and local businesses with the aim of reducing water treatment loads and associated energy use.	Drought	2.1	Medium	Town of Hillsborough Public Space and Sustainability, Utilities	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-22	Evaluate best practices for resilient power, such as backup generation sources, fuel, micro-grids, telecommunications, and emergency service providers. Prepare a community-wide GHG emissions inventory to understand how to reduce emissions associated with the broad set of activities occurring within town's jurisdictional boundary (e.g., energy consumption in residential buildings, on-road transportation, waste generation).	Critical Infrastructure Failure	4.2	Medium	Town of Hillsborough Public Space and Sustainability, Public Works, Utilities, Police, Fire	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-23	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Investigate opportunities and incorporate to the greatest extent possible sustainability and climate initiatives in facility development including geothermal, solar, weatherization, and green infrastructure.	All Hazards	1.2, 4.2	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
PP-2	For on-site renewable energy generation, explore the feasibility of energy storage systems (e.g., solar PV plus battery storage).	Critical Infrastructure Failure	4-2	High	Town of Hillsborough Public Space and Sustainability, Public Works	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
PP-3	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	Town of Hillsborough Stormwater and Environmental Services, Planning and Economic Development	Local, State grants, Federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Implement green infrastructure projects on town-owned and town-maintained properties.	All Hazards	4.1	Medium	Town of Hillsborough Public Space and Sustainability, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-2	Support floodplain reclamation projects.	Flooding	4.1	Medium	Town of Hillsborough Stormwater and Environmental Services, Planning and Economic Development	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-3	Investigate opportunities to restore the Eno River to its natural channel in Gold Park.	Flooding	4.1	Medium	Town of Hillsborough Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-4	Develop a rainwater harvesting or rain barrel cost-sharing program.	Drought, Flooding	2.1	Medium	Town of Hillsborough Public Space and Sustainability, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-5	Coordinate with housing partners to incorporate green infrastructure and best management practices into housing developments and property management policies.	Flooding	1.2	Medium	Town of Hillsborough Planning and Economic Development, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
NRP-6	Develop and adopt incentives to expand the use of green infrastructure (such as bioswales, rain gardens, and green roofs) for development sites.	Drought, Excessive Heat, Flooding	1.2	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
Structural Projects									
SP-1	Relocate the Public Works operation to a non-floodprone site. This is a sizable project and is expected to be completed in the next 5-7 years.	Flooding	4.2	Medium	Town of Hillsborough Public Works Department	Town Budget	2025-2026	Carry Forward	This was originally budgeted for a contract for the 2016-2017 budget cycle. The Public Works department is slated to move to the Town's NC Hwy 86 N facility, but now with construction expected to begin in summer 2025.
SP-2	Develop and implement a capital improvement projects plan for stormwater infrastructure improvements.	Flooding	1.1, 1.2	High	Town of Hillsborough Stormwater and Environmental Services, Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
Emergency Services									
ES-1	Provide public Wi-Fi in town parks and at town facilities.	Critical Infrastructure Failure, Cyber Threat	2.2	Medium	Information Technology	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
ES-2	Coordinate with organizations and agencies to expand access to high-speed internet.	Critical Infrastructure Failure, Cyber Threat	2.2	Medium	Information Technology	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
ES-3	Explore a box fan giveaway program for residents without central air conditioning.	Excessive Heat	2.1, 2.2	Medium	Town of Hillsborough	General Fund (existing staff salaries)	2025-2030	New	
Public Education & Awareness									
PEA-1	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	3.2	Medium	Town of Hillsborough Administration in collaboration with Orange County	General Fund (existing staff salaries)	2025-2030	New	

Table 7.16 – Mitigation Action Plan, Person County

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Status Comments
Prevention									
P-1	Update the Person County Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All Hazards	1.1	Low	PLAN	Local	2030	Carried Forward	No progress to report. Staff remains interested in updating the Subdivision Ordinance in general and plans to address this item.
P-2	Revise and update the regulatory floodplain maps.	Flooding	4.1	Medium	PLAN & GIS	Local	2030	Carried Forward	Floodplain map updates are in progress (per FEMA).
P-3	Identify at risk-populations that may be exceptionally vulnerable in the event of long-term power outages.	Excessive Heat, Tornadoes & Thunderstorms, Severe Winter Weather	2.2	High	PLAN & ES	Local	2030	Carried Forward	No progress to report, but this action remains a priority.
P-4	Organize outreach to vulnerable populations during long-term power outage events	Excessive Heat, Tornadoes & Thunderstorms, Severe Winter Weather	2.1	High	ES	Local	2030	Carried Forward	No progress to report, but this action remains a priority.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	ES, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Pursue the acquisition and/or elevation of flood prone properties.	Flooding	4.2	Low	PLAN, INSP	Local, State grants, Federal grants	2025-2030	New	
PP-2	Create and maintain a list of repetitive flood loss properties.	Flooding	4.2	Medium	PLAN, GIS, & INSP	Local	2030	Carried Forward	No flood FEMA designated repetitive loss properties as of 2025. County will continue to track flood loss properties through GIS and Building Inspections using Crisis Track Software.
PP-3	Retrofit existing public facilities and critical facilities to withstand impacts from all hazards	All Hazards	4.2	High	ES	Federal; State; Local	2025-2030	Carried Forward	Revised to property protection action; previously SP-2. Have previously applied for grant funding for critical facility protection. This action remains a priority.
PP-4	Identify and strengthen public facilities to act as shelters for all hazards	All Hazards	4.2	High	ES	Federal; State; Local	2025-2030	Carried Forward	Revised to property protection action, previously SP-3. Have previously applied for grant funding for critical facility protection. This action remains a priority.
PP-5	Encourage the identification and retrofitting of safe rooms in public buildings, critical facilities, schools, and nursing homes.	Tornadoes & Thunderstorms	4.2	Medium	ES	Local	2025-2030	Carried Forward	Revised to property protection action, previously SP-5. No progress to report. This action remains a priority.
Natural Resource Protection									
NRP-1	Establish Enhanced Voluntary Ag District (EVAD) Ordinance	Flooding	1.1	Medium	SW	Local	2030	Carried Forward	No progress to report, but this action remains a priority.
NRP-2	Develop a conservation easement program	Flooding	1.1	Medium	SW	Federal; Local; State	2030	Carried Forward	No progress to report, but this action remains a priority.
NRP-3	Encourage participation in State & Federal Cost Share programs	Drought, Flooding	1.1	High	SW, NRCS, & NC Forest Service	Federal; Local; State	2025-2030	Carried Forward	No progress to report, but this action remains a priority.
NRP-4	Conduct landowner/farmer workshops on conservation practices	Drought, Flooding	1.1	Medium	SW & AG	State; Local	2025-2030	Carried Forward	No progress to report, but this action remains a priority.
Structural Projects									
SP-1	Identify at risk facilities and evaluate potential mitigation techniques for all hazards	All Hazards	4.2	High	PLAN, GIS, & ES	Local	2025-2030	Carried Forward	No progress to report, but this action remains a priority.
SP-2	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	PLAN, ES	State grants, federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Status Comments
Emergency Services									
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All Hazards	3.1	High	ES	Local	2025-2030	Carried Forward	County has emergency notification system, social & news media, message boards, etc. Will continue to re-evaluate after events.
ES-2	Maintain/improve shelter capacities with alternative power/heat sources.	All Hazards	4.2	High	ES	Federal; State; Local	2025-2030	Carried Forward	Shelters do not have alternative power sources. Previously submitted a grant application for this action.
ES-3	Review program to maintain continuity of government operations.	All Hazards	3.1	Low	ES	Local	2025-2030	Carried Forward	County's COOP Plan is reviewed annually.
ES-4	Identify alternate/new Emergency Operations Center locations.	All Hazards	3.1	High	ES	Local	2030	Carried Forward	Identification of alternate EOC site in progress.
ES-5	Update and maintain Emergency Plan. Review and update EOP every four years.	All Hazards	3.1	Low	ES	Local	2025-2030	Carried Forward	OEM reviews the EOP annually and updates as needed. The EOP is re-adopted every four years.
Public Education & Awareness									
PEA-1	The Emergency Services Department will periodically make various hazard education items available through various media outlets including websites, newspaper, radio	All Hazards	2.1	Medium	ES	Local	2025-2030	Carried Forward	OEM and Plans Dept. conduct hazard awareness activities.
PEA-2	The Emergency Services Department will establish an annual hazard awareness week in coordination with the media to promote hazard awareness.	All Hazards	2.1	Medium	ES	Local	2025-2030	Carried Forward	OEM conducts hazard awareness along with Emergency Preparedness week annually or as requested and we host regular NWS Storm Ready/Spotter seminars or as requested.
PEA-3	Place flood protection and other hazard mitigation education materials in public buildings (i.e. City Hall, County offices, library etc.).	All Hazards	2.1	Medium	PLAN & ES	Local	2025-2030	Carried Forward	OEM and Planning will maintain educational materials in county offices.
PEA-4	Post warning signage at local parks and outdoor venues with information about severe weather.	Tornadoes & Thunderstorms	2.1	High	ES	Local	2025-2030	Carried Forward	No progress to report. County will continue to seek opportunities for implementation.
PEA-5	Ensure school officials are aware of the best area of refuge in school buildings during orientation.	Tornadoes & Thunderstorms	2.1	High	ES	Local	2025-2030	Carried Forward	OEM will continue to coordinate with public school officials on hazard preparedness.

Lead Agency/Department: INSP = INSPECTIONS / ES = EMERGENCY SERVICES / SW = SOIL & WATER / AG = AG EXTENSION / PLAN = PLANNING

Table 7.17 – Mitigation Action Plan, City of Roxboro

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Status Comments
Prevention									
P-1	Assess purchasing, permitting, and employment policies to ensure compliance with FEMA, NCDPS, and NCEMS requirements for funding eligibility to seek BRIC or other mitigation grant opportunities.	All Hazards	3.1	High	Admin Staff	Local	2030	New	
P-2	Update Street Specifications and UDO Development standards to discourage street development in flood hazard areas and/or increase minimum standards to withstand flood damage.	Flooding	1.1, 1.2	High	Planning and Public Services	Local	2030	New	
P-3	Revise and update the regulatory floodplain maps.	Flooding	4.1	Medium	Planning	Local	2030	Carried Forward	Staff contacted members of the NCDPS about this work needing to be complete, but COR/Person County are not due for new maps yet.
P-4	At the next update of the Unified Development Ordinance (UDO), incorporate Greenway and/or Open Space requirements to increase and protect natural areas.	Flooding	2.1	Medium	Planning	Local	2030	Carried Forward	Action revised. Existing UDO is 10 years old and updates are currently pending budget allowance.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Create a registry of historic properties, including photos and key features. Use registry to identify opportunities for unique hazard mitigation techniques for historically sensitive properties/areas and communicate to property owners.	Flooding, Tornadoes & Thunderstorms, Hurricane & Tropical Storm	2.1, 4.2	Medium	Planning and PIO	Local	2030	New	
PP-2	Create and maintain a list of areas that are repeatedly impacted by flash flood events.	Flooding	4.2	Medium	Planning	Local	2021	Carried Forward	Incomplete. There are no significant floods in our community, but there are areas that could be better documented. Action revised.
PP-3	Pursue the acquisition and/or elevation of flood prone properties.	Flooding	4.2	Low	PLAN, INSP	Local, State grants, Federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Assess local water source for vulnerability to various hazards and develop a specific mitigation plan to reduce/avoid impacts.	Drought, Flooding, Wildfire	1.1, 4.1	Medium	Planning, Public Services, and Emergency Services	Local	2030	New	
Structural Projects									
SP-1	Identify at risk facilities and evaluate potential mitigation techniques for all hazards	All Hazards	4.2	High	Planning	Local	2030	Carried Forward	The City is actively working to better identify/map critical facilities and infrastructure in the community.
SP-2	Retrofit existing public facilities and critical facilities to withstand impacts from all hazards	All Hazards	4.2	High	Public Services, Planning	Federal; State; Local	2030	Carried Forward	New staff members are actively working to improve these elements
SP-3	Identify and strengthen public facilities to act as shelters for all hazards	All Hazards	4.2	High	Person County Emergency Services	Federal; State; Local	2025	Carried Forward	No progress to report, but this action remains a priority.
SP-4	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Public Services	State grants, federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Status Comments
SP-5	Encourage the identification and retrofitting of safe rooms in public buildings, critical facilities, schools, and nursing homes.	Tornados & Thunderstorms	4.2	Medium	Public Services, Planning	Local	2025	Carried Forward	Some work completed, but this action remains a priority.
Emergency Services									
ES-1	Develop equipment and supply inventory forms/checklists to ensure departments are adequately prepared for various hazardous events.	All Hazards	3.1	High	Admin Staff, Public Services, Planning, Fire, and Police	Local	2030	New	
ES-2	Maintain/improve shelter capacities with alternative power/heat sources.	All Hazards	4.2	High	Person County Emergency Services	Federal; State; Local	2025	Carried Forward	Efforts are ongoing to identify funding and install backup power for shelters.
ES-3	Develop an emergency response communications plan with PIO.	All Hazards	3.1	High	Admin Staff and PIO	Local	2030	New	
Public Education & Awareness									
PEA-3	Place flood protection and other hazard mitigation education materials in public buildings (i.e. City Hall, County offices, library etc.).	All Hazards	2.1	Medium	Planning	Local	2025	Carried Forward	Shared information and now have a PIO that can improve upon what has been done.

8 PLAN MAINTENANCE

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This section discusses how the Mitigation Action Plans will be implemented by participating jurisdictions and outlines the method and schedule for monitoring, updating, and evaluating the plan. This section also discusses incorporating the plan into existing planning mechanisms and how the public will continue to be involved in the planning process. It consists of the following three subsections:

8.1 Implementation
8.2 Monitoring, Evaluation, and Enhancement
8.3 Continued Public Involvement

8.1 IMPLEMENTATION

Each jurisdiction participating in this plan update is responsible for implementing specific mitigation actions as prescribed in their Mitigation Action Plan (found in Section 7). In each Mitigation Action Plan, every proposed action is assigned to a specific local department or agency to ensure responsibility and accountability for each action. Additionally, a timeline or target date for implementation is provided for each action to help assess whether reasonable progress is being made toward implementation. When applicable, potential funding sources have also been identified for actions. The participating jurisdictions will seek funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. These criteria will be reviewed and updated as needed as part of the HMPC's regular review of the Hazard Mitigation Plan and the Mitigation Action Plans. This approach enables individual jurisdictions to update their own unique Mitigation Action Plan as needed without altering the broader focus of the regional plan.

8.1.1 PLAN INTEGRATION

An important implementation mechanism that is highly effective and low-cost is incorporation of the Hazard Mitigation Plan recommendations and their underlying principles into other plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement the Mitigation Action Plan. It will be the responsibility of the HMPC representatives from each participating jurisdiction to determine and pursue opportunities for integrating the requirements of this plan with other local planning documents and ensure that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Hazard Mitigation Plan and will not contribute to increased hazard vulnerability in the Region. Methods for integration may include:

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

In addition to the above opportunities that HMPC representatives of all participating jurisdictions will pursue, the following jurisdictions noted integration of the 2020 Eno-Haw Regional Hazard Mitigation Plan and specific opportunities for integration of this plan update:

- The Town of Carrboro updated its Comprehensive Plan and integrated findings from the 2020 HMP in that effort.
- The City of Roxboro and Person County updated their joint Future Land Use Plan and integrated information on known hazard risks and potential policies for mitigation.
- The Town of Hillsborough updated its Historic District Design Guidelines to include hazard mitigation strategies for the preservation of historic resources. This plan update has been integrated with the Hillsborough Comprehensive Sustainability Plan by incorporating recommended actions in the Town's mitigation action plan.
- The Town of Chapel Hill updated its Future Land Use Map and land development regulations and included information on known hazard areas and policies for mitigation.
- Orange County, Carrboro, Chapel Hill, and Hillsborough will integrate this plan update with their regional heat action plan, which is currently under development.

Opportunities to integrate the requirements of this plan into other local planning mechanisms shall continue to be identified through future meetings of the HMPC and through the five-year review process described herein. Although it is recognized that there are many possible benefits to integrating components of this plan into other local planning mechanisms, the development and maintenance of this stand-alone Hazard Mitigation Plan is deemed by the HMPC to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

8.2 MONITORING, EVALUATION, AND ENHANCEMENT

8.2.1 ROLE OF HMPC IN IMPLEMENTATION, MONITORING AND MAINTENANCE

With adoption of this plan, each jurisdiction will be responsible for the implementation and maintenance of their mitigation actions. County Emergency Managers will take the lead in all plan monitoring and update procedures. As such, each jurisdiction, led by their County Emergency Manager, agrees to continue their relationship with the HMPC and:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure hazard mitigation remains a consideration for community decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended revisions to the local governing boards; and
- Inform and solicit input from the public.

The HMPC's primary duty moving forward is to see the plan successfully carried out and report to the local governing boards, NCEM, FEMA, and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering

stakeholder concerns about mitigation, passing concerns on to appropriate entities, and providing relevant information for posting on community websites (and others as appropriate).

Simultaneous to these efforts, it will be important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the costlier recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the Region will be positioned to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

8.2.2 MAINTENANCE SCHEDULE

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized. The County Emergency Managers will be responsible for convening the HMPC and initiating regular reviews. Regular maintenance will take place through quarterly conference calls and an annual meeting of the HMPC. The HMPC will also convene to review the plan after significant hazard events. If determined appropriate or as requested, an annual report on the plan will be developed and presented to local governing bodies of participating jurisdictions to report on implementation progress and recommended changes.

The five-year written update to this plan will be submitted to the NCEM and FEMA Region 4, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this plan update anticipated to be adopted and fully approved by 2025, the next plan update for the Eno-Haw region will be completed by 2030.

8.2.3 MAINTENANCE EVALUATION PROCESS

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to project implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to asset inventories; and
- Incorporate new project recommendations or changes in project prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the HMPC will follow the following process:

- The HMPC representatives from each jurisdiction will be responsible for tracking and reporting on their mitigation actions. Jurisdictional representatives should provide input on whether the action as implemented met the defined objectives and/or is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional representatives will determine what additional measures may be implemented and will make any required modifications to the plan.
- All monitoring and implementation information will be reported to the full HMPC, led by the County Emergency Managers, during quarterly meetings. An annual plan maintenance report may be drafted as deemed necessary.

Changes will be made to the plan as needed to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the mitigation action plans will be by written changes and submissions, as is appropriate and necessary, and as approved by the appropriate jurisdiction's local governing body.

Following a disaster declaration, the plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of the County Emergency Managers to collaborate on reconvening the HMPC and ensuring the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

CRITERIA FOR QUARTERLY REVIEWS IN PREPARATION FOR 5-YEAR UPDATE

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. More specifically, quarterly reviews will monitor changes to the following information:

- Community growth or change in the past quarter.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of any Emergency Operations Center (EOC) in the Region and whether the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the Hazard Mitigation Plan. Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

8.3 CONTINUED PUBLIC INVOLVEMENT

Continued public involvement is imperative to the overall success of the plan's implementation. The quarterly review process will provide an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. Efforts to involve the public in the maintenance, evaluation and revision process may include:

- Advertising HMPC meetings in the local newspaper, public bulletin boards and/or local government office buildings;
- Designating willing citizens and private sector representatives as official members of the HMPC;
- Utilizing local media to update the public of any maintenance and/or review activities;
- Utilizing local government websites to advertise any maintenance and/or review activities;
- Maintaining copies of the plan in public libraries or other appropriate venues;
- Posting annual progress reports on the Plan to local government websites;
- Heavy publicity of the plan and potential ways for the public to be involved after significant hazard events, tailored to the event that has just happened;
- Keeping websites, social media outlets, etc. updated;
- Drafting articles for the local community newspapers/newsletters;
- Utilizing social media accounts (e.g. Twitter, Facebook).

PUBLIC INVOLVEMENT FOR FIVE-YEAR UPDATE

When the HMPC reconvenes for the five-year update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the HMPC will be responsible for coordinating the activities necessary to involve the greater public, including disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the plan update draft. The HMPC will continue to reach out to stakeholders and organizations that can represent or connect with vulnerable populations and underserved communities.

9 PLAN ADOPTION

Requirement §201.6(c)(5): [The plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 (Adopt the Plan) of the 10-step planning process, in accordance with the requirements of DMA 2000. FEMA Approval Letters and community adoption resolutions are provided below.

Placeholder

ANNEX A. ALAMANCE COUNTY

A.1 ASSET INVENTORY

Alamance County and the HMPC provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table A.1 through Table A.10 provide a count of critical facilities by FEMA lifeline category by jurisdiction in Alamance County. Figure A.1 through Figure A.10 show the locations of all critical facilities by jurisdiction in Alamance County. It is important to note that the Towns of Green Level and Ossipee do not have any critical facilities within their jurisdictional boundaries.

Table A.11 provides a detailed inventory of the critical facilities in Alamance County, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table A.1 – Critical Facilities by Type, Unincorporated Alamance County

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	1	$112,167
Food, Hydration, Shelter	40	$95,265,007
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	12	$3,709,771
Transportation	0	$-
Water Systems	28	$1,771,975
Total	**81**	**$100,858,920**

Source: Alamance County, HMPC

Table A.2 – Critical Facilities by Type, City of Burlington

Facility Type	Count of Facility Type	Structure Value
Communications	1	$-
Energy	1	$97,953
Food, Hydration, Shelter	21	$89,669,574
Hazardous Materials	0	$-
Health and Medical	4	$120,225,653
Safety and Security	8	$5,182,591
Transportation	1	$6,680,877
Water Systems	26	$3,150,403
Total	**62**	**$225,007,051**

Source: Alamance County, HMPC

Table A.3 – Critical Facilities by Type, City of Graham

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	11	$73,522,793
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	2	$7,087,278
Transportation	0	$-
Water Systems	7	$253,024
Total	**20**	**$80,863,095**

Source: Alamance County, HMPC

Table A.4 – Critical Facilities by Type, City of Mebane

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	4	$50,535,281
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	4	$2,488,523
Transportation	0	$-
Water Systems	24	$6,346,621
Total	**32**	**$59,370,425**

Source: Alamance County, HMPC

Table A.5 – Critical Facilities by Type, Town of Elon

Facility Type	Count of Facility Type	Structure Value
Communications	3	$745,986
Energy	1	$36,952
Food, Hydration, Shelter	88	$383,696,260
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	8	$3,651,091
Transportation	0	$-
Water Systems	12	$24,201,721
Total	**112**	**$412,332,009**

Source: Alamance County, HMPC

Table A.6 – Critical Facilities by Type, Town of Green Level

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	0	$-
Total	**0**	**$-**

Source: Alamance County, HMPC

Table A.7 – Critical Facilities by Type, Town of Haw River

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	1	$6,855,151
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	1	$840,410
Transportation	0	$-
Water Systems	1	$-
Total	**3**	**$7,695,561**

Source: Alamance County, HMPC

Table A.8 – Critical Facilities by Type, Town of Ossipee

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	0	$-
Total	**0**	**$-**

Source: Alamance County, HMPC

Table A.9 – Critical Facilities by Type, Town of Swepsonville

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	2	$4,127,967
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	1	$1,301,083
Transportation	0	$-
Water Systems	0	$-
Total	**3**	**$5,429,050**

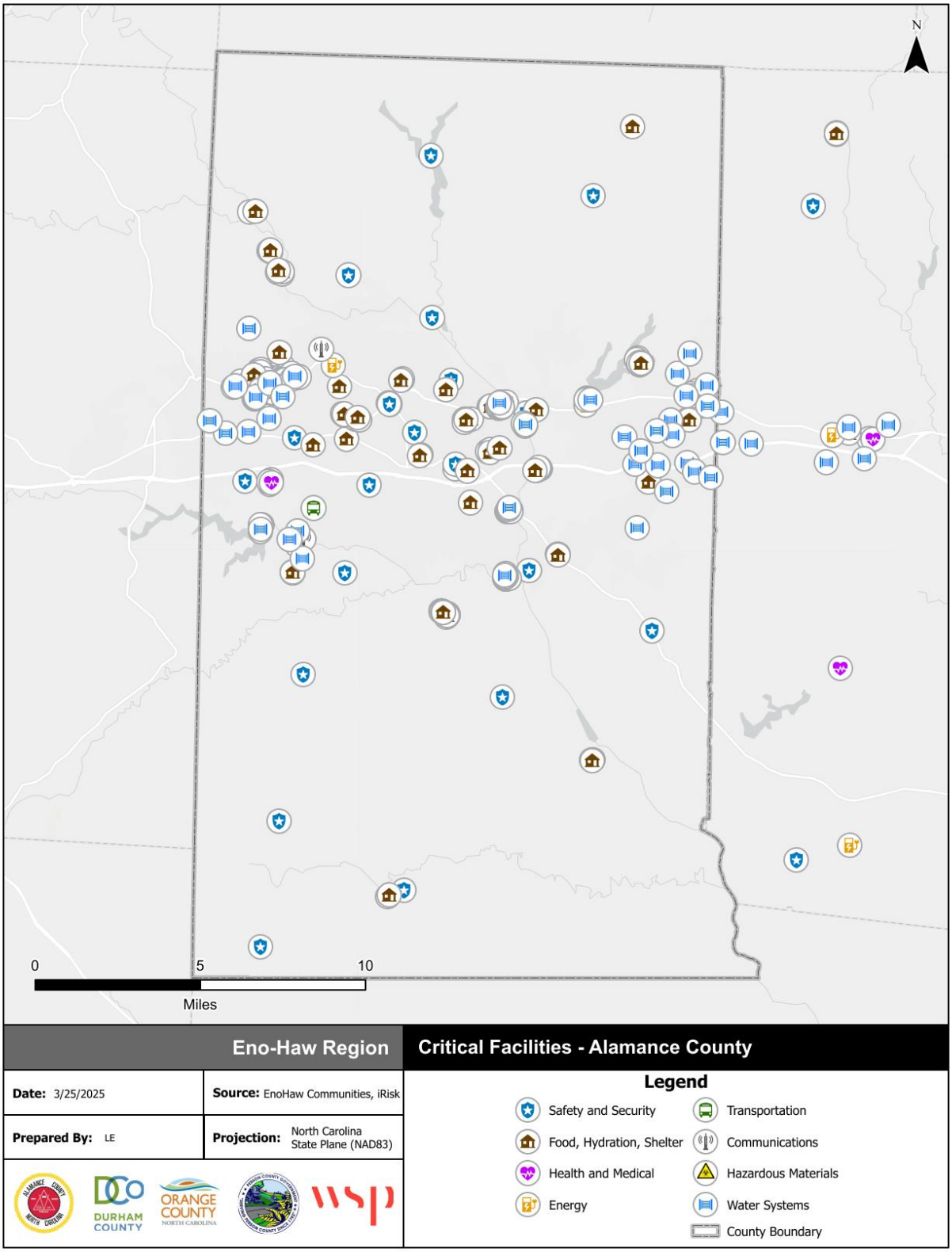
Source: Alamance County, HMPC

Table A.10 – Critical Facilities by Type, Village of Alamance

Facility Type	Count of Facility Type	Structure Value
Communications	1	$-
Energy	1	$371,094
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	1	$297,525
Transportation	0	$-
Water Systems	3	$725,009
Total	**6**	**$1,393,628**

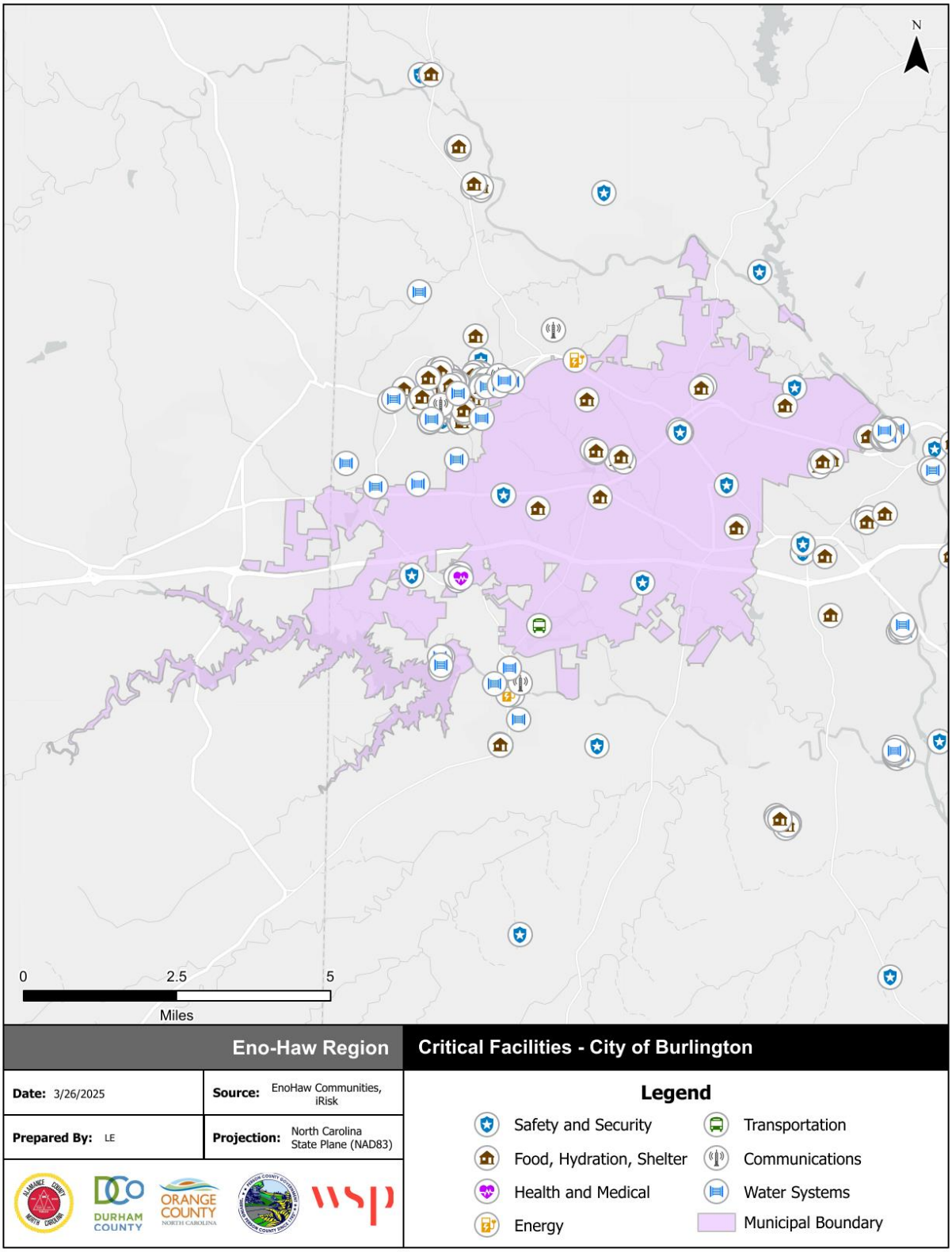
Source: Alamance County, HMPC

Figure A.1 – Critical Facilities, Unincorporated Alamance County



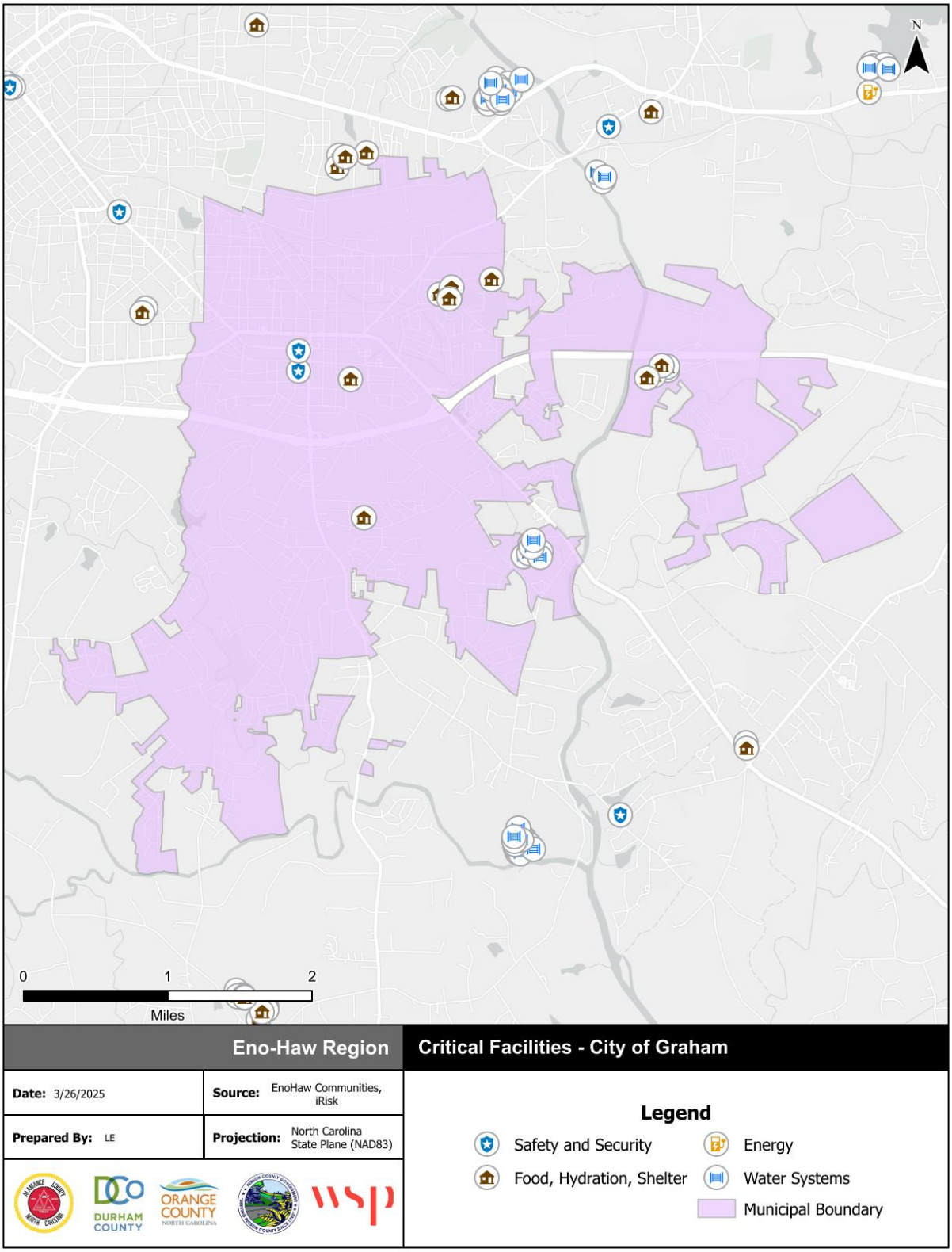
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.2 – Critical Facilities, City of Burlington



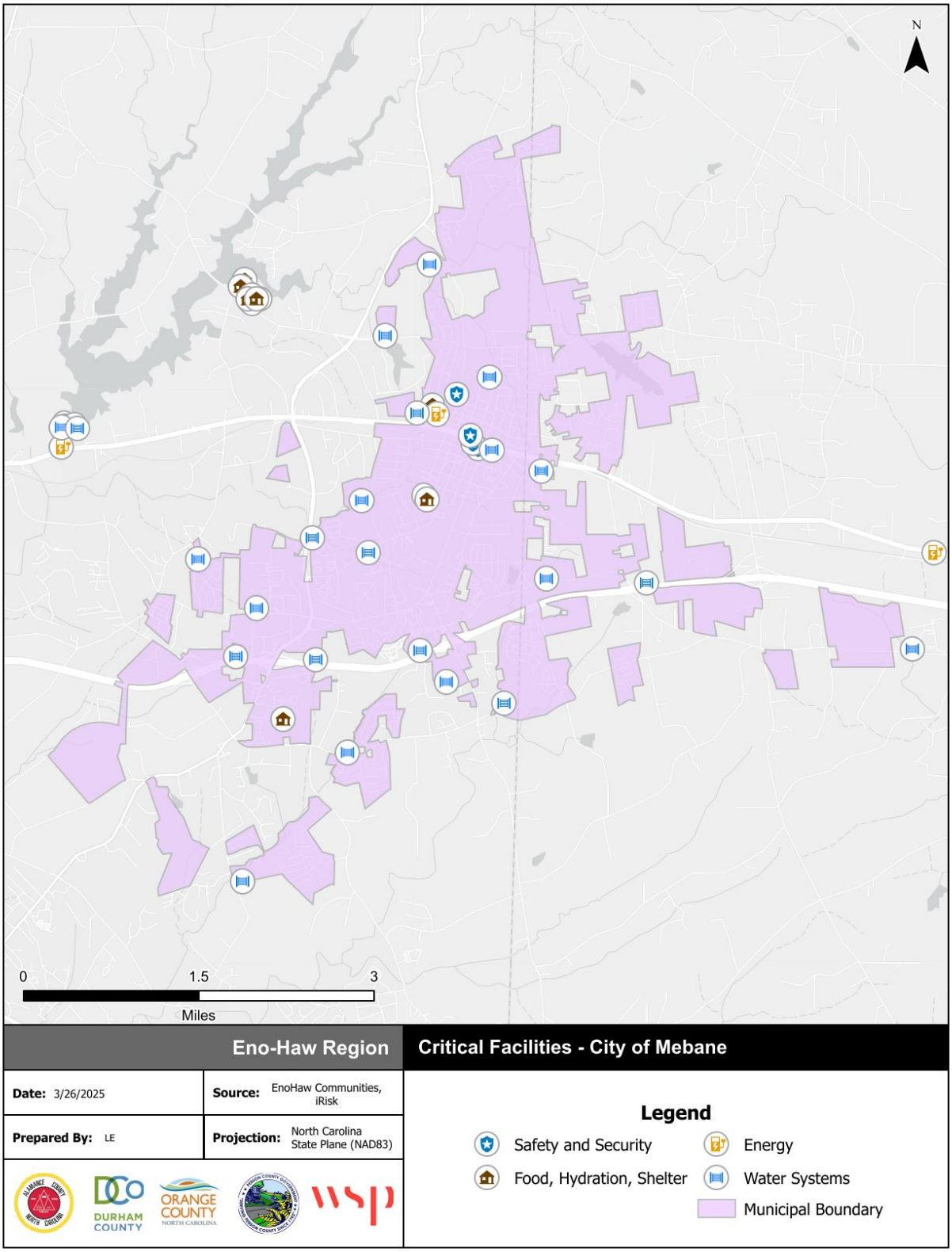
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.3 – Critical Facilities, City of Graham



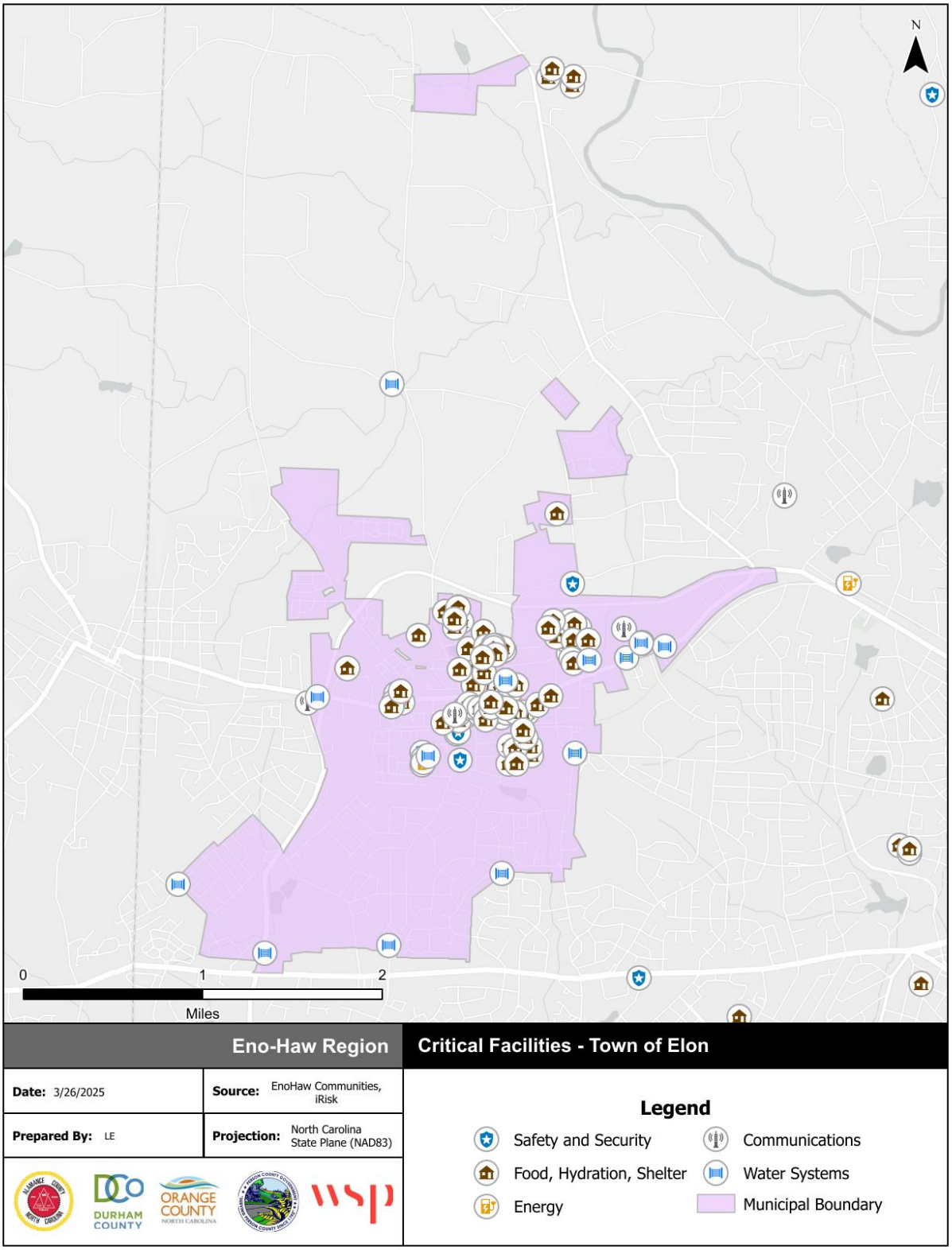
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.4 – Critical Facilities, City of Mebane



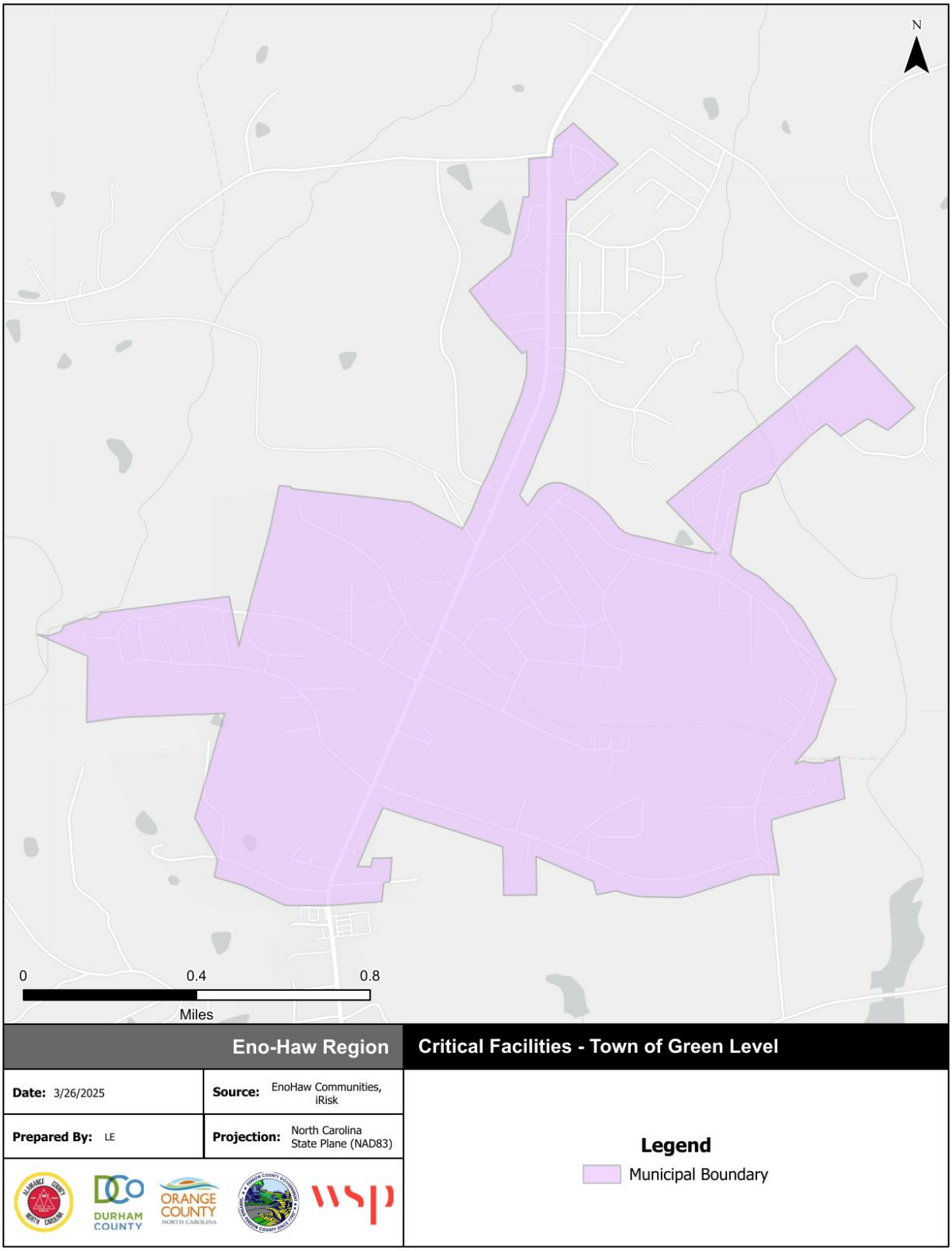
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.5 – Critical Facilities, Town of Elon



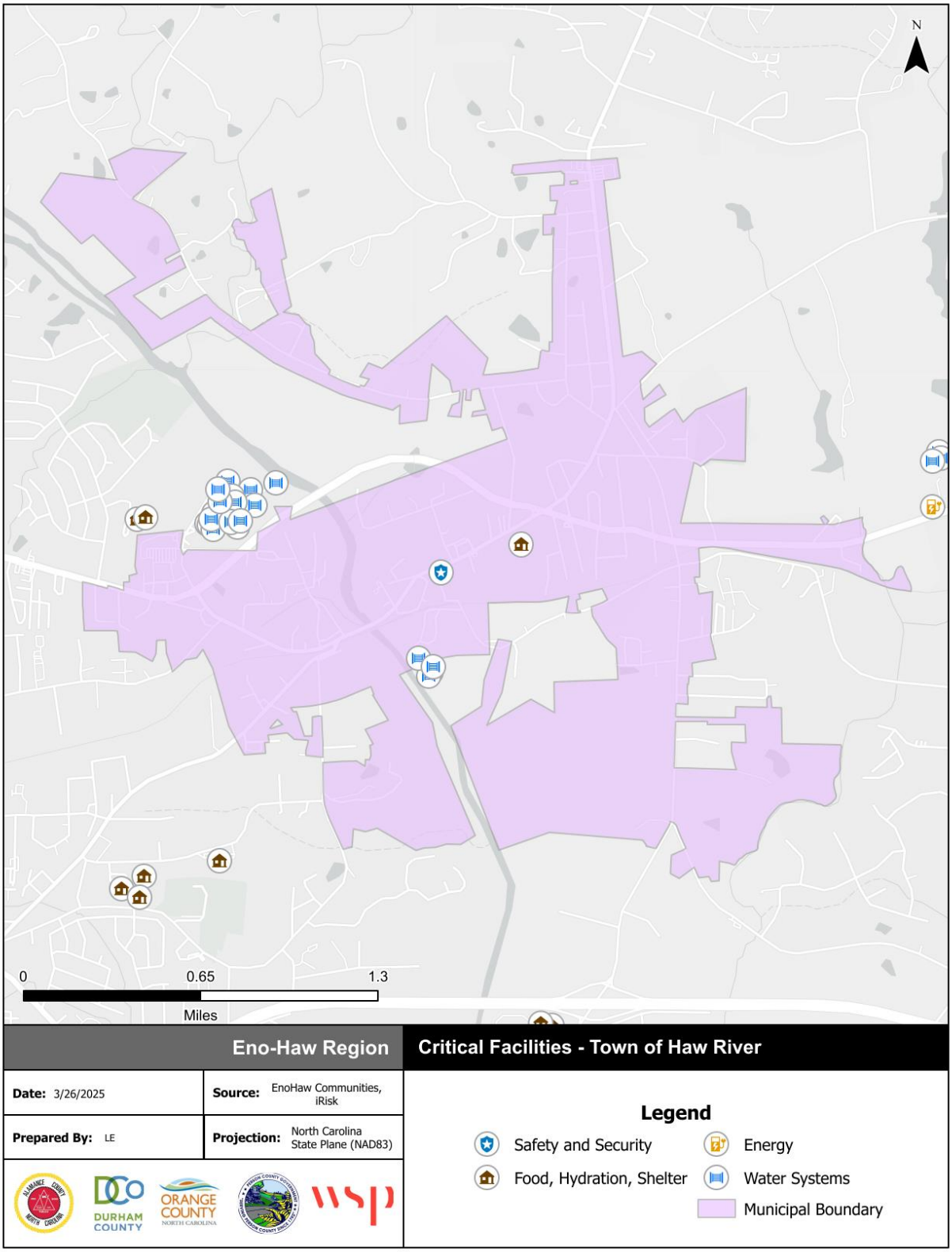
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.6 – Critical Facilities, Town of Green Level



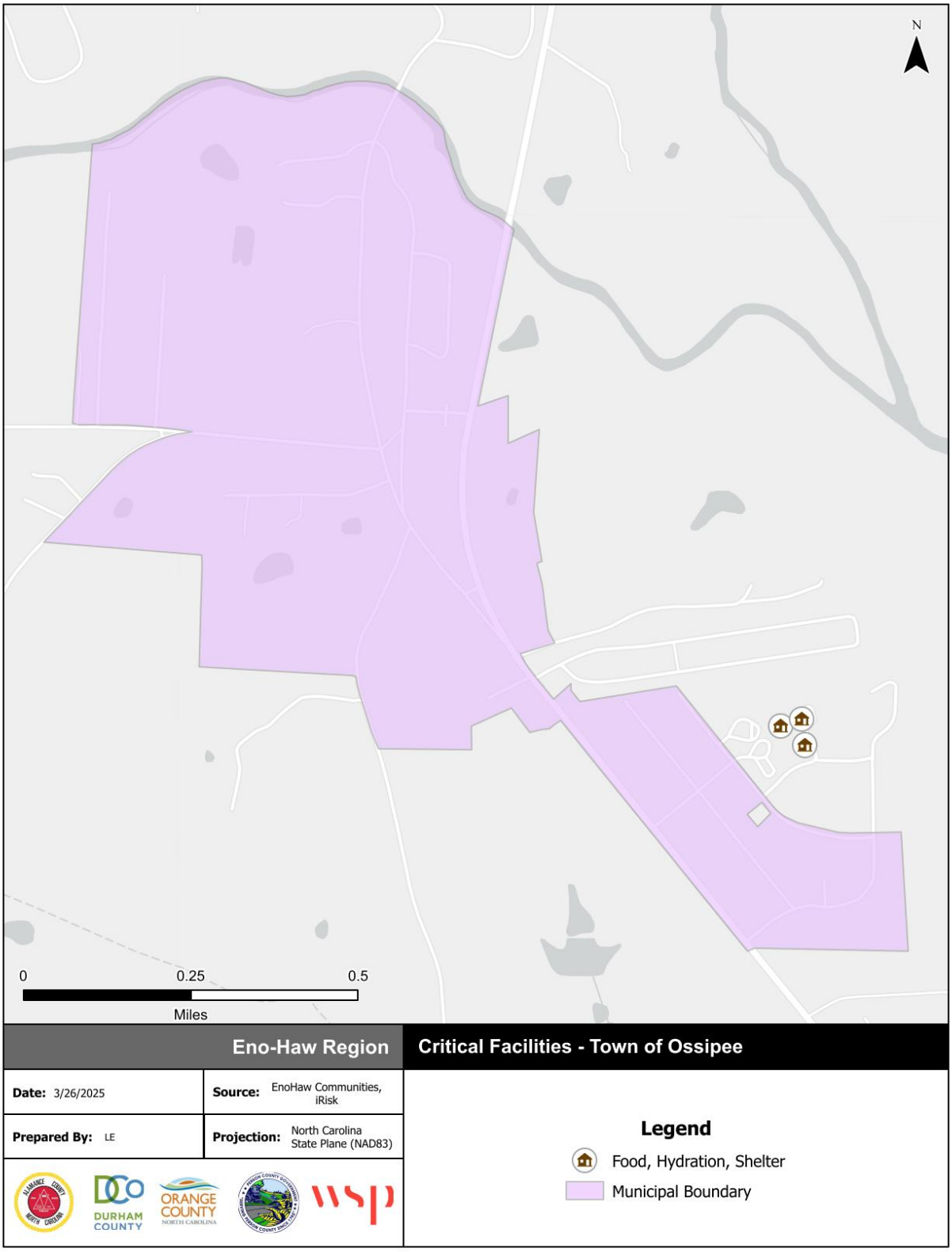
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.7 – Critical Facilities, Town of Haw River



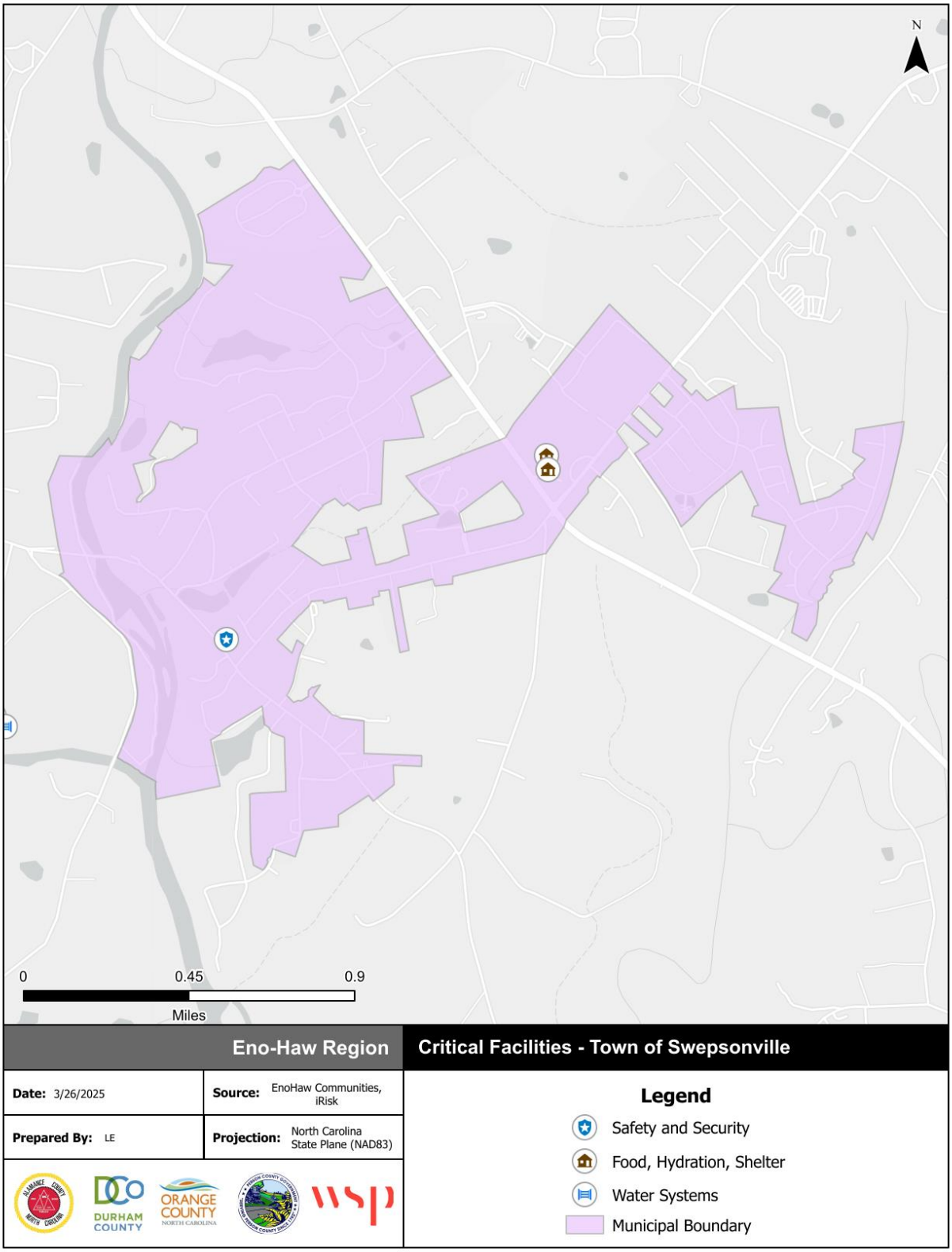
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.8 – Critical Facilities, Town of Ossipee



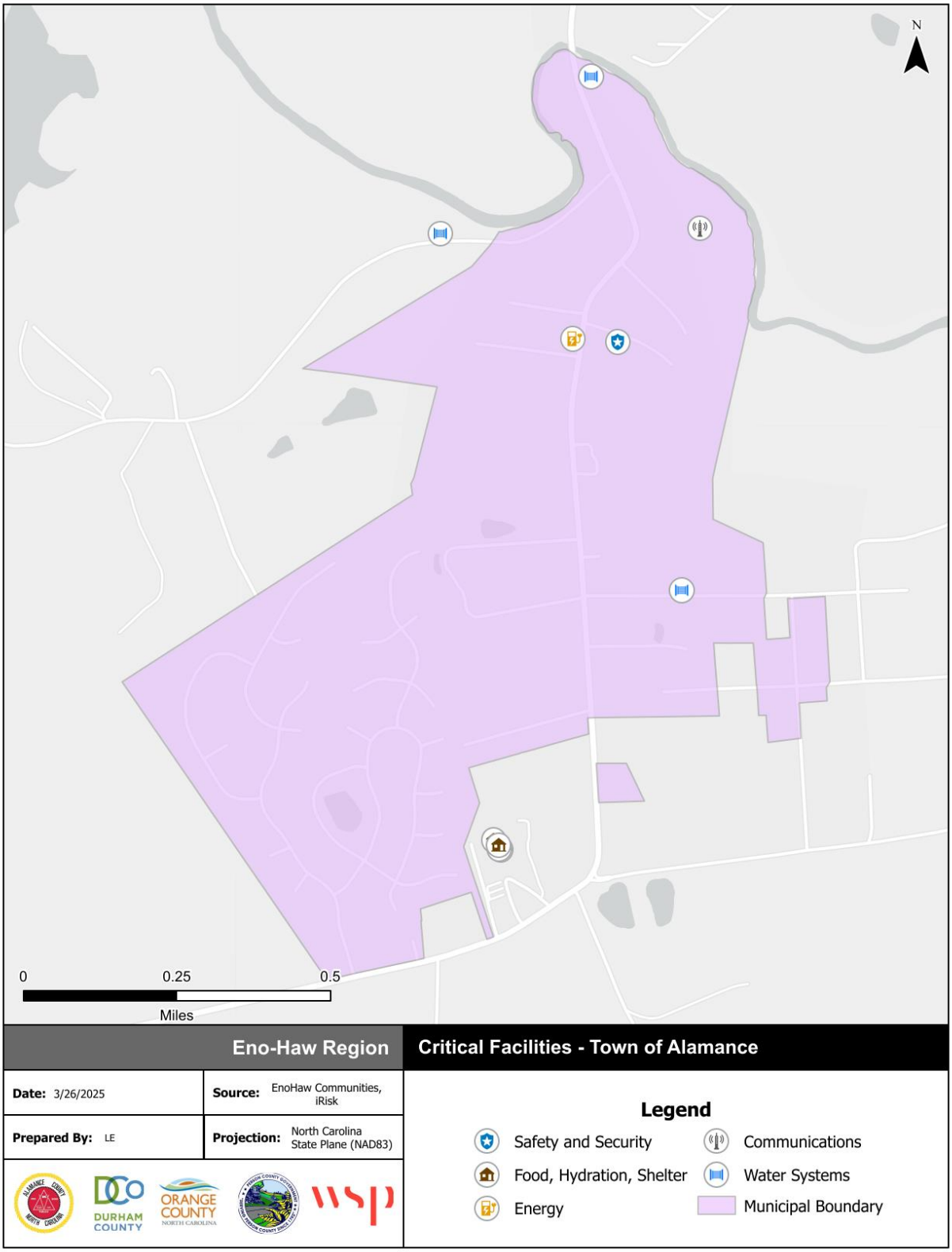
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.9 – Critical Facilities, Town of Swepsonville



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure A.10 – Critical Facilities, Village of Alamance



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Table A.11 – Alamance County Critical Facilities Inventory

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Village of Alamance							
Safety and Security	Municipal	2874 Rob Shephard Dr Burlington NC 27215	$297,525.00	NA	X, Unshaded	Y	0
Energy	Fuel Station	4157 S NC 62 Burlington NC 27215	$371,094.00	NA	X, Unshaded	Y	0
Water Systems	Utility	3926 S Nc 62 Burlington NC 27215	$3,273.00	NA	X, Shaded		3
Water Systems	Utility	2753 Birch LN Burlington NC 27215	$721,736.00	NA	X, Unshaded		1.5
Communications	Communications	4040 S NC 62 Burlington Nc 27215	-	NA	X, Unshaded		0
Water Systems	Utility	3055 Pond Rd. Burlington NC 27215	-	5.6	AE		1
City of Burlington							
Food, Hydration, Shelter	School	2630 BUCKINGHAM ROAD, BURLINGTON, NC, 27217	$2,530,929.50	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	3400 HARRIS RD	$387,724.25	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded		0
Food, Hydration, Shelter	School	2200 N. Mebane Street Burlington, N.C. 27217	$4,889,122.50	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded		1.5
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded		3
Food, Hydration, Shelter	School	502 NORTH GRAHAM HOPEDALE ROAD, BURLINGTON, NC, 27217	$7,139,744.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	316 CARDEN STREET, BURLINGTON, NC, 27215	$2,185,114.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	215 SOUTH CHURCH STREET, BURLINGTON, NC, 27215	$349,843.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	267 WEST FRONT STREET, BURLINGTON, NC, 27215	$1,546,826.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	141 TRAIL ONE, BURLINGTON, NC, 27215	$4,098,289.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	School	408 BILLINGHAM DRIVE, BURLINGTON, NC, 27215	$1,776,953.25	NA	X, Unshaded	Y	0
Health and Medical	Hospital	1234 HUFFMAN MILL ROAD, BURLINGTON, NC, 27215	$36,816,349.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	601-623 Gunn St, Burlington, North Carolina, 27217	$3,693,400.00	NA	X, Unshaded	Y	0
Energy	Substation	1834 NORTH PARK AVENUE, BURLINGTON, NC, 27217	$97,953.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	417-451 Tarleton Ave, Burlington, North Carolina, 27215	$4,200,522.33	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1136 EAST WEBB AVENUE, BURLINGTON, NC, 27217	$86,862.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1307 SOUTH CHURCH STREET, BURLINGTON, NC, 27215	$4,200,522.33	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2235 DELANEY DRIVE, BURLINGTON, NC, 27215	$12,929,152.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1714 WEST DAVIS STREET, BURLINGTON, NC, 27215	$9,417,632.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1710 EDGEWOOD AVENUE, BURLINGTON, NC, 27215	$1,776,953.25	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded		3
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	6.6	AE		3
Food, Hydration, Shelter	School	2200 NORTH MEBANE STREET, BURLINGTON, NC, 27217	$4,889,122.50	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	3400 HARRIS RD	$387,724.25	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	601 Gunn St. Burlington N.C. 27217	$3,693,400.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2630 BUCKINGHAM ROAD, BURLINGTON, NC, 27217	$2,530,929.50	NA	X, Unshaded	Y	0
Health and Medical	Hospital	Holt-Pardue Rd, Burlington, North Carolina, 27215	$36,816,349.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	267 WEST FRONT STREET, BURLINGTON, NC, 27215	$1,546,826.00	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	School	404 BILLINGHAM DRIVE, BURLINGTON, NC, 27215	$1,776,953.25	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	408 BILLINGHAM DRIVE, BURLINGTON, NC, 27215	$1,776,953.25	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Health and Medical	Hospital	1240 HUFFMAN MILL ROAD, BURLINGTON, NC, 27215	$36,816,349.00	NA	X, Unshaded	Y	0
Health and Medical	Hospital	1236 HUFFMAN MILL ROAD, BURLINGTON, NC, 27215	$9,776,606.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2229 BROADVIEW DRIVE, BURLINGTON, NC, 27217	$4,889,122.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2200 N MEBANE ST	$4,889,122.50	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	Bulldog Aly, Burlington, North Carolina, 27215	$4,200,522.33	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded		2
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	300-338 Carden St, Burlington, North Carolina, 27215	$2,185,114.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1575 INDUSTRY DRIVE, BURLINGTON, NC, 27215	$1,050,922.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	225 Stone Quarry Rd, Burlington, NC 27217	$72,704.82	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	3400 HARRIS RD	$387,724.25	NA	X, Unshaded	Y	2
Water Systems	Treatment Plant	3400-3444 Harris Rd, Burlington, North Carolina, 27215	$387,724.25	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1906 WIlkins St. Burlington, N.C.	$303,952.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	2748 South Church Street. Burlington, N.C.	$297,360.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	3644 Bonnar Bridge Parkway Burlington, N.C.	$-	NA	X, Unshaded	Y	0
Communications	Communications	447 Macarthur Lane	$-	NA	X, Unshaded		0
Transportation	Transportation	3441 N Aviation Dr, Burlington, NC 27215	$6,680,877.00	NA	X, Unshaded	Y	0
Town of Elon							
Food, Hydration, Shelter	University	308 NORTH OKELLY AVENUE, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	314 EAST HAGGARD AVENUE, ELON, NC, 27244	$11,074,989.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	306 NORTH OKELLY AVENUE, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT M204A, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT H203A, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	129 NORTH WILLIAMSON AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	405 EAST COLLEGE AVENUE, ELON, NC, 27244	$361,438.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	401 EAST COLLEGE AVENUE, ELON, NC, 27244	$361,438.50	NA	X, Unshaded	Y	2
Food, Hydration, Shelter	University	212 EAST LEBANON AVENUE, UNIT 201B, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	1-99 Widener Way, Elon, North Carolina, 27244	$1,505,074.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	504 EAST COLLEGE AVENUE, ELON, NC, 27244	$9,169,719.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	325 SOUTH ANTIOCH AVENUE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	105 LOY COURT, UNIT 204, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT O103A, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded		1
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT I202D, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	400 MOONELON ROAD, ELON, NC, 27244	$254,628.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	2857 BILL LOY DRIVE, UNIT 113, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	3377 BILL LOY DRIVE, UNIT 102A, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	104 EAST HAGGARD AVENUE, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	3453 BILL LOY DRIVE, UNIT 102B, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	200 EAST LEBANON AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	10 BANK OF AMERICA DRIVE, ELON, NC, 27244	$1,343,991.40	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	305 NORTH OKELLY AVENUE, ELON, NC, 27244	$11,074,989.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT C203B, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	302 EAST LEBANON AVENUE, UNIT 206, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded		1
Food, Hydration, Shelter	University	320 NORTH ANTIOCH AVENUE, UNIT 110, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	102 LOY COURT, UNIT 204, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	2317 BILL LOY DRIVE, UNIT 325B, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	412 WEST HAGGARD AVENUE, ELON, NC, 27244	$1,505,074.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	108 LOY COURT, UNIT 203B, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	112 NORTH WILLIAMSON AVENUE, ELON, NC, 27244	$537,865.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	130 NORTH WILLIAMSON AVENUE, UNIT 103, ELON, NC, 27244	$-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	106 EAST LEBANON AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT D202A, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	543 NORTH WILLIAMSON AVENUE, ELON, NC, 27244	$1,343,991.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	301 SOUTH OKELLY AVENUE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	103 LOY COURT, UNIT 203B, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	131 NORTH WILLIAMSON AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	101 EAST HAGGARD AVENUE, UNIT 306A, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	101 LOY COURT, UNIT 204, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT F203B, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	103 EAST HAGGARD AVENUE, UNIT 318, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	115 EAST HAGGARD AVENUE, UNIT 210, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded		2
Food, Hydration, Shelter	University	113 EAST HAGGARD AVENUE, UNIT 323, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	1
Food, Hydration, Shelter	University	417 NORTH WILLIAMSON AVENUE, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	202 WEST LEBANON AVENUE, ELON, NC, 27244	$478,829.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	105 EAST HAGGARD AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	100 CAMPUS DRIVE, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	416 WEST HAGGARD AVENUE, ELON, NC, 27244	$1,505,074.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	418 WEST HAGGARD AVENUE, ELON, NC, 27244	$1,505,074.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	738 HOLT CHAPEL LANE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded		2
Food, Hydration, Shelter	University	200 WEST PHOENIX DRIVE, ELON, NC, 27244	$243,807.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT G202D, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	698 HOLT CHAPEL LANE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded		2
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	201 SOUTH OKELLY AVENUE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	10 BANK OF AMERICA DR	$1,343,991.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	107 EAST HAGGARD AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	216 SOUTH ANTIOCH AVENUE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	108 EAST LEBANON AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	3543 BILL LOY DRIVE, UNIT 101, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT K202D, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT J102E, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT L203A, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	329 SOUTH ANTIOCH AVENUE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	519 EAST HAGGARD AVENUE, ELON, NC, 27244	$9,169,719.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	406 WEST HAGGARD AVENUE, ELON, NC, 27244	$1,505,074.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	109 EAST HAGGARD AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	550 HOLT CHAPEL LANE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT N104B, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	100 LOY COURT, UNIT 204, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	10 BANK OF AMERICA DR	$1,343,991.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	304 EAST LEBANON AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded		1
Food, Hydration, Shelter	University	107 LOY COURT, UNIT 202, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	106 LOY COURT, UNIT 204, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	104 LOY COURT, UNIT 203, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	762 E HAGGARD AVE	$4,125,408.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	219 SOUTH WILLIAMSON AVENUE, ELON, NC, 27244	$991,839.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT E203B, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT P103A, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	1
Food, Hydration, Shelter	University	111 EAST HAGGARD AVENUE, ELON, NC, 27244	$3,623,227.94	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	1-99 Bank of America Dr, Elon, North Carolina, 27244	$1,343,991.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT B203B, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	103 SOUTH ANTIOCH AVENUE, ELON, NC, 27244	$1,454,345.44	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	700 EAST HAGGARD AVENUE, UNIT A203B, ELON, NC, 27244	$4,586,072.47	NA	X, Unshaded		1
Food, Hydration, Shelter	University	3046 BILL LOY DRIVE, ELON, NC, 27244	$5,895,408.50	NA	X, Unshaded	Y	0
Safety and Security	Police Station	104 S. Williamson Avenue, Elon, NC, 27244	$318,696.50	NA	X, Unshaded	Y	0
Safety and Security	Municipal	104 S. Williamson Ave, Elon, NC, 27244	$318,696.50	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	2110 Powerline Road, Elon, NC, 27244	$1,874,052.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	720 Walker Road, Elon, NC, 27244	$40,967,724.00	NA	X, Unshaded	Y	0
Water Systems	Utility	214 Johnson Street Unit A, Elon, NC, 27244	$-	NA	X, Unshaded	Y	0
Safety and Security	Municipal	214 Johnson Street, Elon, NC, 27244	$36,951.80	NA	X, Unshaded	Y	0
Communications	Communications	133 W College Ave	$745,986.00	NA	X, Unshaded	Y	0
Water Systems	Utility	714 E Haggard Ave	$-	1.6	AE		1
Water Systems	Utility	756 E Haggard	$6,895,797.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	307 N' Okelly Ave	$11,074,989.50	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Utility	810 E Haggard	$158,968.00	NA	X, Unshaded	Y	0
Water Systems	Utility	908 S. Williamson Ave	$1,165,243.00	NA	X, Unshaded	Y	0
Water Systems	Utility	1950 W Heritage Drive	$-	NA	X, Unshaded	Y	0
Energy	Fuel Station	214 Johnson St	$36,951.80	NA	X, Unshaded	Y	0
Safety and Security	Municipal	214 Johnson St	$36,951.80	NA	X, Unshaded	Y	0
Safety and Security	Municipal	214 Johnson St	$36,951.80	NA	X, Unshaded	Y	0
Safety and Security	Municipal	214 Johnson St	$36,951.80	NA	X, Unshaded	Y	0
Water Systems	Utility	1101 Brookview Drive	$355,309.00	NA	X, Unshaded	Y	0
Water Systems	Utility	202 Old Charleston Dr	$426,006.00	NA	X, Unshaded	Y	0
Communications	Communications	2948 Danieley CenterDrive	$-	NA	X, Unshaded		3
Food, Hydration, Shelter	University	540 N WILLIAMSON AVE	$-	NA	X, Unshaded	Y	0
Water Systems	Utility	307 N' Okelly Ave	$11,074,989.50	NA	X, Unshaded	Y	0
Water Systems	Utility	762 E HAGGARD AVE	$4,125,408.00	NA	X, Unshaded	Y	0
Water Systems	Utility	103 Truitt Dr.		NA	X, Unshaded	Y	0
Water Systems	Utility	W Haggard		NA	X, Unshaded		0
Communications	Communications	895 Haggard Ave		NA	X, Unshaded		0
City of Graham							
Food, Hydration, Shelter	School	320 IVEY ROAD, GRAHAM, NC, 27253	$4,813,231.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	903 TROLLINGER RD	$4,114,169.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	727-901 Trollinger Rd, Graham, North Carolina, 27253	$4,114,169.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	311 EAST PINE STREET, GRAHAM, NC, 27253	$7,470,919.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Community College	1247 JIMMIE KERR RD	$8,956,393.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Community College	1247 JIMMIE KERR RD	$8,956,393.40	NA	X, Unshaded	Y	3.5
Food, Hydration, Shelter	Community College	1247 JIMMIE KERR ROAD, GRAHAM, NC, 27253	$8,956,393.40	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Treatment Plant	Waste Water Plant Rd, Graham, North Carolina, 27253	$36,146.29	NA	X, Unshaded	Y	0
Safety and Security	Police Station	216 SOUTH MAPLE STREET, GRAHAM, NC, 27253	$4,656,764.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1204 EAST GILBREATH STREET, GRAHAM, NC, 27253	$36,146.29	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Community College	Exit 150, Graham, North Carolina, 27253	$8,956,393.40	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Community College	1247 JIMMIE KERR RD	$8,956,393.40	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	Waste Water Plant Dr, Graham, North Carolina, 27253	$36,146.29	NA	X, Unshaded		3
Water Systems	Treatment Plant	Waste Water Plant Rd, Graham, North Carolina, 27253	$36,146.29	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	Waste Water Plant Rd, Graham, North Carolina, 27253	$36,146.29	6.3	AE	Y	0
Water Systems	Treatment Plant	1204 EAST GILBREATH STREET, GRAHAM, NC, 27253	$36,146.29	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	Waste Water Plant Dr, Graham, North Carolina, 27253	$36,146.29	NA	X, Unshaded	Y	0
Safety and Security	Emergency Operations Center	124 WEST ELM STREET, GRAHAM, NC, 27253	$2,430,514.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	824-848 Town Branch Rd, Graham, North Carolina, 27253	$4,114,169.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1025 TROLLINGER ROAD, GRAHAM, NC, 27253	$4,114,169.00	NA	X, Unshaded	Y	0
Town of Haw River							
Water Systems	Treatment Plant	255 STONE STREET, HAW RIVER, NC, 27258	$-	NA	X, Unshaded		3.5
Food, Hydration, Shelter	School	701 EAST MAIN STREET, HAW RIVER, NC, 27258	$6,855,151.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	403 EAST MAIN STREET, HAW RIVER, NC, 27258	$840,410.00	NA	X, Unshaded	Y	0
City of Mebane							

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Safety and Security	Municipal	106 EAST WASHINGTON STREET, MEBANE, NC, 27302	$256,721.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	101 WEST WASHINGTON STREET, MEBANE, NC, 27302	$304,924.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	3224 OLD HILLSBOROUGH ROAD, MEBANE, NC, 27302	$41,728,210.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	405 NORTH FIRST STREET, MEBANE, NC, 27302	$1,326,559.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	N Charles St, Mebane, North Carolina, 27302	$4,248,080.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	700-798 W Lake St, Mebane, North Carolina, 27302	$2,279,495.50	NA	X, Unshaded		0
Food, Hydration, Shelter	School	600 SOUTH THIRD STREET, MEBANE, NC, 27302	$2,279,495.50	NA	X, Unshaded	Y	0
Safety and Security	Police Station	116 WEST CENTER STREET, MEBANE, NC, 27302	$600,319.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	635 CORREGIDOR STREET, MEBANE, NC, 27302	$-	NA	X, Unshaded	Y	0
Water Systems	Utility	302 Brinkley Circle	$-	NA	X, Unshaded		3
Water Systems	Utility	1169 North First Street	$-	NA	X, Unshaded		3
Water Systems	Utility	106A West Sabastion Street	$61,642.00	NA	X, Unshaded		1.5
Water Systems	Utility	204 East Washington Street	$1,688,290.00	NA	X, Unshaded	Y	0
Water Systems	Utility	1138 South Third Street	$-	4.4	AE	Y	0
Water Systems	Utility	1304 Fieldstone Drive	$-	NA	X, Unshaded		3
Water Systems	Utility	1109 Birkdale Drive	$-	NA	X, Unshaded		1
Water Systems	Utility	398 Gregory Poole Lane	$-	NA	X, Unshaded		0
Water Systems	Utility	1160 Terrell Street	$-	NA	X, Unshaded		1.5
Water Systems	Utility	1101 Cameron Lane	$-	NA	X, Unshaded		0
Water Systems	Utility	1353 Mebane Oaks Road	$4,230,059.00	NA	X, Unshaded	Y	0
Water Systems	Utility	3460 Old Hillsborough Road	$-	NA	X, Unshaded		2
Water Systems	Utility	906 Street B	$-	NA	X, Shaded		3
Water Systems	Utility	420 South Third Street	$-	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Utility	525 West Clay Street	$366,630.00	NA	X, Unshaded		1.5
Water Systems	Utility	2246 Turner Road	$-	NA	X, Unshaded		1
Water Systems	Utility	113 S 11th Street, Mebane, NC 27302	$-	NA	X, Unshaded	Y	0
Water Systems	Utility	7501 Oakwood Street Extension	$-	NA	X, Unshaded		1
Water Systems	Utility	7013 Industrial Drive	$-	NA	X, Unshaded		1.5
Water Systems	Utility	4911 West Ten Road	$-	NA	X, Unshaded		2.5
Water Systems	Utility	4000 West Ten Road	$-	NA	X, Unshaded		0
Water Systems	Utility	485 Brookhollow Road	$-	NA	X, Unshaded		0
Water Systems	Utility	200 Alice Miller Court	$-	NA	X, Unshaded		0
Town of Swepsonville							
Food, Hydration, Shelter	School	2518 NC 54 HWY	$2,063,983.50	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2518 NC 54 HIGHWAY, GRAHAM, NC, 27253	$2,063,983.50	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	225 Stone Quarry Rd, Burlington, NC 27217	$1,301,083.00	NA	X, Unshaded	Y	0
Unincorporated Alamance County							
Food, Hydration, Shelter	School	4751 S NC 62 HWY	$1,260,778.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4751 S NC 62 HWY	$1,260,778.00	NA	X, Unshaded	Y	0
Energy	Substation	US Highway 70, Mebane, North Carolina, 27302	$112,167.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	2172 BELLEMONT ALAMANCE ROAD, BURLINGTON, NC, 27215	$125,897.00	NA	X, Unshaded		3
Water Systems	Treatment Plant	1824 US-70, Mebane, NC 27302	$-	NA	X, Shaded	Y	0
Food, Hydration, Shelter	School	7702-7798 Sylvan Rd, Snow Camp, North Carolina, 27349	$1,933,974.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded		3
Food, Hydration, Shelter	School	2847 PLEASANT GROVE UNION SCHOOL ROAD, BURLINGTON, NC, 27217	$3,295,036.00	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Safety and Security	Fire Station	4671 NC 54 HIGHWAY, GRAHAM, NC, 27253	$652,465.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1824 US-70, Mebane, NC 27302	$-	NA	X, Shaded	Y	0
Water Systems	Treatment Plant	1824 US-70, Mebane, NC 27302	$-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Treatment Plant	Tabardrey Rd, Haw River, North Carolina, 27258	$-	5.1	AE		0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded		0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded		0
Safety and Security	Fire Station	2806 OLD NC 87 HIGHWAY, FLOOR 2, ELON, NC, 27244	$626,967.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Shaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Food, Hydration, Shelter	School	1731 N NC 87 HWY	$3,477,363.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	2832 NORTH NC 87 HIGHWAY, ELON, NC, 27244	$7,643,758.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	4853 FRIENDSHIP ROCK CREEK ROAD, BURLINGTON, NC, 27215	$248,933.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	4751 S NC 62 HWY	$1,260,778.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	Tabardrey Rd, Haw River, North Carolina, 27258	$-	9.4	AE		2
Water Systems	Treatment Plant	Tabardrey Rd, Haw River, North Carolina, 27258	$-	13.4	AE	Y	0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Safety and Security	Fire Station	595 ALTAMAHAW UNION RIDGE ROAD, BURLINGTON, NC, 27217	$291,488.00	NA	X, Unshaded	Y	3
Safety and Security	Fire Station	2404 STALEY STORE ROAD, LIBERTY, NC, 27298	$96,917.00	NA	X, Unshaded		3
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		2.5
Safety and Security	Fire Station	2545 WEST GREENSBORO CHAPEL HILL ROAD, SNOW CAMP, NC, 27349	$137,756.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	5827 CHURCH RD	$1,158,297.67	NA	X, Unshaded		1
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded		0
Food, Hydration, Shelter	School	2100 ELDON DRIVE, ELON, NC, 27244	$6,670,950.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	Eldon Dr, Elon, North Carolina, 27244	$6,670,950.00	NA	X, Unshaded		1.5
Safety and Security	Fire Station	2164 CAROLINA ROAD, BURLINGTON, NC, 27217	$482,908.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4040 MEBANE ROGERS RD	$2,100,090.55	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	8416 SNOW CAMP ROAD, SNOW CAMP, NC, 27349	$392,641.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	Eastern High School Rd, Mebane, North Carolina, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	Eastern High School Rd, Mebane, North Carolina, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	5827 CHURCH ROAD, GRAHAM, NC, 27253	$1,158,297.67	NA	X, Unshaded		0
Safety and Security	Fire Station	4606 SOUTH NC 87 HIGHWAY, GRAHAM, NC, 27253	$83,787.00	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Food, Hydration, Shelter	School	Eastern High School Rd, Mebane, North Carolina, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4751 S NC 62 HWY	$1,260,778.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4040 MEBANE ROGERS ROAD, MEBANE, NC, 27302	$2,100,090.55	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	School	Eastern High School Rd, Mebane, North Carolina, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	3970 MEBANE ROGERS ROAD, MEBANE, NC, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	3173 MANSFIELD ROAD, BURLINGTON, NC, 27217	$7,708.00	NA	X, Unshaded		3
Food, Hydration, Shelter	School	Eastern High School Rd, Mebane, North Carolina, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	3847 NORTH NC 49 HIGHWAY, BURLINGTON, NC, 27217	$562,304.00	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Shaded		0
Food, Hydration, Shelter	School	2246-2298 Eldon Dr, Elon, North Carolina, 27244	$6,670,950.00	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Food, Hydration, Shelter	School	1731 N NC 87 HWY	$3,477,363.00	NA	X, Unshaded		3
Food, Hydration, Shelter	School	Gerringer Mill Rd, Elon, North Carolina, 27244	$3,477,363.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	4114-4138 Mebane Rogers Rd, Mebane, North Carolina, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4040 MEBANE ROGERS ROAD, MEBANE, NC, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	5827 CHURCH RD	$1,158,297.67	NA	X, Unshaded		0
Food, Hydration, Shelter	School	Gerringer Mill Rd, Elon, North Carolina, 27244	$3,477,363.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	7718 SYLVAN ROAD, SNOW CAMP, NC, 27349	$1,933,974.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	Eastern High School Rd, Mebane, North Carolina, 27302	$2,100,090.55	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	Southern High School Rd, Graham, North Carolina, 27253	$1,356,087.45	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	771 SOUTHERN HIGH SCHOOL ROAD, GRAHAM, NC, 27253	$1,356,087.45	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded		0
Food, Hydration, Shelter	School	631 SOUTHERN HIGH SCHOOL RD	$1,356,087.45	NA	X, Unshaded		0
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		2
Water Systems	Treatment Plant	2471 BOY WOOD RD	$93,261.84	NA	X, Unshaded		0
Water Systems	Utility	2712 Amick Rd	$-	1.2	X, Shaded		2
Water Systems	Treatment Plant	1824 US-70, Mebane, NC 27302		NA	X, Shaded	Y	0
Water Systems	Treatment Plant	1824 US-70, Mebane, NC 27302		NA	X, Unshaded	Y	0

A.2 RISK ASSESSMENT

This section contains a summary of the County's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Dam Failure, Flood and Wildfire.

A.2.1 DAM FAILURE

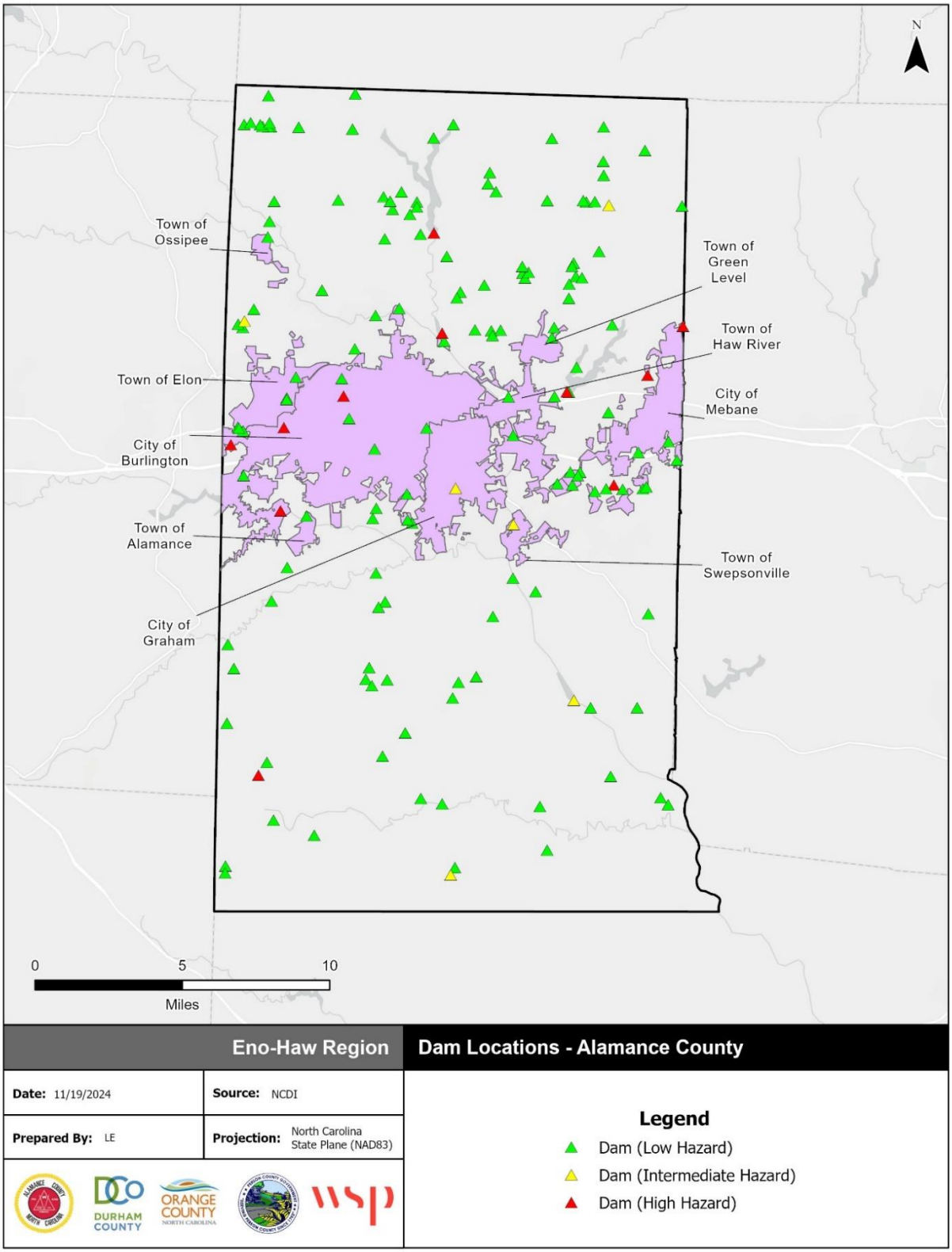
Table A.12 lists all high hazard dams located in unincorporated Alamance County that have been identified by the North Carolina Dam Inventory with a condition assessment of "fair" or "poor." Note that there are currently no high hazard dams located in Alamance County with a condition assessment of "poor." Figure A.11 through Figure A.18 show the location of all dams by jurisdiction in Alamance County. It is important to note that there are no dams located in the Town of Green Level and the Village of Alamance.

Table A.12 – High Hazard Dams by Jurisdiction in Alamance County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Town
Lake Cammack Dam	NC00739	Fair	36000	Burlington
Forest Lake Dam	NC00748	Fair	235	Mebane
Timber Ridge Lake Dam	NC00742	Fair	288	Saxapahaw
Old Stoney Creek Dam	NC00762	Fair	3600	Hopedale
McEwen Estate Dam	NC01734	Fair	142	Alamance
Tate Dam	NC01737	Fair	56	Burlington
Back Creek Reservoir Dam	NC04873	Fair	10645	Haw River
Lake Mackintosh Dam	NC04954	Fair	30825	Alamance
Somerton Lake Dam	NC05203	Fair	47	Burlington
Mill Creek Subdivision Dam	NC05718	Fair	7	Mebane
Meadowood Lake Dam	NC06834	Fair	60	Melville

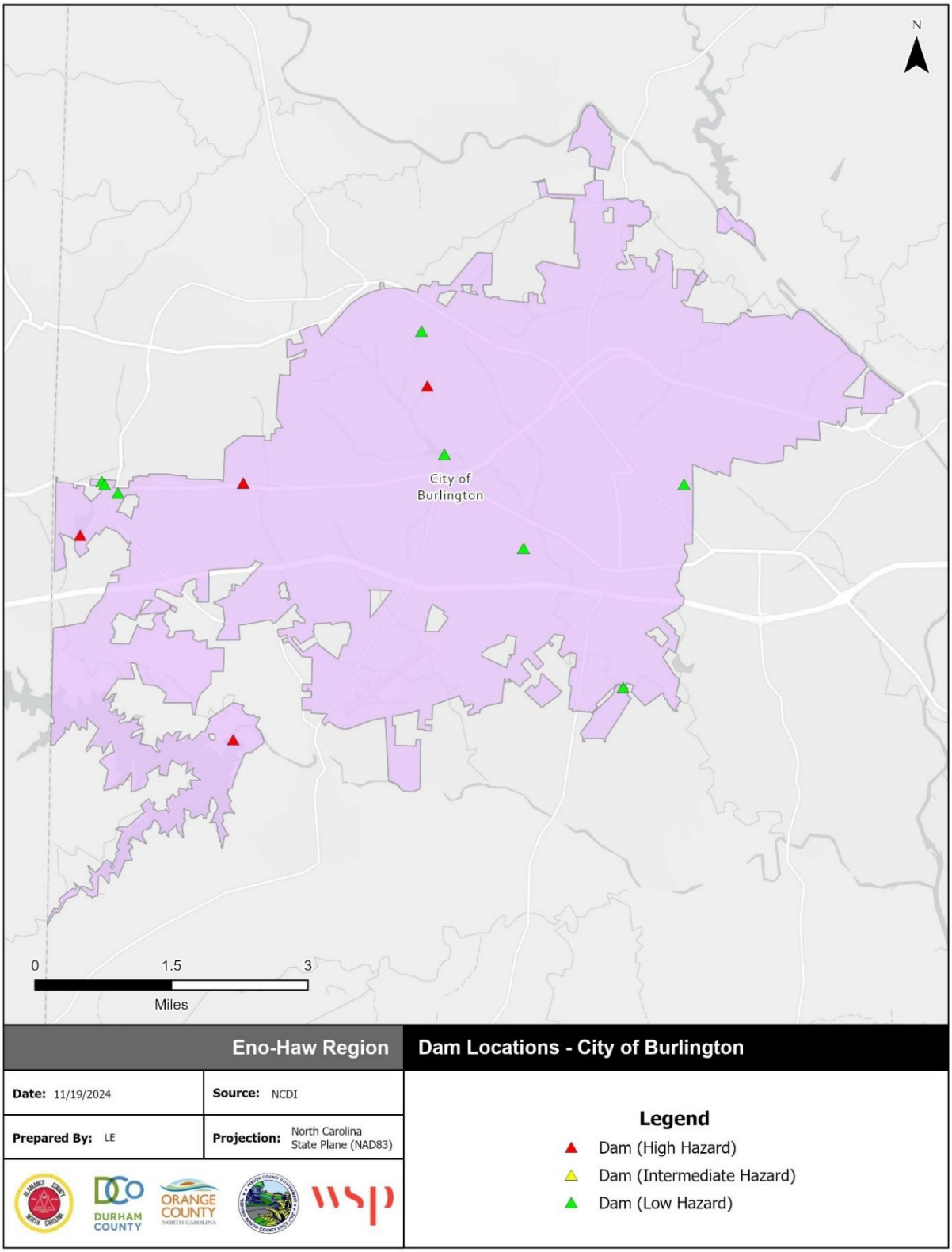
Source: NC Dam Inventory, November 2024

Figure A.11 – Dam Inventory, Unincorporated Alamance County



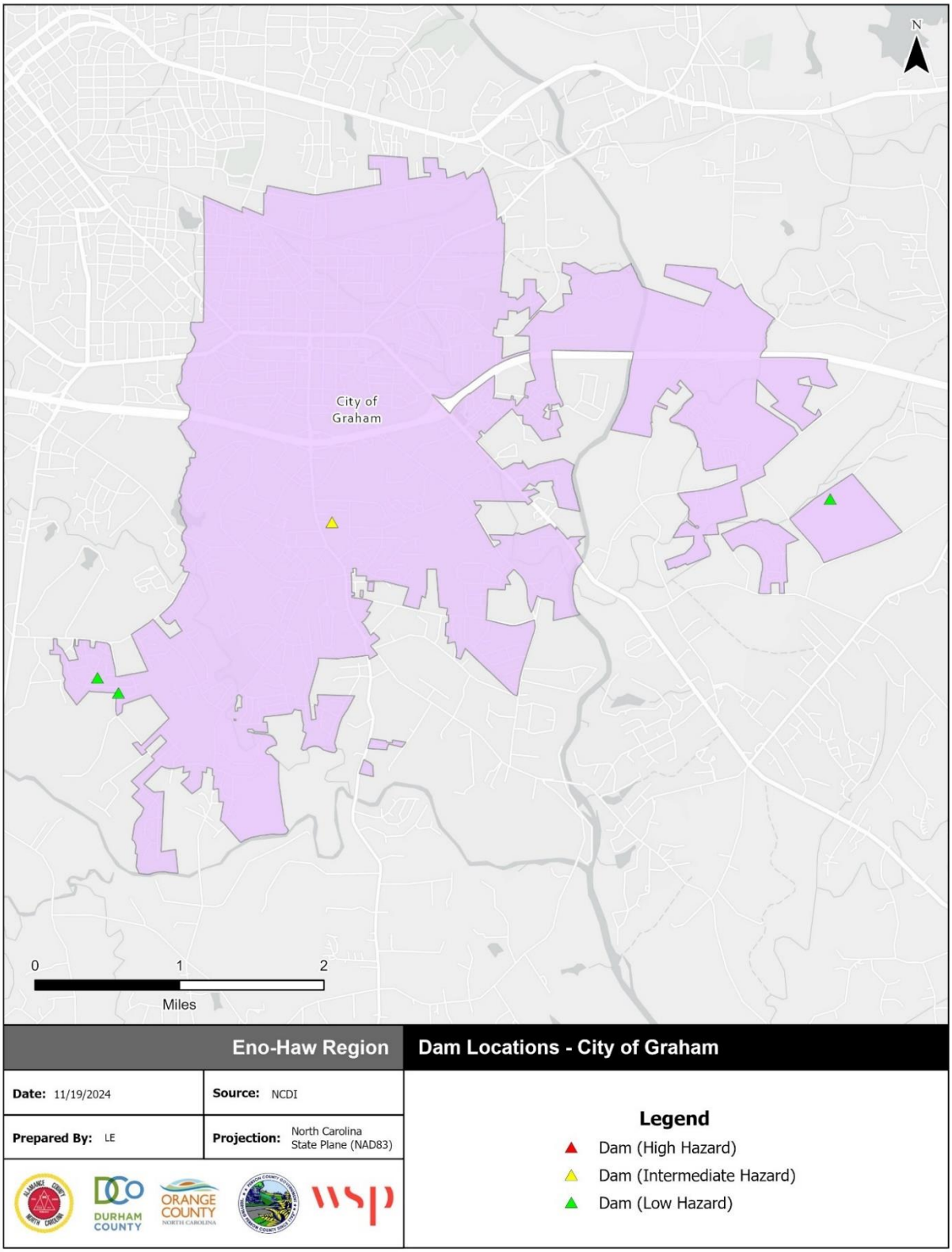
Source: NC Dam Inventory, November 2024

Figure A.12 – Dam Inventory, City of Burlington



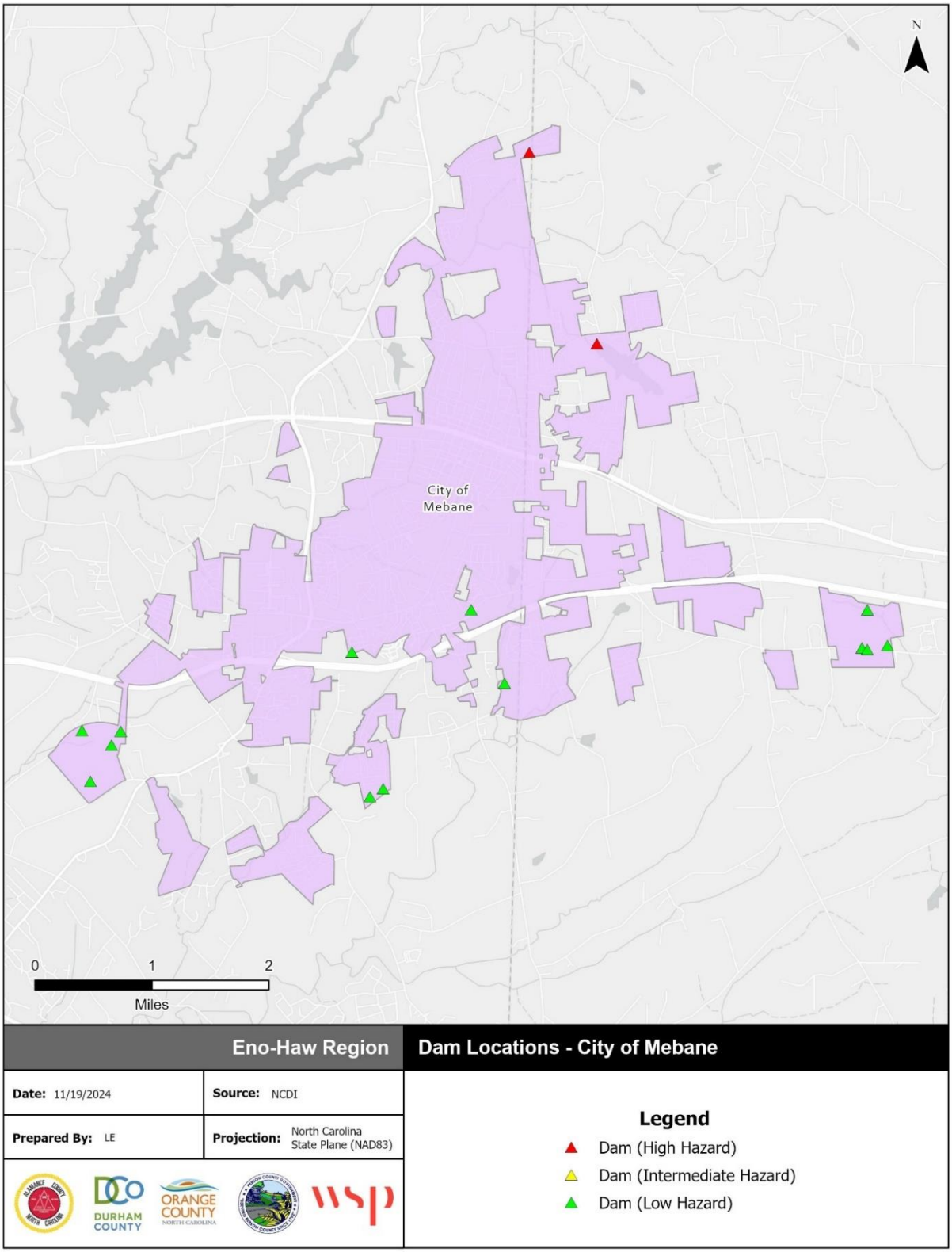
Source: NC Dam Inventory, November 2024

Figure A.13 – Dam Inventory, City of Graham



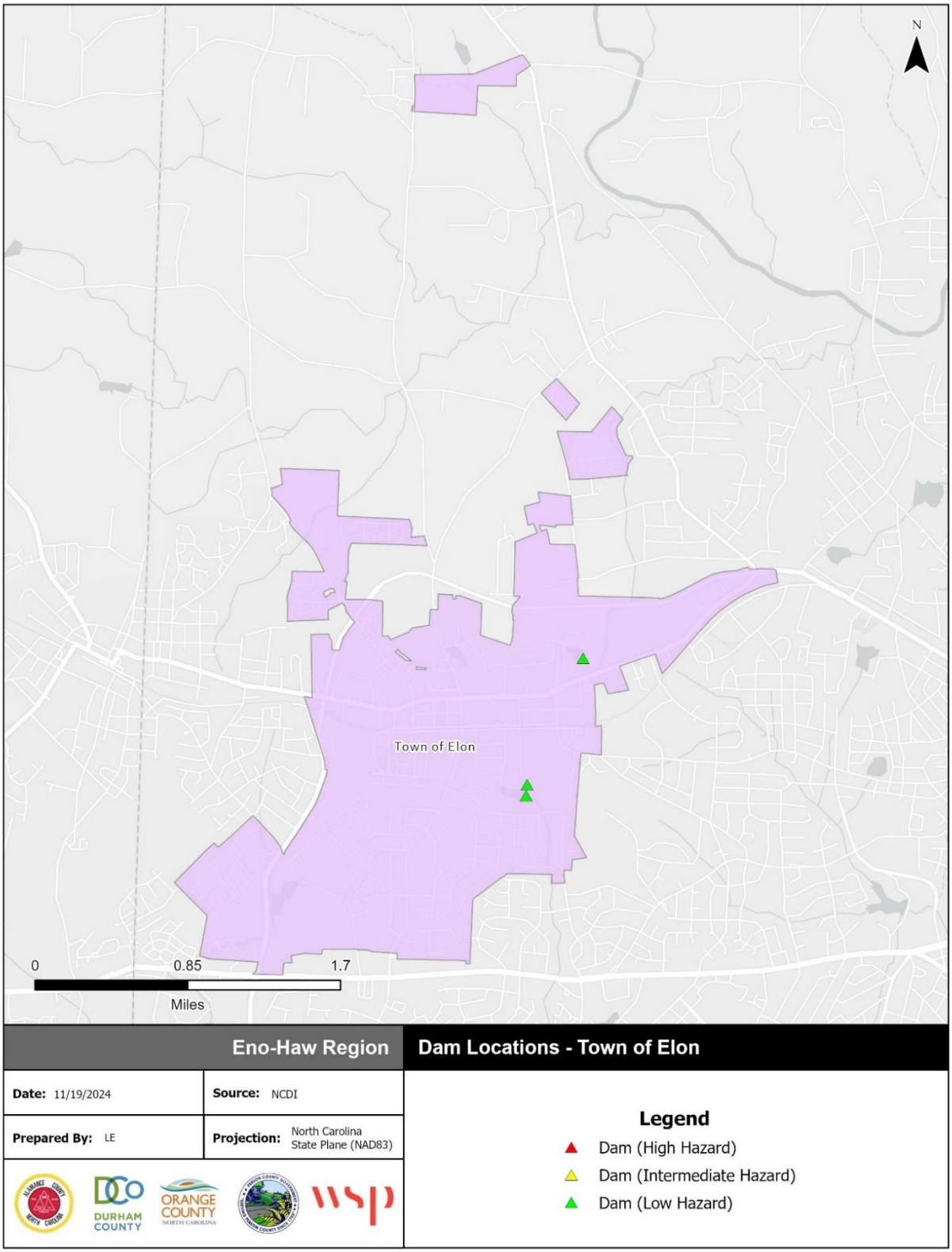
Source: NC Dam Inventory, November 2024

Figure A.14 – Dam Inventory, City of Mebane



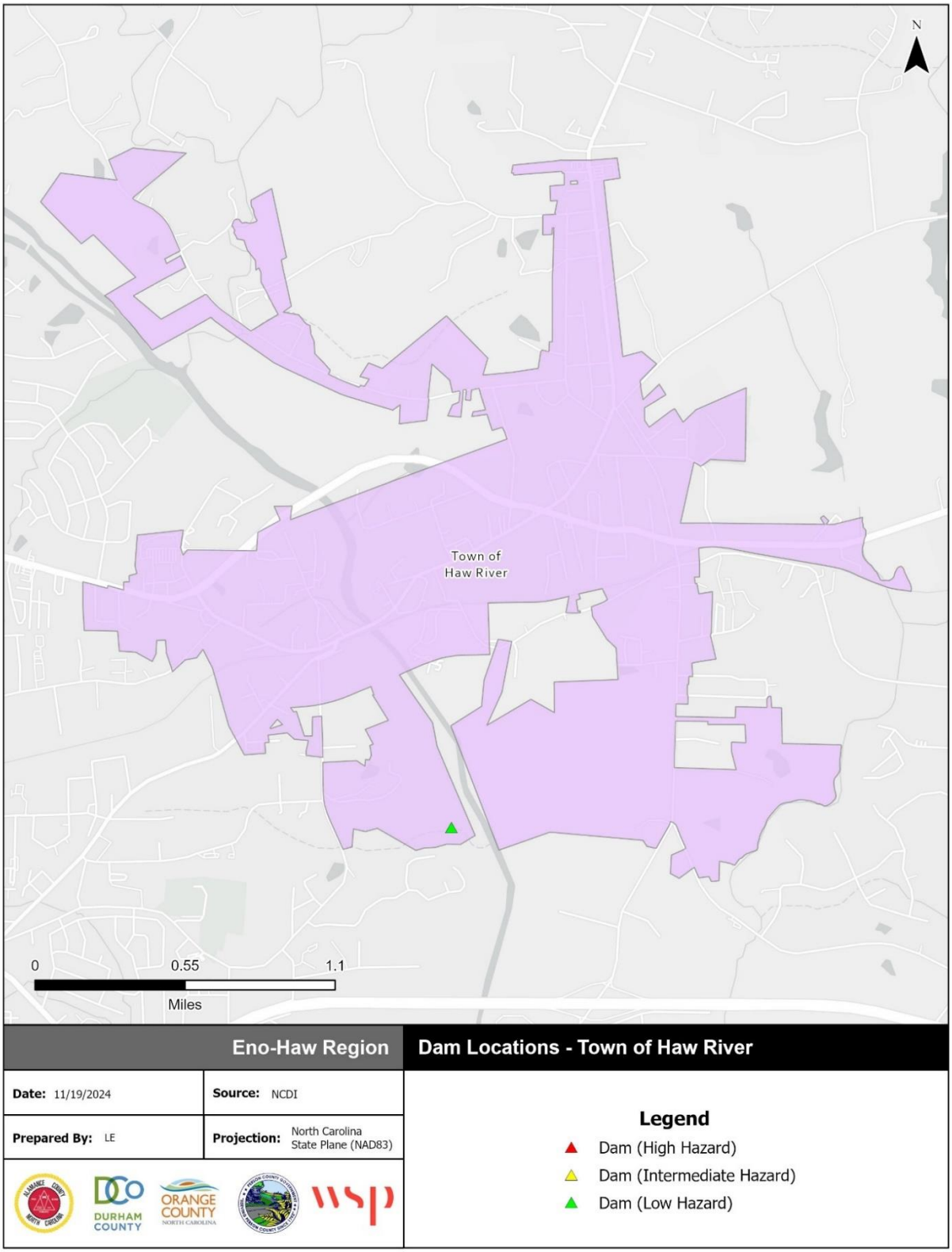
Source: NC Dam Inventory, November 2024

Figure A.15 – Dam Inventory, Town of Elon



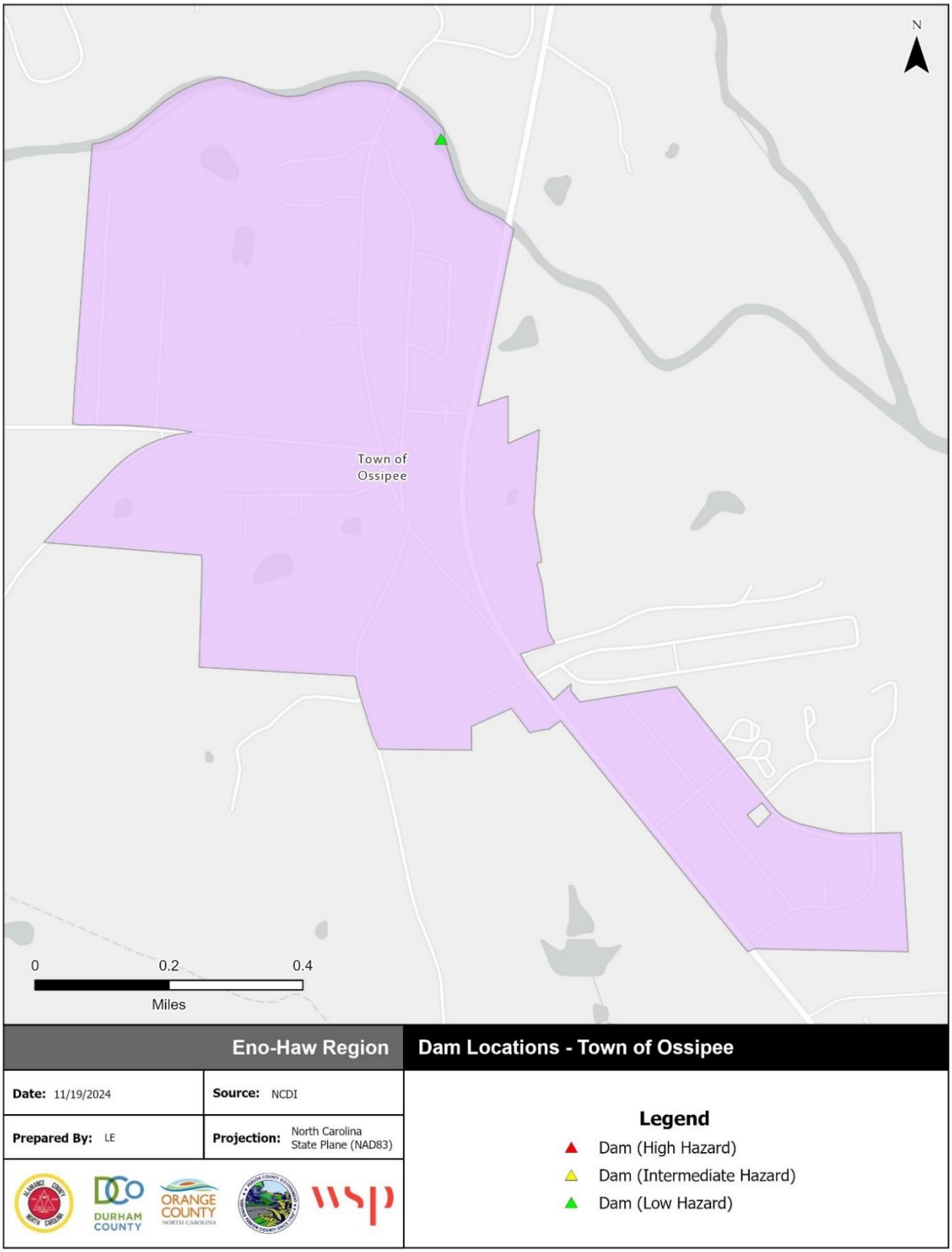
Source: NC Dam Inventory, November 2024

Figure A.16 – Dam Inventory, Town of Haw River



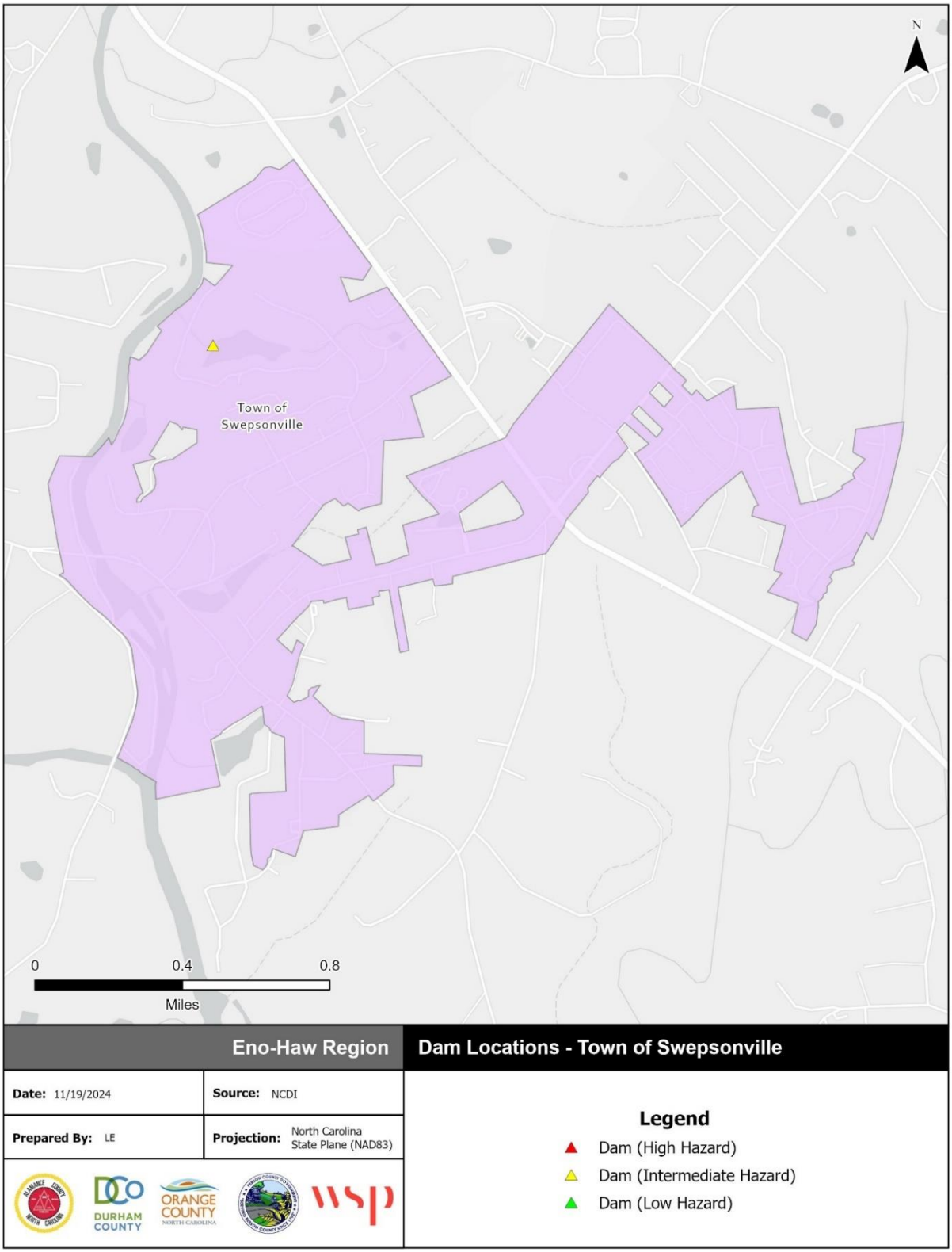
Source: NC Dam Inventory, November 2024

Figure A.17 – Dam Inventory, Town of Ossipee



Source: NC Dam Inventory, November 2024

Figure A.18 – Dam Inventory, Town of Swepsonville



Source: NC Dam Inventory, November 2024

A.2.2 FLOODING

Table A.13 details the acreage of Alamance County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, at slightly over 1 percent, the City of Graham, the Village of Alamance, and the Town of Haw River have the largest portion of its land area within the mapped 1%-annual-chance floodplain. Overall, 0.4 percent of the total land in the county is within the mapped 1%-annual-chance floodplain.

Table A.13 – Flood Zone Acreage by Jurisdiction, Alamance County

Flood Zone	Acreage	Percent of Total (%)
Unincorporated Alamance County		
Zone AE	16,155.8	6.8
Zone X (500-year)	930.4	0.4
Zone X (unshaded)	221,413.8	92.8
Total	**238,500.0**	--
City of Burlington		
Zone AE	1,683.5	8.8
Zone X (500-year)	106.3	0.6
Zone X (unshaded)	17,283.2	90.6
Total	**19,073.1**	--
City of Graham		
Zone AE	549.2	8.0
Zone X (500-year)	88.8	1.3
Zone X (unshaded)	6,266.3	90.8
Total	**6,904.3**	--
City of Mebane		
Zone AE	301.6	4.2
Zone X (500-year)	23.2	0.3
Zone X (unshaded)	6,833.3	95.5
Total	**7,158.1**	--
Town of Elon		
Zone AE	106.4	4.1
Zone X (500-year)	6.4	0.2
Zone X (unshaded)	2,474.3	95.6
Total	**2,587.0**	--
Town of Green Level		
Zone AE	2.2	0.2
Zone X (500-year)	1.2	0.1
Zone X (unshaded)	871.6	99.6
Total	**874.9**	--
Town of Haw River		
Zone AE	202.5	10.1
Zone X (500-year)	37.3	1.9
Zone X (unshaded)	1,766.5	88.0
Total	**2,006.3**	--

Flood Zone	Acreage	Percent of Total (%)
Town of Ossipee		
Zone AE	20.1	5.0
Zone X (500-year)	2.6	0.6
Zone X (unshaded)	379.2	94.3
Total	**402.0**	--
Town of Swepsonville		
Zone AE	112.3	11.9
Zone X (500-year)	4.8	0.5
Zone X (unshaded)	824.9	87.6
Total	**942.0**	--
Village of Alamance		
Zone AE	21.8	4.5
Zone X (500-year)	7.1	1.5
Zone X (unshaded)	456.5	94.0
Total	**485.4**	--
County Total	**278,933.1**	--

Source: FEMA Effective DFIRM

Figure A.19 through Figure A.28 reflect the effective mapped flood hazard zones for all jurisdictions in Alamance County with land in or near the SFHA, and Figure A.29 through Figure A.38 display the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table A.14 provides building counts and values for critical facilities by flood zone in Alamance County and participating jurisdictions.

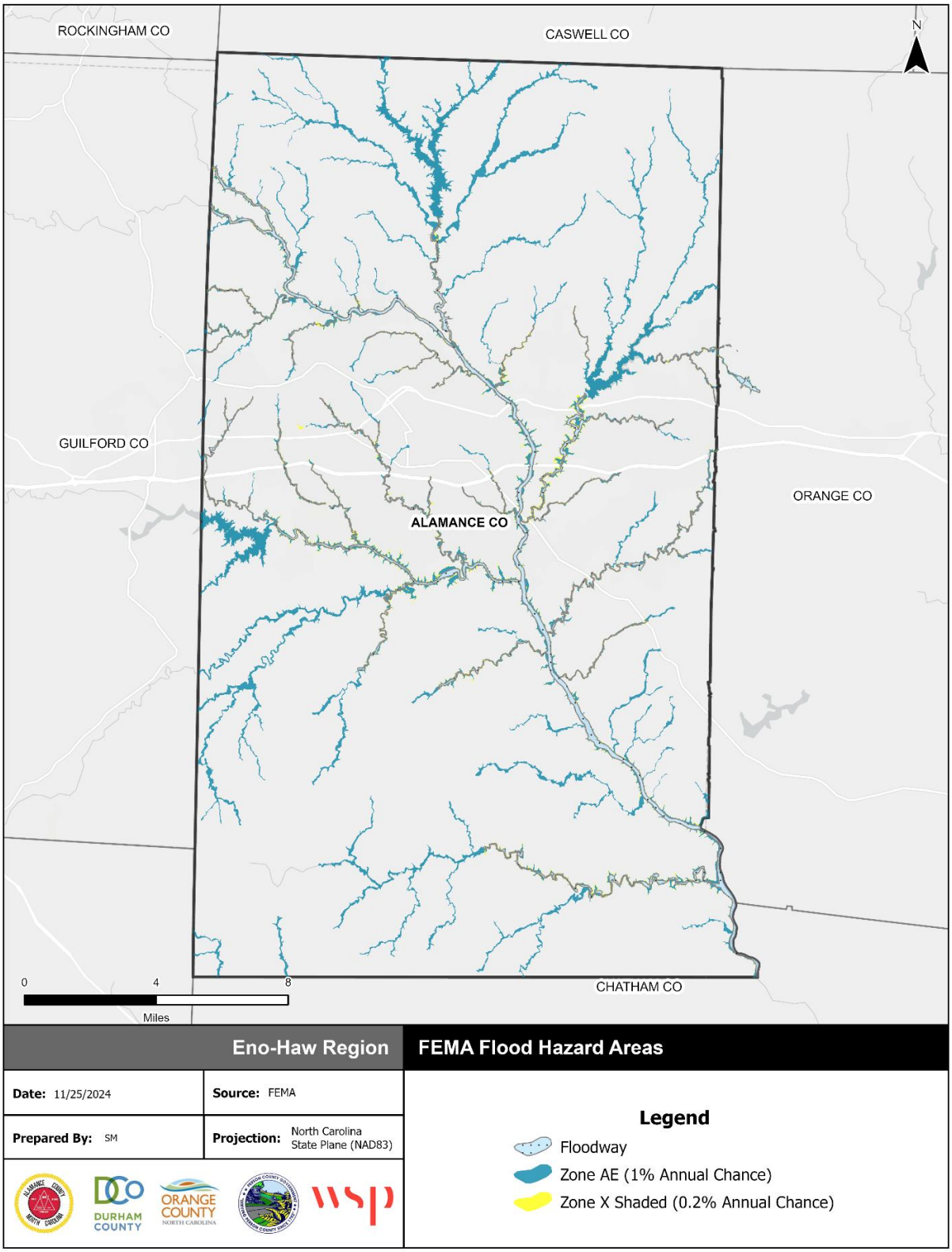
Table A.14 – Critical Facilities Exposed to Flooding, Alamance County

Flood Zone	Critical Facility Count	Structure Value
Unincorporated Alamance County		
Zone AE	3	$-
Zone X (500-year)	6	$186,524
Zone X (unshaded)	72	$100,672,396
Total	**81**	**$100,858,920**
City of Burlington		
Zone AE	1	$72,705
Zone X (500-year)	0	$-
Zone X (unshaded)	61	$224,934,346
Total	**62**	**$225,007,051**
City of Graham		
Zone AE	1	$36,146
Zone X (500-year)	0	$-
Zone X (unshaded)	19	$80,826,949
Total	**20**	**$80,863,095**
City of Mebane		
Zone AE	1	$-
Zone X (500-year)	1	$-
Zone X (unshaded)	30	$59,370,425
Total	**32**	**$59,370,425**

Flood Zone	Critical Facility Count	Structure Value
Town of Elon		
Zone AE	1	$-
Zone X (500-year)	0	$-
Zone X (unshaded)	111	$412,332,009
Total	**112**	**$412,332,009**
Town of Green Level		
Zone AE	0	$-
Zone X (500-year)	0	$-
Zone X (unshaded)	0	$-
Total	**0**	**$-**
Town of Haw River		
Zone AE	0	$-
Zone X (500-year)	0	$-
Zone X (unshaded)	3	$7,695,561
Total	**3**	**$7,695,561**
Town of Ossipee		
Zone AE	0	$-
Zone X (500-year)	0	$-
Zone X (unshaded)	0	$-
Total	**0**	**$-**
Town of Swepsonville		
Zone AE	0	$-
Zone X (500-year)	0	$-
Zone X (unshaded)	3	$5,429,050
Total	**3**	**$5,429,050**
Village of Alamance		
Zone AE	1	$-
Zone X (500-year)	1	$3,273
Zone X (unshaded)	4	$1,390,355
Total	**6**	**$1,393,628**
Alamance County Total		
Zone AE	8	$108,851.10
Zone X (500-year)	8	$189,796.68
Zone X (unshaded)	303	$892,651,091.21
Total	**319**	**$892,949,739**

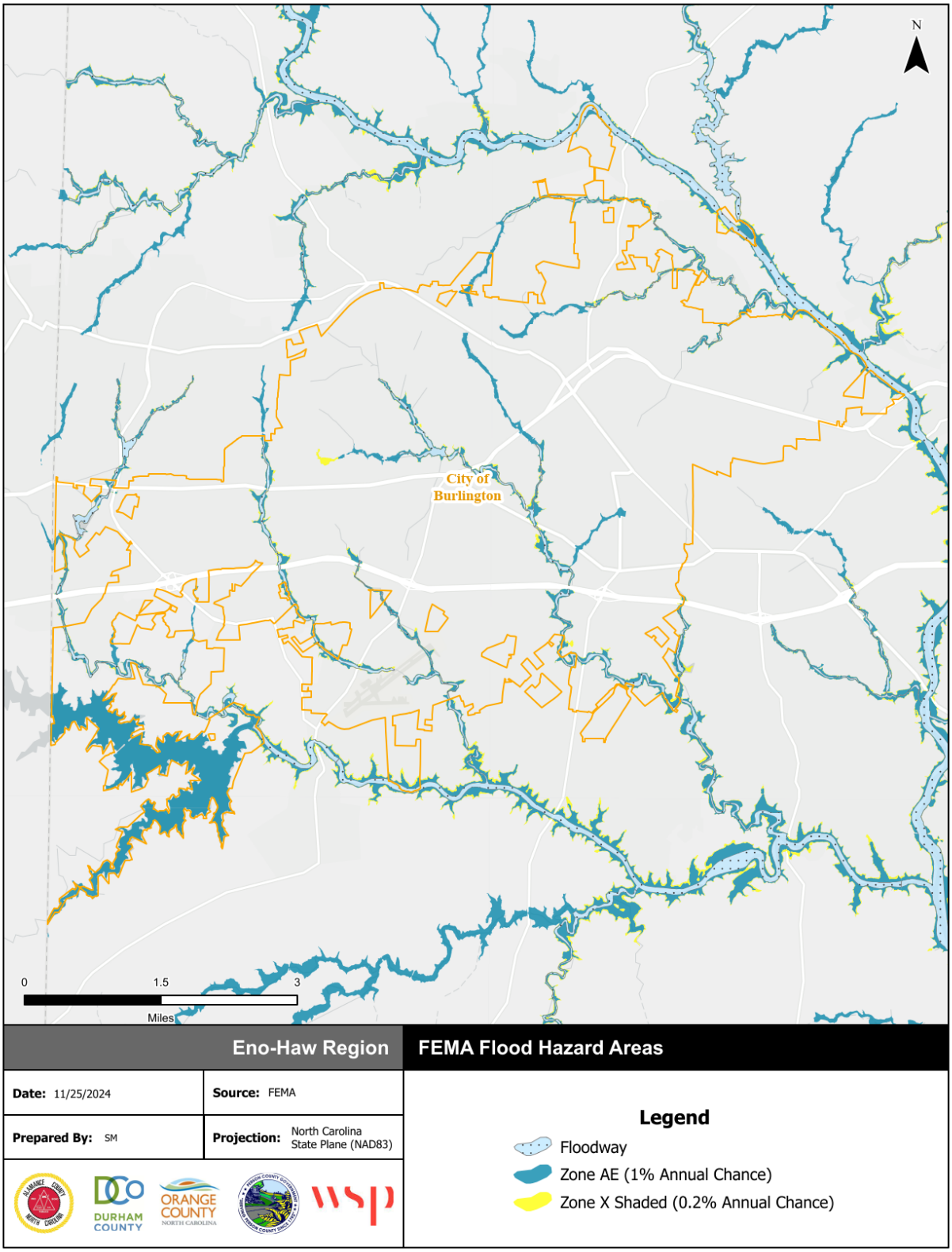
Source: FEMA Effective DFIRM, HMPC
Note: The Towns of Ossipee and Green Level do not have any critical facilities exposed to flooding

Figure A.19 – FEMA Flood Hazard Areas, Unincorporated Alamance County



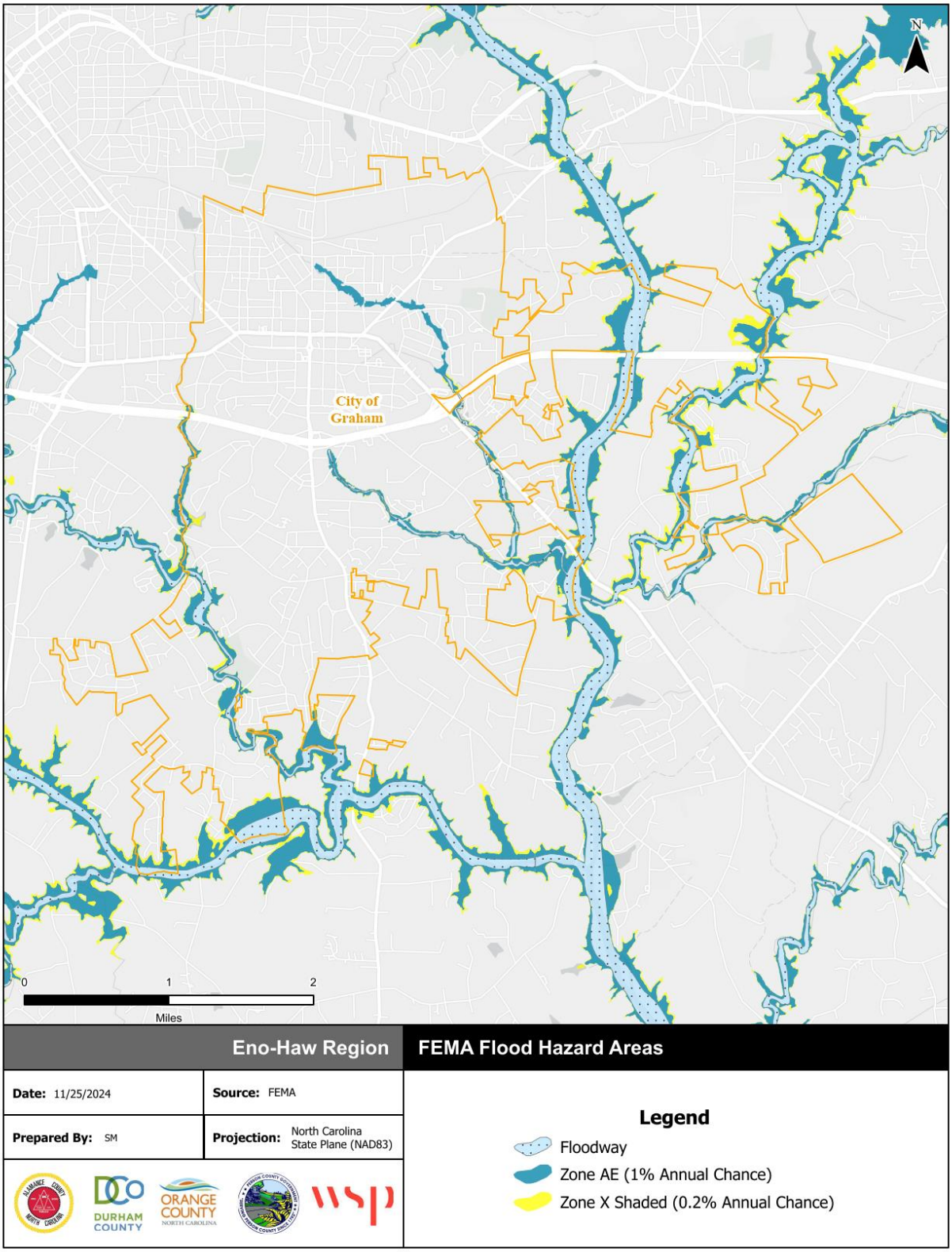
Source: FEMA Effective DFIRM

Figure A.20 – FEMA Flood Hazard Areas, City of Burlington



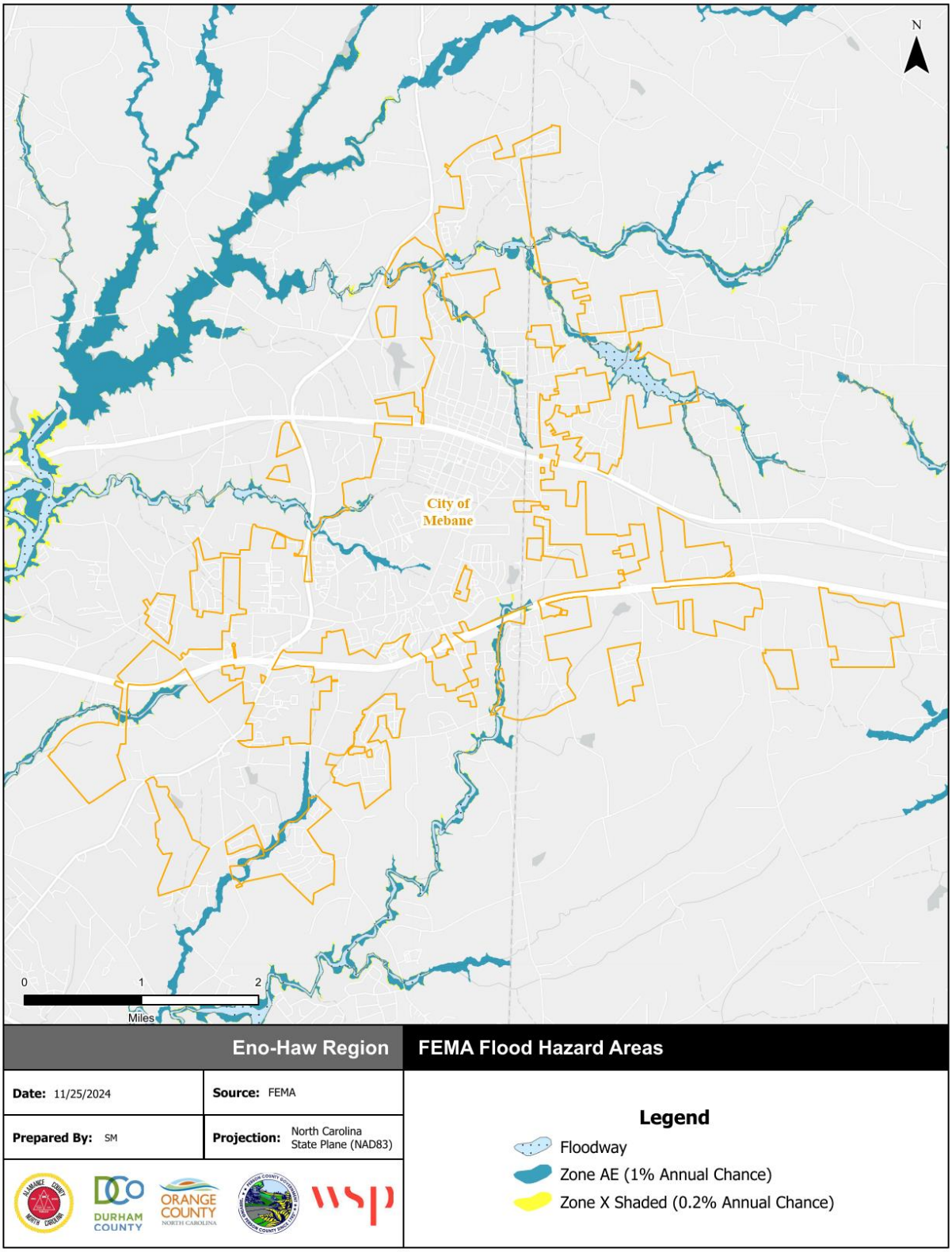
Source: FEMA Effective DFIRM

Figure A.21 – FEMA Flood Hazard Areas, City of Graham



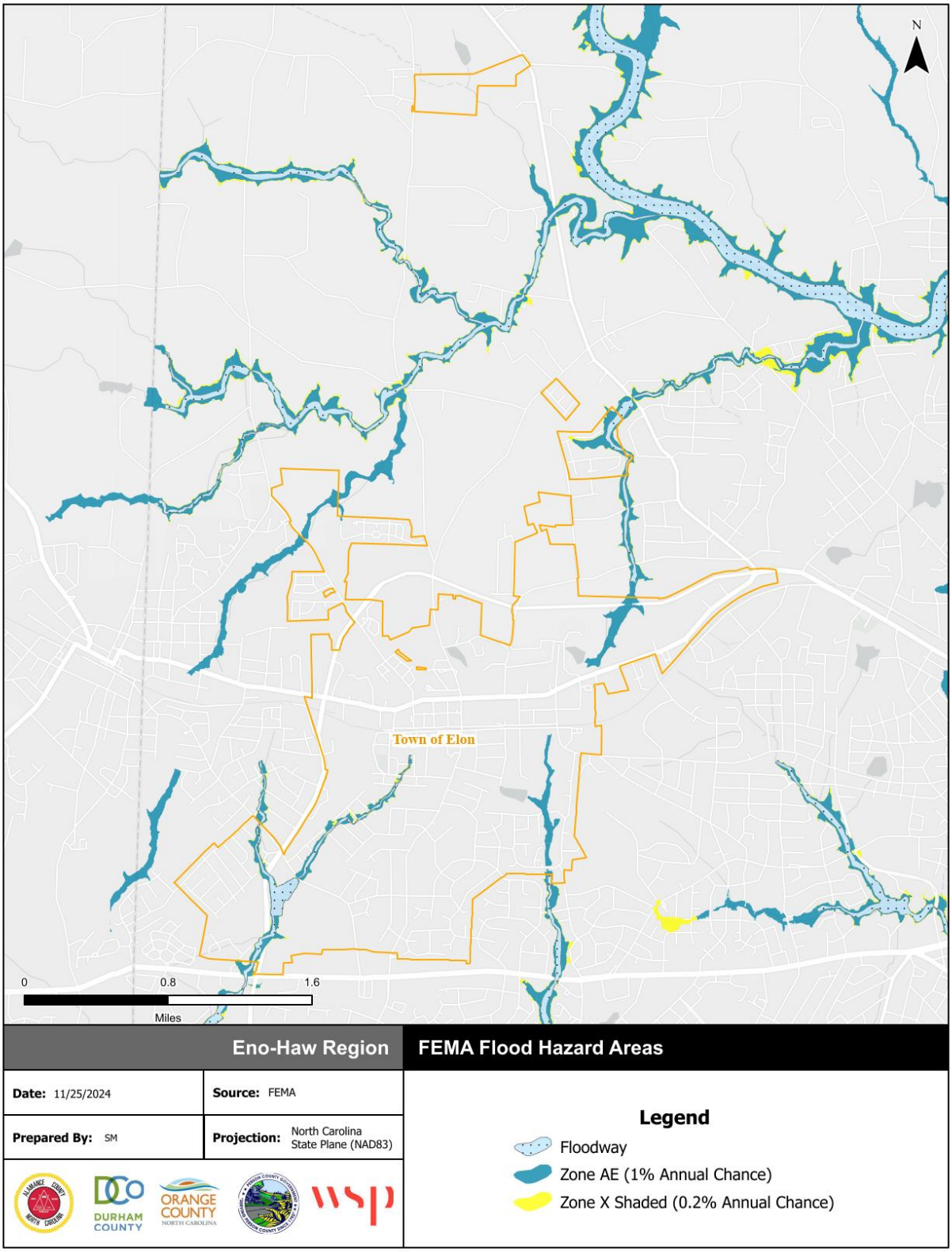
Source: FEMA Effective DFIRM

Figure A.22 – FEMA Flood Hazard Areas, City of Mebane



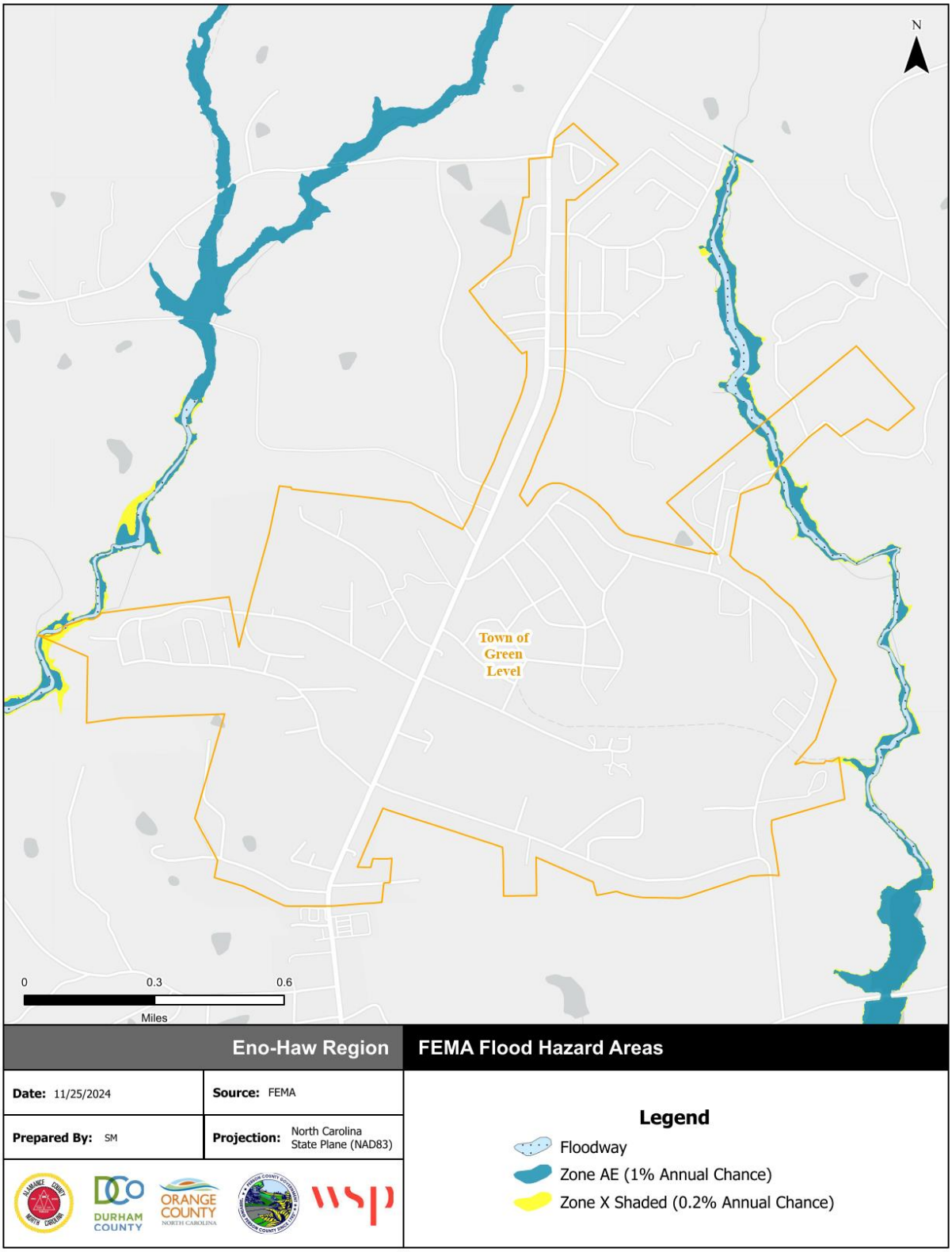
Source: FEMA Effective DFIRM

Figure A.23 – FEMA Flood Hazard Areas, Town of Elon



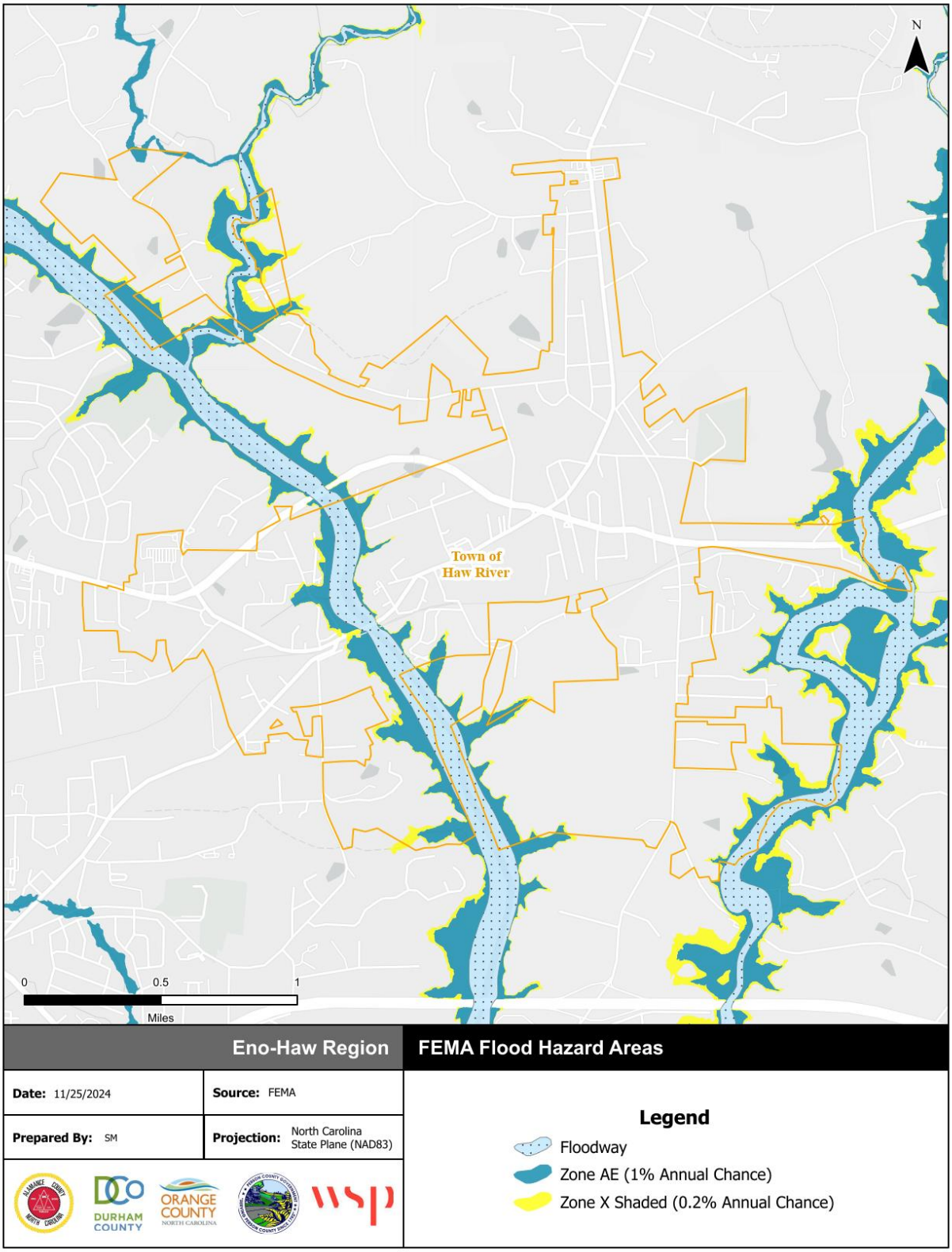
Source: FEMA Effective DFIRM

Figure A.24 – FEMA Flood Hazard Areas, Town of Green Level



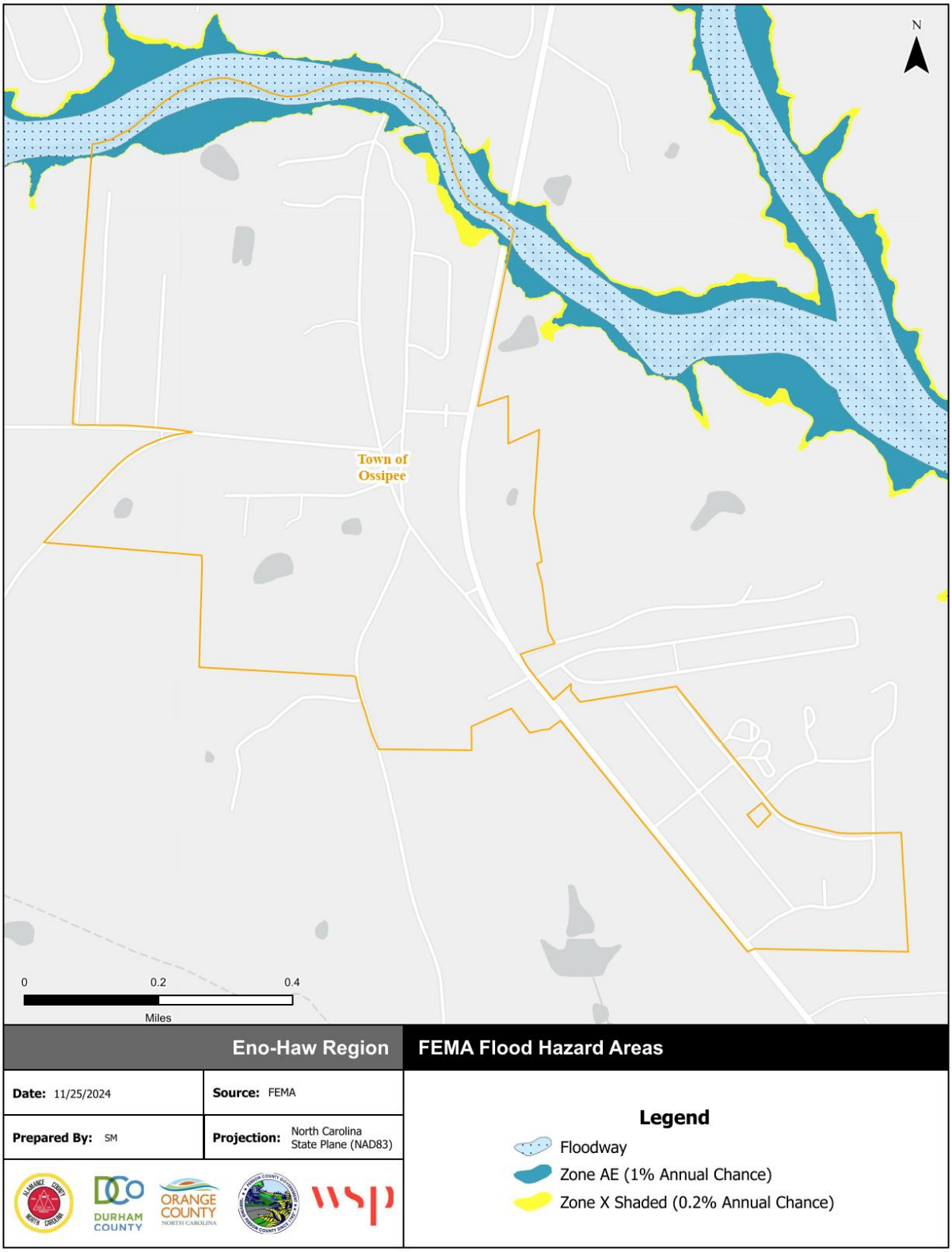
Source: FEMA Effective DFIRM

Figure A.25 – FEMA Flood Hazard Areas, Town of Haw River



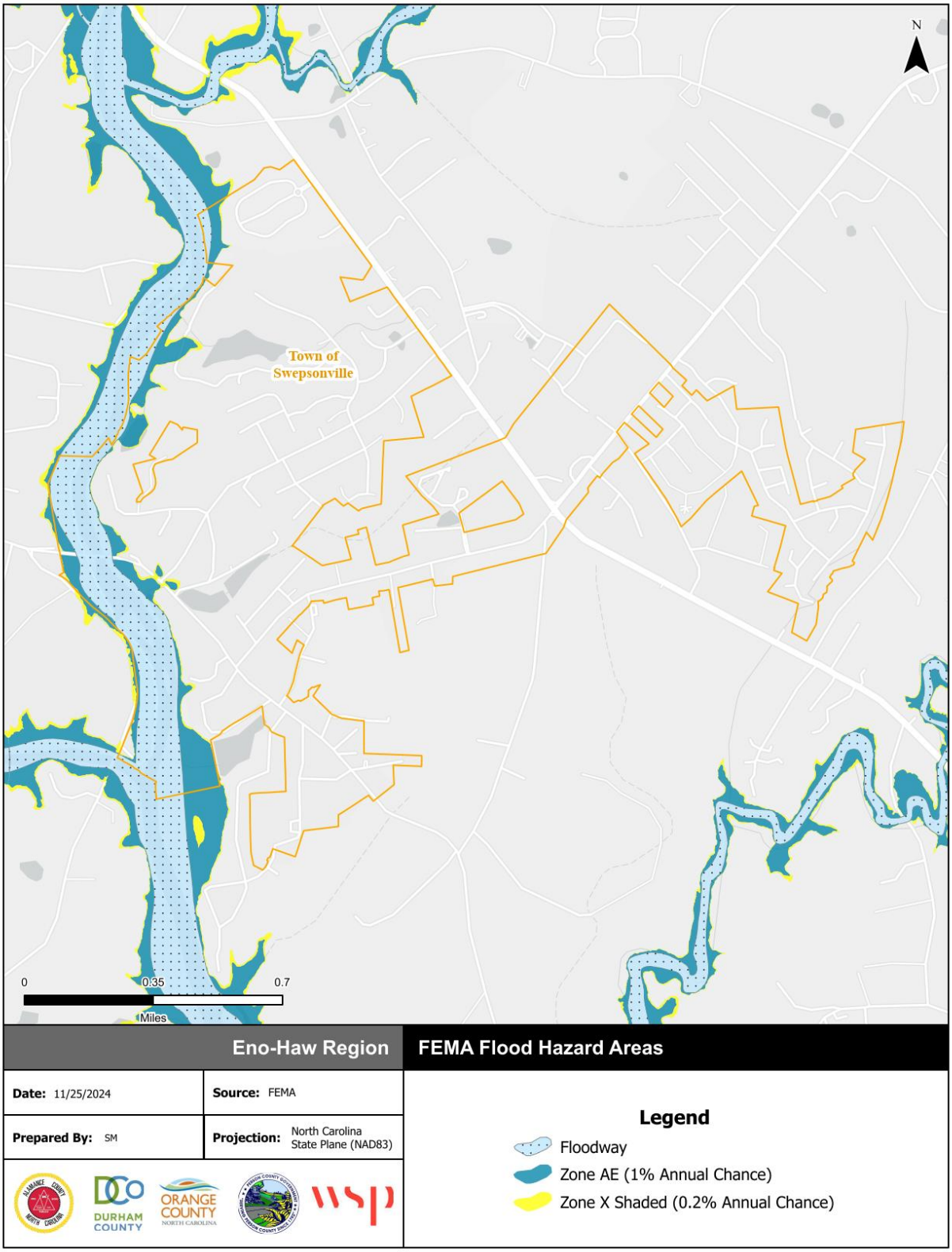
Source: FEMA Effective DFIRM

Figure A.26 – FEMA Flood Hazard Areas, Town of Ossipee



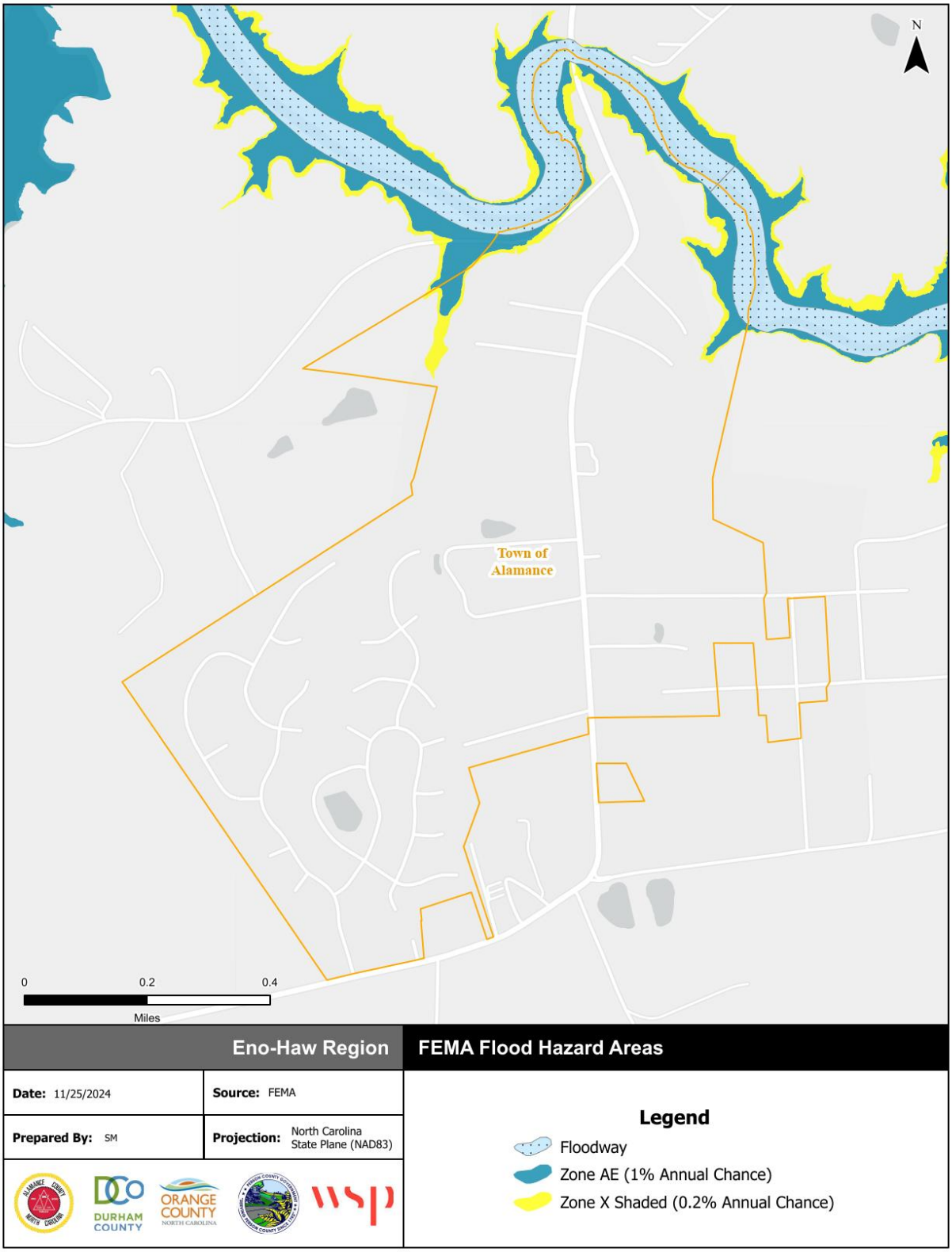
Source: FEMA Effective DFIRM

Figure A.27 – FEMA Flood Hazard Areas, Town of Swepsonville



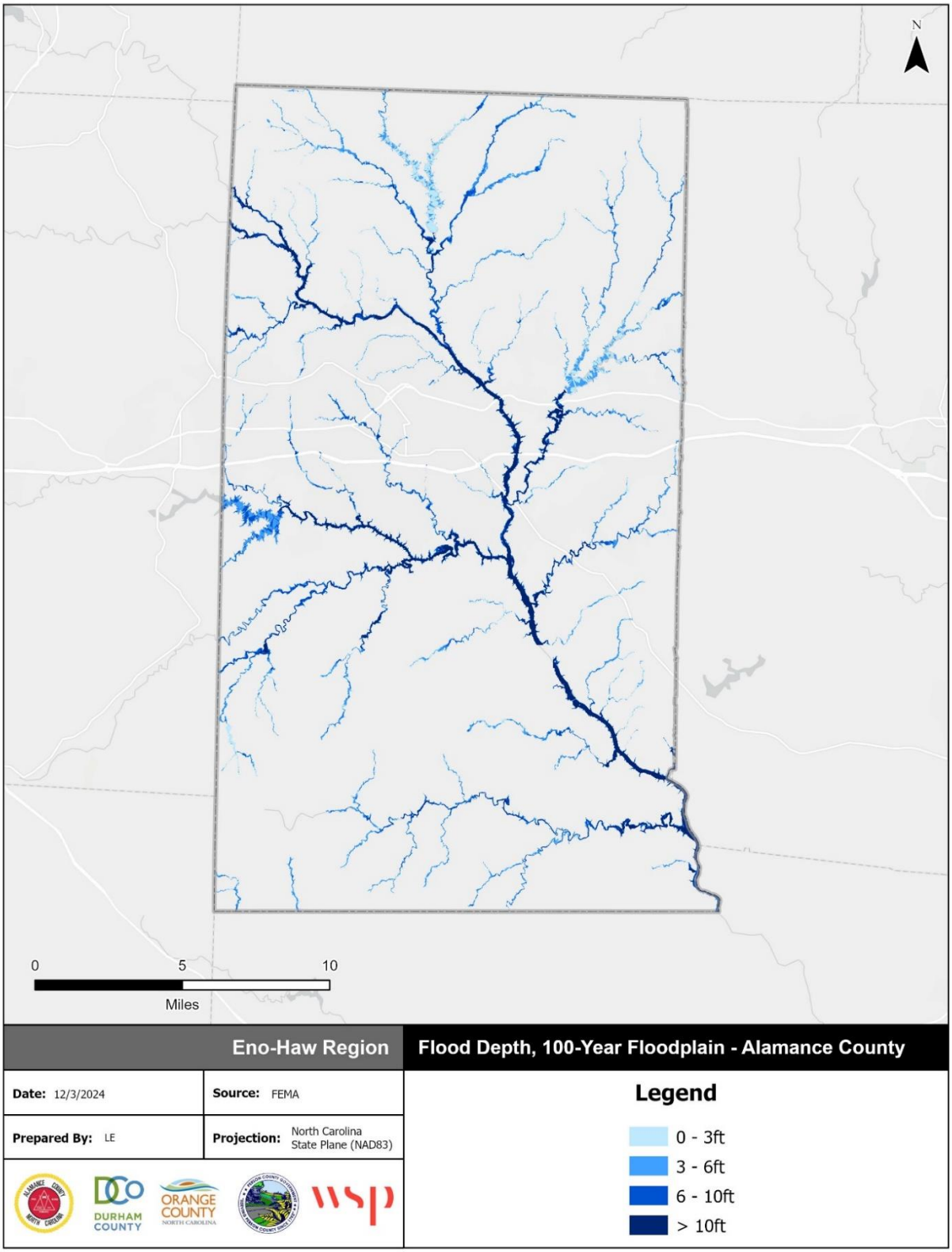
Source: FEMA Effective DFIRM

Figure A.28 – FEMA Flood Hazard Areas, Village of Alamance



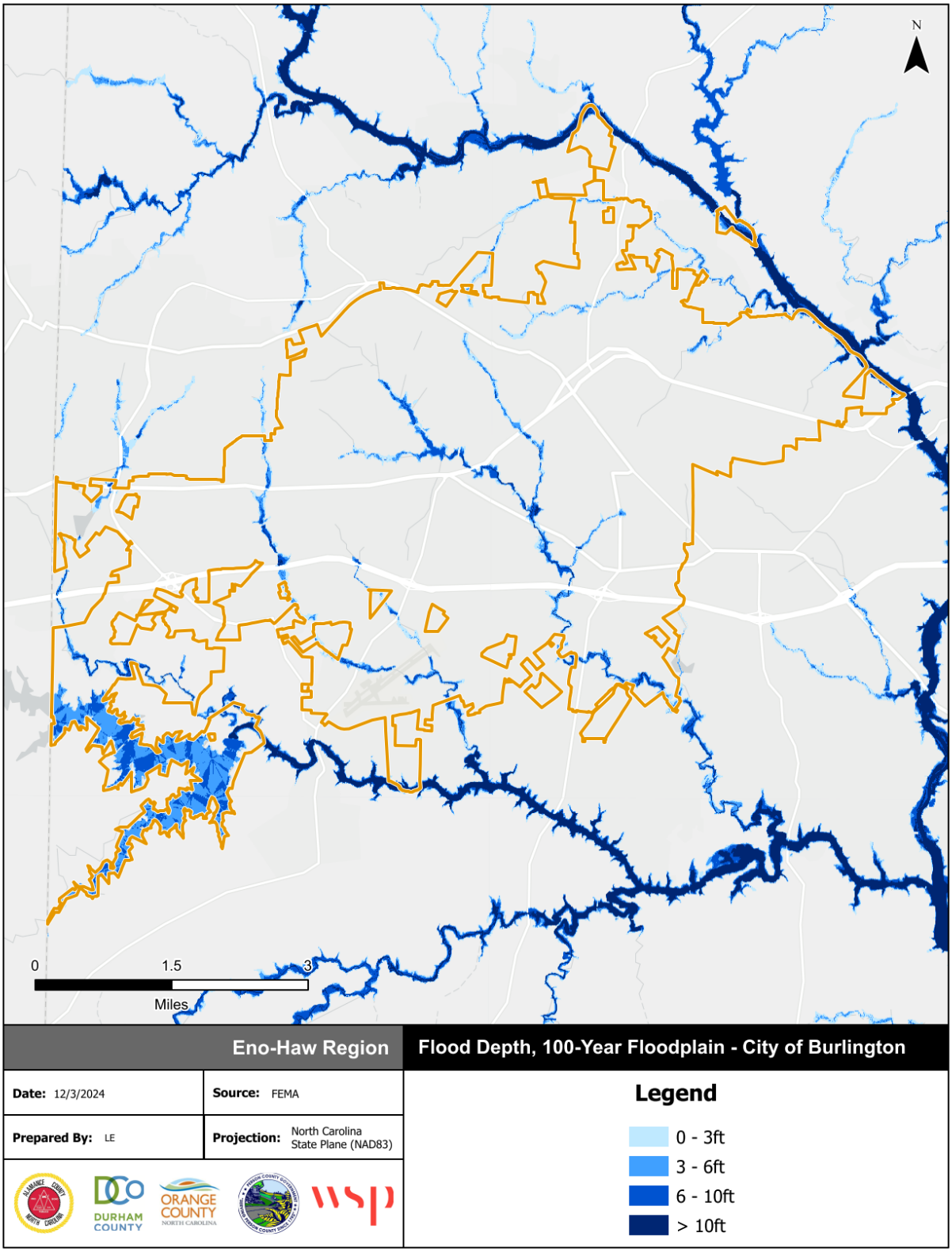
Source: FEMA Effective DFIRM

Figure A.29 – Flood Depth, 1%-Annual-Chance Floodplain, Unincorporated Alamance County



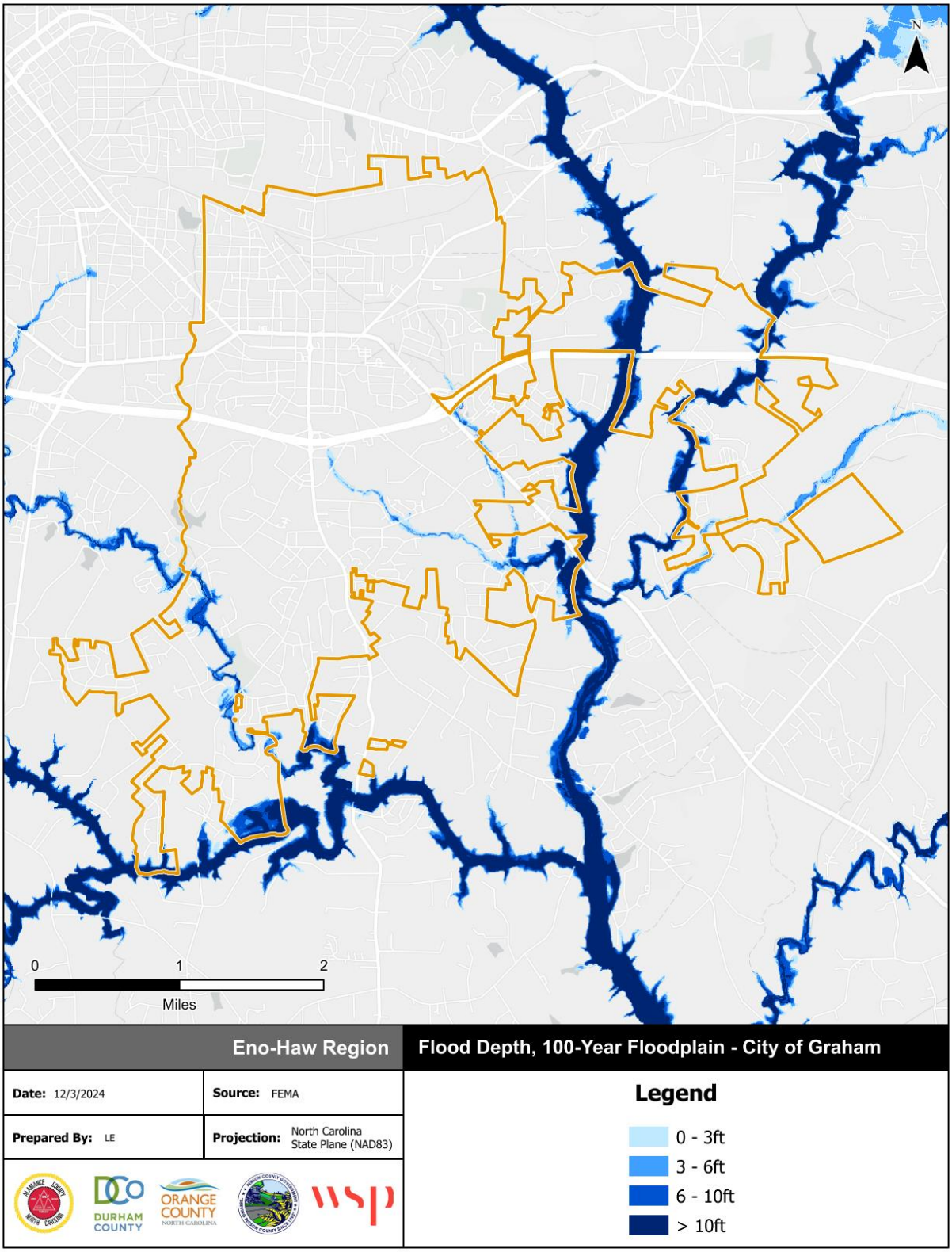
Source: FEMA Effective DFIRM

Figure A.30 – Flood Depth, 1%-Annual-Chance Floodplain, City of Burlington



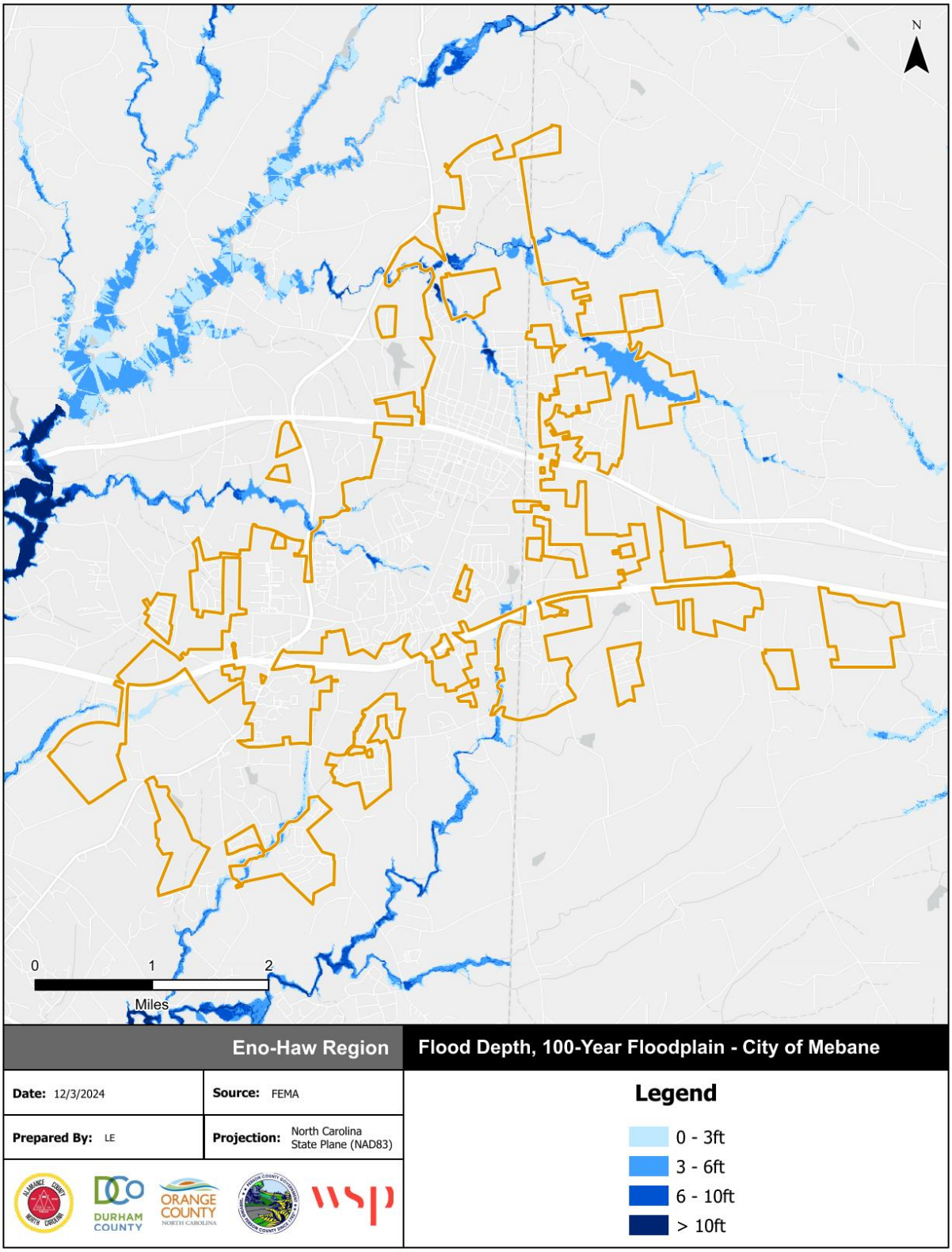
Source: FEMA Effective DFIRM

Figure A.31 – Flood Depth, 1%-Annual-Chance Floodplain, City of Graham



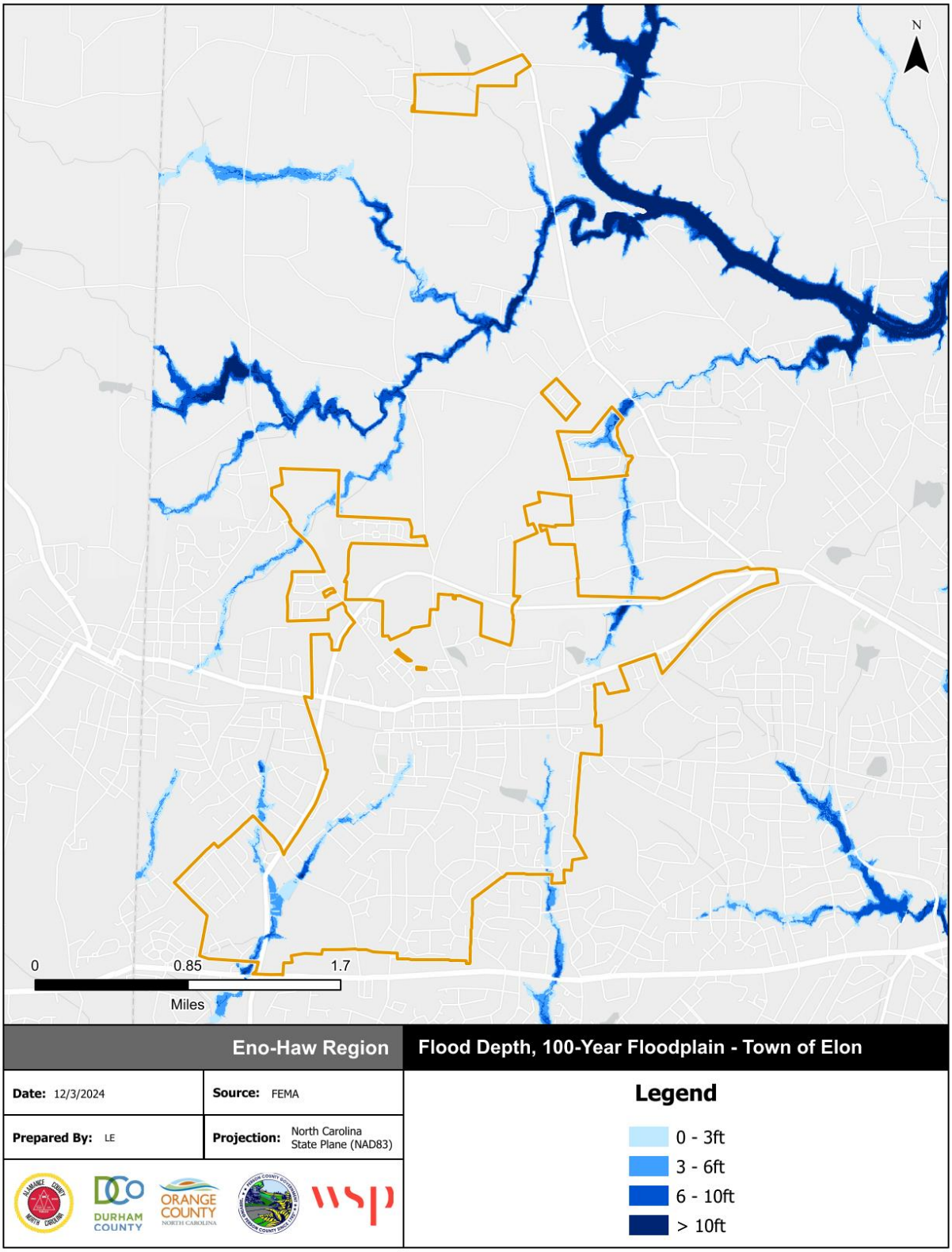
Source: FEMA Effective DFIRM

Figure A.32 – Flood Depth, 1%-Annual-Chance Floodplain, City of Mebane



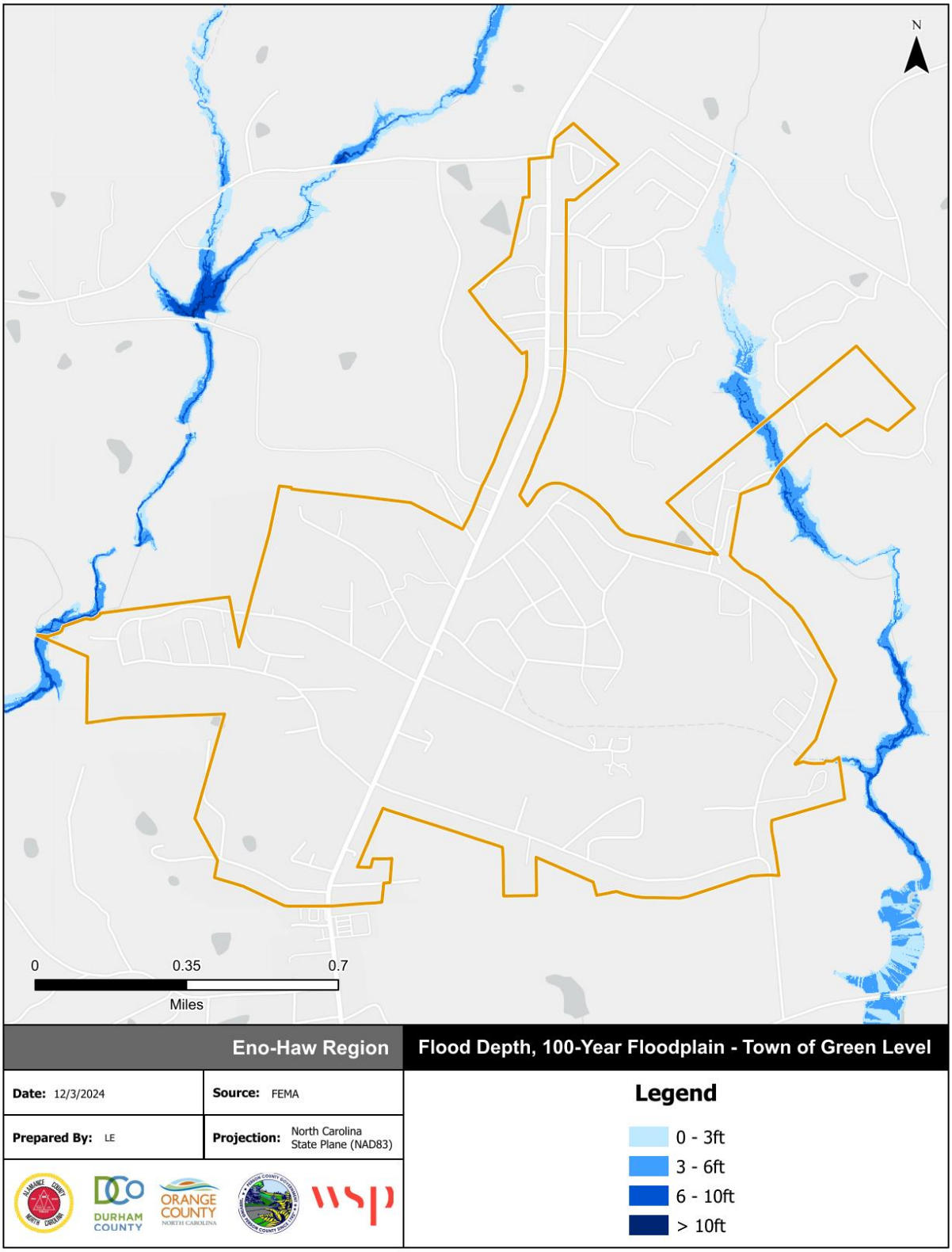
Source: FEMA Effective DFIRM

Figure A.33 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Elon



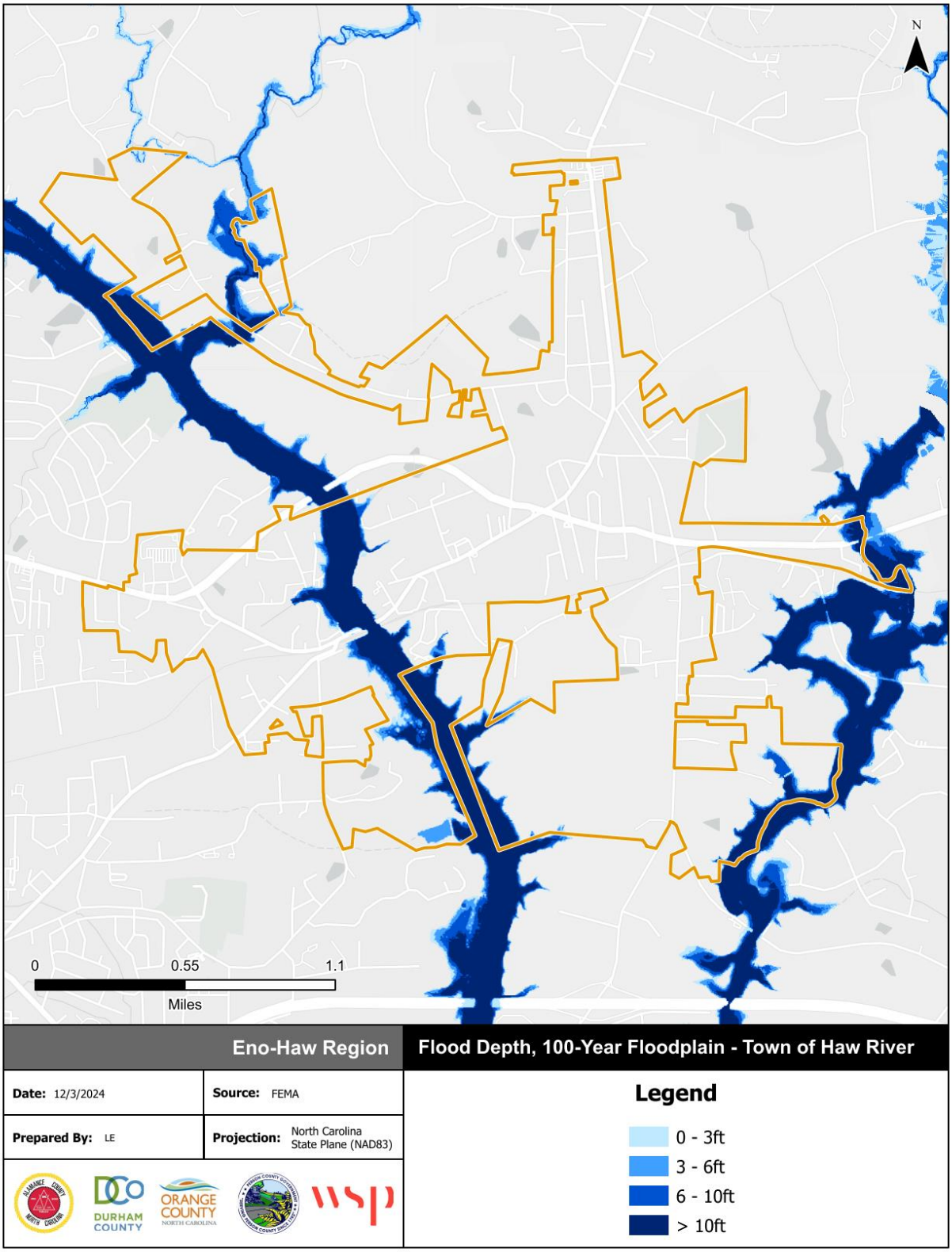
Source: FEMA Effective DFIRM

Figure A.34 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Green Level



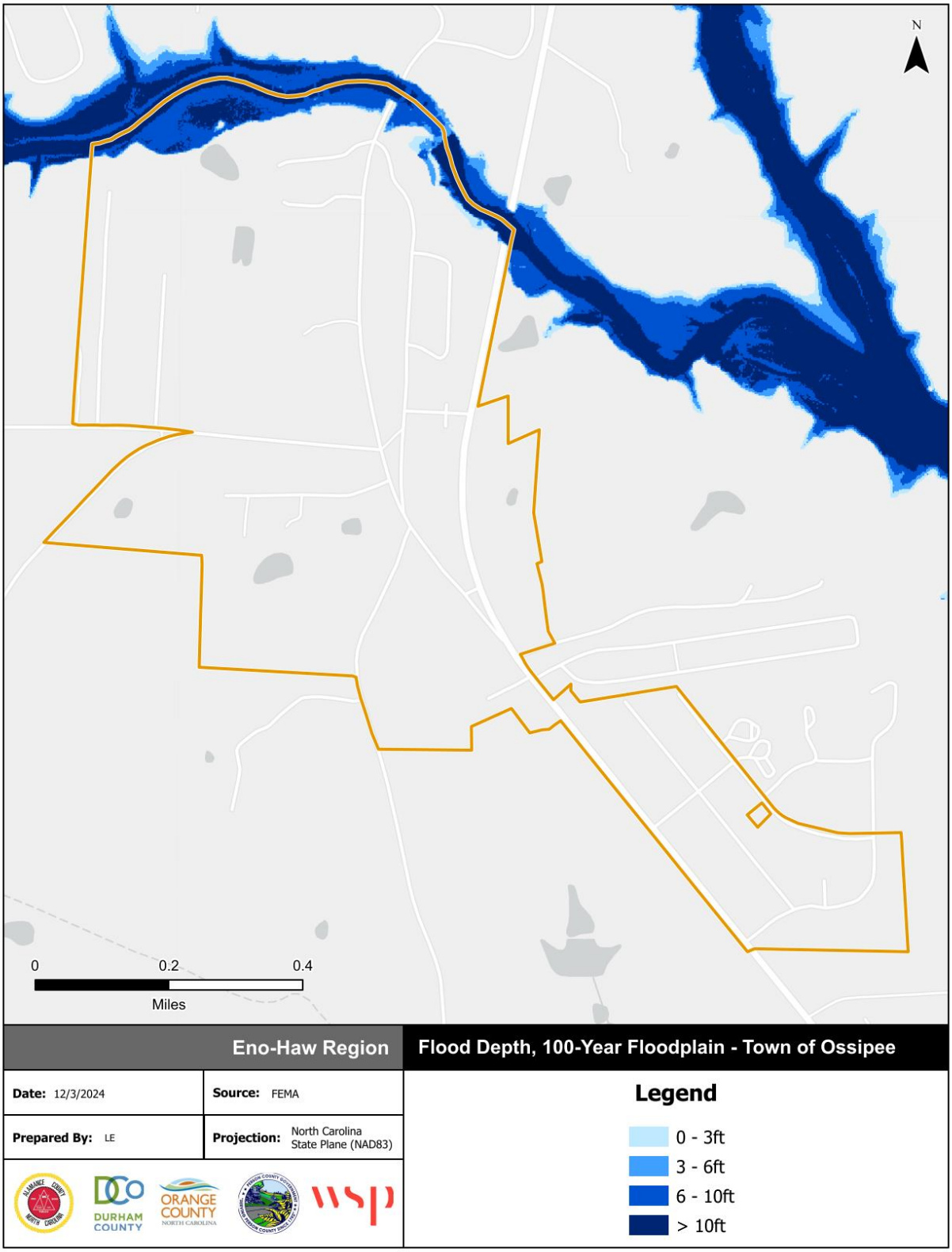
Source: FEMA Effective DFIRM

Figure A.35 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Haw River



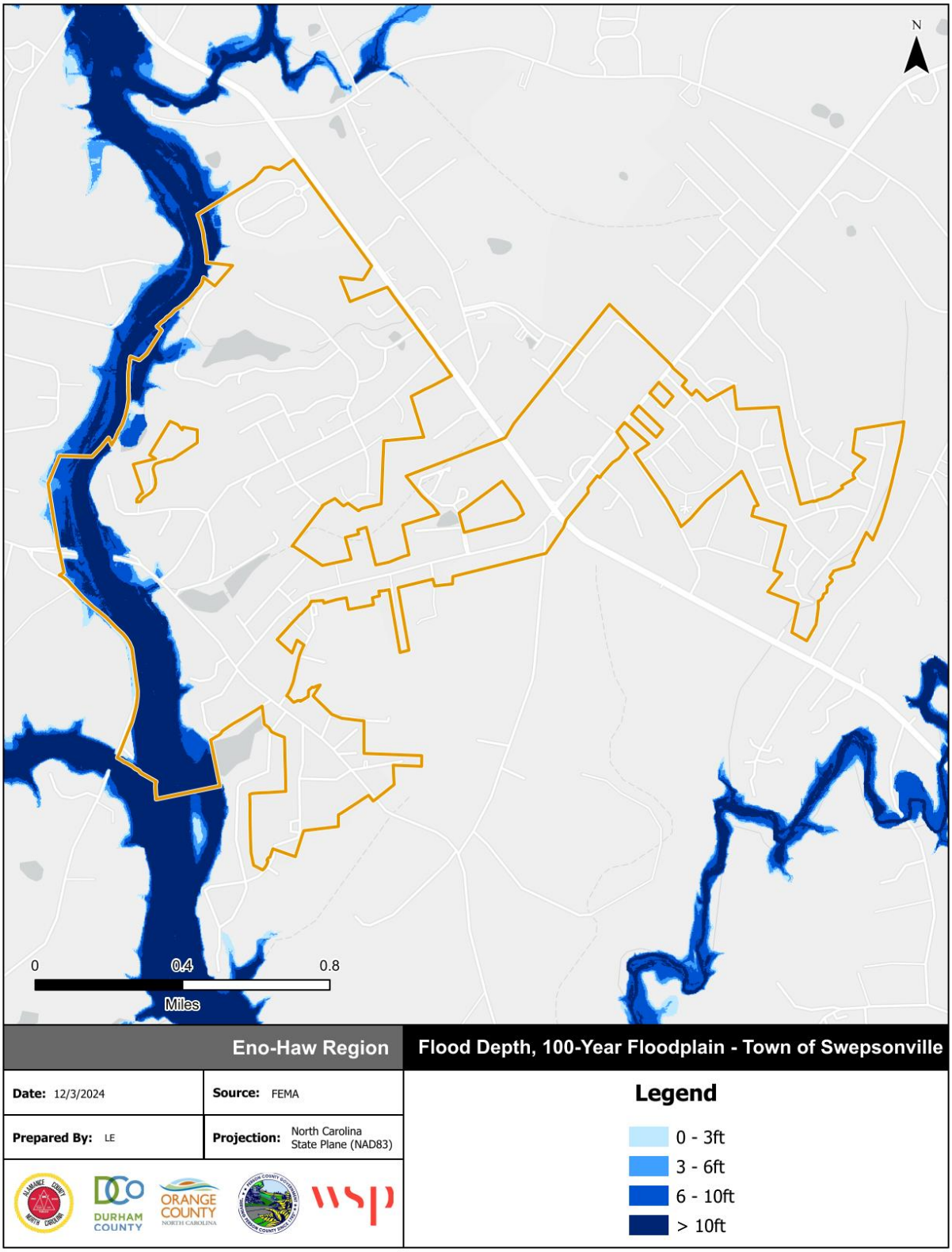
Source: FEMA Effective DFIRM

Figure A.36 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Ossipee



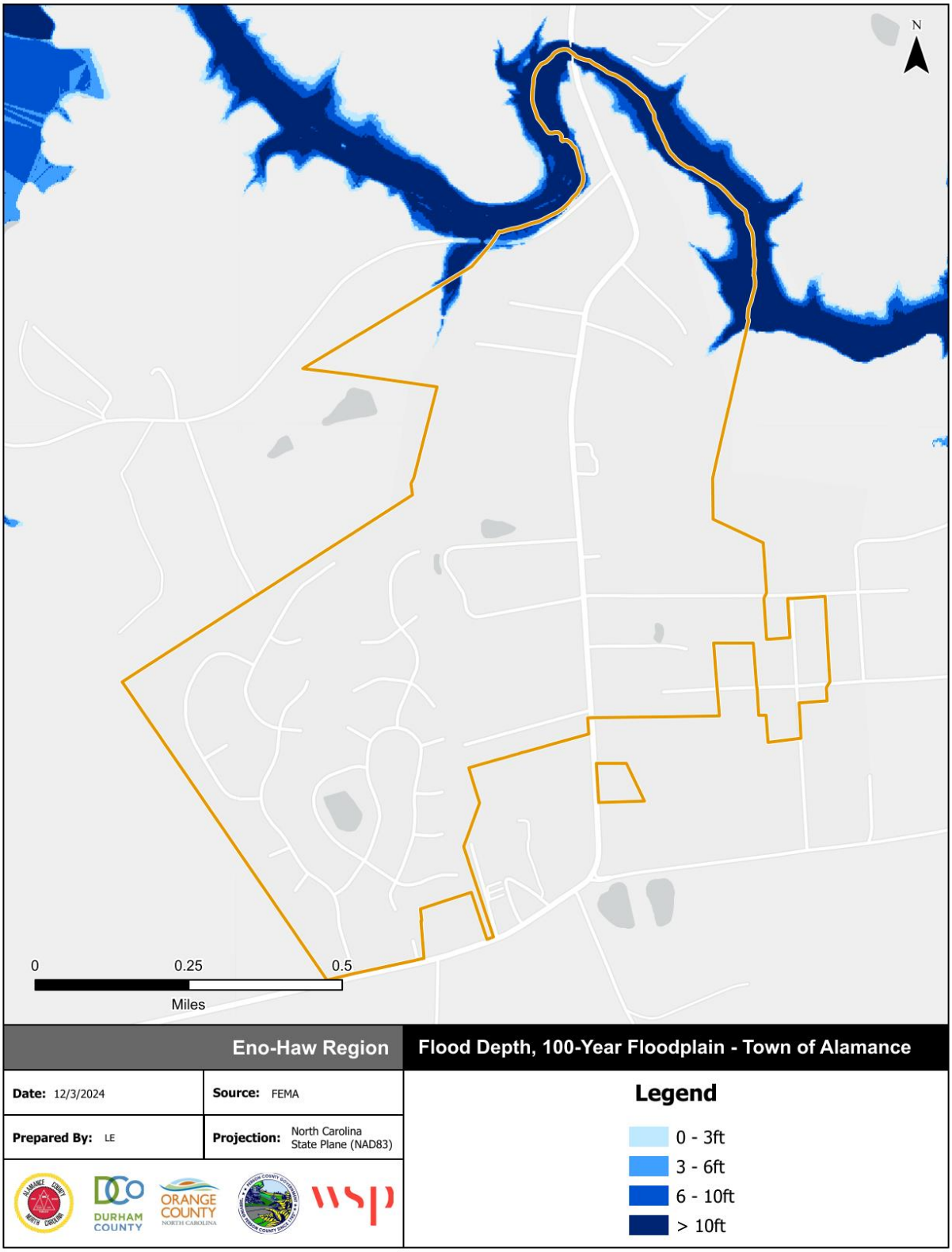
Source: FEMA Effective DFIRM

Figure A.37 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Swepsonville



Source: FEMA Effective DFIRM

Figure A.38 – Flood Depth, 1%-Annual-Chance Floodplain, Village of Alamance



Source: FEMA Effective DFIRM

A.2.2.1 *FLOOD INSURANCE DATA*

The following tables reflect NFIP policy and claims data for the County and incorporated jurisdictions categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table A.15 – NFIP Program Entry Dates

Community	Regular Program Entry	Emergency Program Entry
Alamance County	12/01/1981	1/16/1975
Village of Alamance	12/17/1987	12/17/1987
City of Burlington	4/1/1981	4/18/1975
Town of Elon	6/5/1989	3/10/1988
City of Graham	11/19/1980	6/30/1976
Town of Green Level	8/13/2007	-
Town of Haw River	11/5/1980	8/25/1975
City of Mebane	9/26/1975	11/5/1980
Town of Ossipee	Not Participating	
Town of Swepsonville	7/31/2001	-

Source: FEMA Community Information System

Table A.16 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Alamance County					
Single Family	19	$20,419	$5,243,000	34	$454,947.05
2-4 Family	1	$834	$350,000	0	$0.00
Non-Residential	1	$573	$25,000	6	$396,687.30
Total	**21**	**$21,826**	**$5,618,000**	**40**	**$851,634.35**
Village of Alamance					
Single Family	1	$336	$227,000	0	$0.00
Toal	**1**	**$336**	**$227,000**	**0**	**$0.00**
City of Burlington					
Single Family	71	$56,668	$15,507,000	49	$401,688.45
All Other Residential	13	$4,916	$1,809,000	2	$0.00
Non-Residential	4	$18,298	$2,050,000	2	$37,235.61
Total	**88**	**$79,882**	**$19,366,000**	**53**	**$438,924.06**
Town of Elon					
Single Family	17	$12,798	$4,906,000	6	$135,379.05
2-4 Family	2	$1,757	$700,000	0	$0.00
Total	**19**	**$14,555**	**$5,606,000**	**6**	**$135,379.05**
City of Graham					
Single Family	47	$37,278	$11,511,000	11	$66,098.16
Non-Residential	3	$13,562	$1,601,000	0	$0.00
Total	**50**	**$50,840**	**$13,112,000**	**11**	**$66,098.16**
Town of Haw River					
Single Family	2	$1,171	$205,000	1	$60,000.00
2-4 Family	1	$665	$210,000	0	$0.00
Total	3	$1,836	$415,000	1	$60,000.00

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
City of Mebane					
Single Family	31	$20,013	$8,949,000	3	$4,622.05
2-4 Family	1	$409	$350,000	0	$0.00
Total	**32**	**$20,422**	**$9,299,000**	**3**	**$4,622.05**
Town of Swepsonville					
Single Family	3	$1,887	$928,000	0	$0.00
Total	**3**	**$1,887**	**$928,000**	**0**	**$0.00**

Source: FEMA Community Information System, accessed April 2025

Table A.17 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Alamance County					
A01-30 & AE Zones	8	$11,252	$1,683,000	31	$743,069.66
A Zones	1	$573	$25,000	2	$100,061.71
B, C & X Zone					
Standard	12	$10,001	$3,910,000	3	$3,235.64
Preferred	0	$0	$0	1	$0.00
Total	**21**	**$21,826**	**$5,618,000**	**37**	**$846,367.01**
Village of Alamance					
B, C & X Zone					
Standard	1	$336	$227,000	0	$0.00
Total	**1**	**$336**	**$227,000**	**0**	**$0.00**
City of Burlington					
A01-30 & AE Zones	49	$47,469	$8,769,000	35	$383,580.75
A Zones	0	$0	$0	4	$13,208.70
B, C & X Zone					
Standard	39	$32,413	$10,597,000	3	$4,081.34
Preferred	0	$0	$0	8	$37,187.40
Total	**88**	**$79,882**	**$19,366,000**	**50**	**$438,058.19**
Town of Elon					
A01-30 & AE Zones	7	$5,745	$1,681,000	4	$30,851.04
B, C & X Zone					
Standard	12	$8,810	$3,925,000	1	$10,473.56
Preferred	0	$0	$0	1	$94,054.45
Total	**19**	**$14,555**	**$5,606,000**	**6**	**$135,379.05**
City of Graham					
A01-30 & AE Zones	31	$27,064	$7,224,000	8	$50,031.61
B, C & X Zone					
Standard	19	$23,776	$5,888,000	1	$2,345.45
Preferred	0	$0	$0	2	$13,721.10
Total	**50**	**$50,840**	**$13,112,000**	**11**	**$66,098.16**

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Haw River					
A01-30 & AE Zones	2	$1,171	$205,000	1	$60,000.00
B, C & X Zone					
Standard	1	$665	$210,000	0	$0.00
Total	**3**	**$1,836**	**$415,000**	**1**	**$60,000.00**
City of Mebane					
A01-30 & AE Zones	17	$11,472	$4,321,000	0	$0.00
B, C & X Zone					
Standard	15	$8,950	$4,978,000	0	$0.00
Preferred	0	$0	$0	3	$4,622.05
Total	**32**	**$20,422**	**$9,299,000**	**3**	**$4,622.05**
Town of Swepsonville					
B, C & X Zone					
Standard	3	$1,887	$928,000	0	$0.00
Total	**3**	**$1,887**	**$928,000**	**0**	**$0.00**

Source: FEMA Community Information System, accessed April 2025

Table A.18 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Alamance County					
A01-30 & AE Zones	3	$6,024	$550,000	28	$692,586.50
A Zones	0	$0	$0	1	$73,761.71
B, C & X Zone	7	$6,551	$2,160,000	3	$3,235.64
Standard	7	$6,551	$2,160,000	3	$3,235.64
Total	**10**	**$12,575**	**$2,710,000**	**32**	**$769,583.85**
City of Burlington					
A01-30 & AE Zones	29	$38,544	$5,666,000	35	$383,580.75
A Zones	0	$0	$0	4	$13,208.70
B, C & X Zone	23	$22,957	$6,803,000	10	$41,268.74
Standard	23	$22,957	$6,803,000	3	$4,081.34
Preferred	0	$0	$0	7	$37,187.40
Total	**52**	**$61,501**	**$12,469,000**	**49**	**$438,058.19**
Town of Elon					
A01-30 & AE Zones	5	$3,983	$1,341,000	0	$0.00
B, C & X Zone	5	$3,765	$1,475,000	1	$10,473.56
Standard	5	$3,765	$1,475,000	1	$10,473.56
Total	**10**	**$7,748**	**$2,816,000**	**1**	**$10,473.56**
City of Graham					
A01-30 & AE Zones	2	$1,314	$396,000	8	$50,031.61
B, C & X Zone	6	$7,124	$1,944,000	2	$13,721.10
Standard	6	$7,124	$1,944,000	0	$0.00
Preferred	0	$0	$0	2	$13,721.10
Total	**8**	**$8,438**	**$2,340,000**	**10**	**$63,752.71**

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Haw River					
A01-30 & AE Zones	1	$717	$44,000	1	$60,000.00
Total	**1**	**$717**	**$44,000**	**1**	**$60,000.00**
City of Mebane					
A01-30 & AE Zones	2	$620	$240,000	0	$0.00
B, C & X Zone	4	$2,890	$1,268,000	2	$3,090.26
Standard	4	$2,890	$1,268,000	0	$0.00
Preferred	0	$0	$0	2	$3,090.26
Total	**6**	**$3,510**	**$1,508,000**	**2**	**$3,090.26**
Town of Swepsonville					
B, C & X Zone	1	$581	$228,000	0	$0.00
Standard	1	$581	$228,000	0	$0.00
Total	**1**	**$581**	**$228,000**	**0**	**$0.00**

Source: FEMA Community Information System, accessed April 2025

Table A.19 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Alamance County					
A01-30 & AE Zones	5	$5,228	$1,133,000	3	$50,483.16
A Zones	1	$573	$25,000	1	$26,300.00
B, C & X Zone	5	$3,450	$1,750,000	1	$0.00
Standard	5	$3,450	$1,750,000	0	$0.00
Total	**11**	**$9,251**	**$2,908,000**	**5**	**$76,783.16**
Village of Alamance					
B, C & X Zone	1	$336	$227,000	0	$0.00
Standard	1	$336	$227,000	0	$0.00
Total	**1**	**$336**	**$227,000**	**0**	**$0.00**
City of Burlington					
A01-30 & AE Zones	20	$8,925	$3,103,000	0	$0.00
B, C & X Zone	16	$9,456	$3,794,000	1	$0.00
Standard	16	$9,456	$3,794,000	0	$0.00
Preferred	0	$0	$0	1	$0.00
Total	**36**	**$18,381**	**$6,897,000**	**1**	**$0.00**
Town of Elon					
A01-30 & AE Zones	2	$1,762	$340,000	4	$30,851.04
B, C & X Zone	7	$5,045	$2,450,000	1	$94,054.45
Standard	7	$5,045	$2,450,000	0	$0.00
Preferred	0	$0	$0	1	$94,054.45
Total	**9**	**$6,807**	**$2,790,000**	**5**	**$124,905.49**

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
City of Graham					
A01-30 & AE Zones	29	$25,750	$6,828,000	0	$0.00
B, C & X Zone	13	$16,652	$3,944,000	1	$2,345.45
Standard	13	$16,652	$3,944,000	1	$2,345.45
Total	**42**	**$42,402**	**$10,772,000**	**1**	**$2,345.45**
Town of Haw River					
A01-30 & AE Zones	1	$454	$161,000	0	$0.00
B, C & X Zone	1	$665	$210,000	0	$0.00
Standard	1	$665	$210,000	0	$0.00
Total	**2**	**$1,119**	**$371,000**	**0**	**$0.00**
City of Mebane					
A01-30 & AE Zones	15	$10,852	$4,081,000	0	$0.00
B, C & X Zone	11	$6,060	$3,710,000	1	$1,531.79
Standard	11	$6,060	$3,710,000	0	$0.00
Preferred	0	$0	$0	1	$1,531.79
Total	**26**	**$16,912**	**$7,791,000**	**1**	**$1,531.79**
Town of Swepsonville					
B, C & X Zone	2	$1,306	$700,000	0	$0.00
Standard	2	$1,306	$700,000	0	$0.00
Total	**2**	**$1,306**	**$700,000**	**0**	**$0.00**

Source: FEMA Community Information System, accessed April 2025

A.2.3 WILDFIRE

Table A.20 summarizes the acreage in Alamance County that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 25 percent of Alamance County is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table A.20 – Functional Wildland Urban Interface Acreage, Alamance County

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	69,426	25%
	Indirect Exposure	27,718	10%
	Critical Fireshed	91,005	33%
	Sources of Ember Load to Buildings	85,064	31%
	Little to No Exposure	0	0%
	Water	4,749	2%
	Total	**277,961**	**100%**

Source: Southern Wildfire Risk Assessment

Figure A.39 and Figure A.48 depict the Functional WUI with the location of critical facilities for unincorporated Alamance County and all participating jurisdictions. Figure A.49 and Figure A.58 depict the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure A.59 and Figure A.68 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Functional WUI areas with direct exposure to wildfire are distributed throughout the county with limited gaps. Burn probability is low throughout most of the county with clusters of moderate burn probability in southern Alamance County. Potential fire intensity is low to moderate across much of Alamance County with a few clusters of moderate to high fire intensity in the southeastern region of unincorporated Alamance County.

Table A.21 and Table A.30 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table A.21 – Critical Facilities Exposed to Wildfire, Unincorporated Alamance County

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	18	$50,184,843
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	8	$1,939,723
Transportation	0	$-
Water Systems	19	$1,585,451
Total	**45**	**$53,710,017**

Source: Southern Wildfire Risk Assessment

Table A.22 – Critical Facilities Exposed to Wildfire, City of Burlington

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	6	$751,248
Total	**6**	**$751,248**

Source: Southern Wildfire Risk Assessment

Table A.23 – Critical Facilities Exposed to Wildfire, City of Graham

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	1	$8,956,393
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	1	$36,146
Total	**2**	**$8,992,540**

Source: Southern Wildfire Risk Assessment

Table A.24 – Critical Facilities Exposed to Wildfire, City of Mebane

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	6	$61,642
Total	**6**	**$61,642**

Source: Southern Wildfire Risk Assessment

Table A.25 – Critical Facilities Exposed to Wildfire, Town of Elon

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	10	$31,521,259
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	0	$-
Total	**10**	**$31,521,259**

Source: Southern Wildfire Risk Assessment

Table A.26 – Critical Facilities Exposed to Wildfire, Town of Green Level

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	0	$-
Total	**0**	**0**

Source: Southern Wildfire Risk Assessment

Table A.27 – Critical Facilities Exposed to Wildfire, Town of Haw River

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	1	$-
Total	**1**	**$-**

Source: Southern Wildfire Risk Assessment

Table A.28 – Critical Facilities Exposed to Wildfire, Town of Ossipee

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	0	$-
Total	**0**	**$-**

Source: Southern Wildfire Risk Assessment

Table A.29 – Critical Facilities Exposed to Wildfire, Town of Swepsonville

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	0	$-
Total	**0**	**$-**

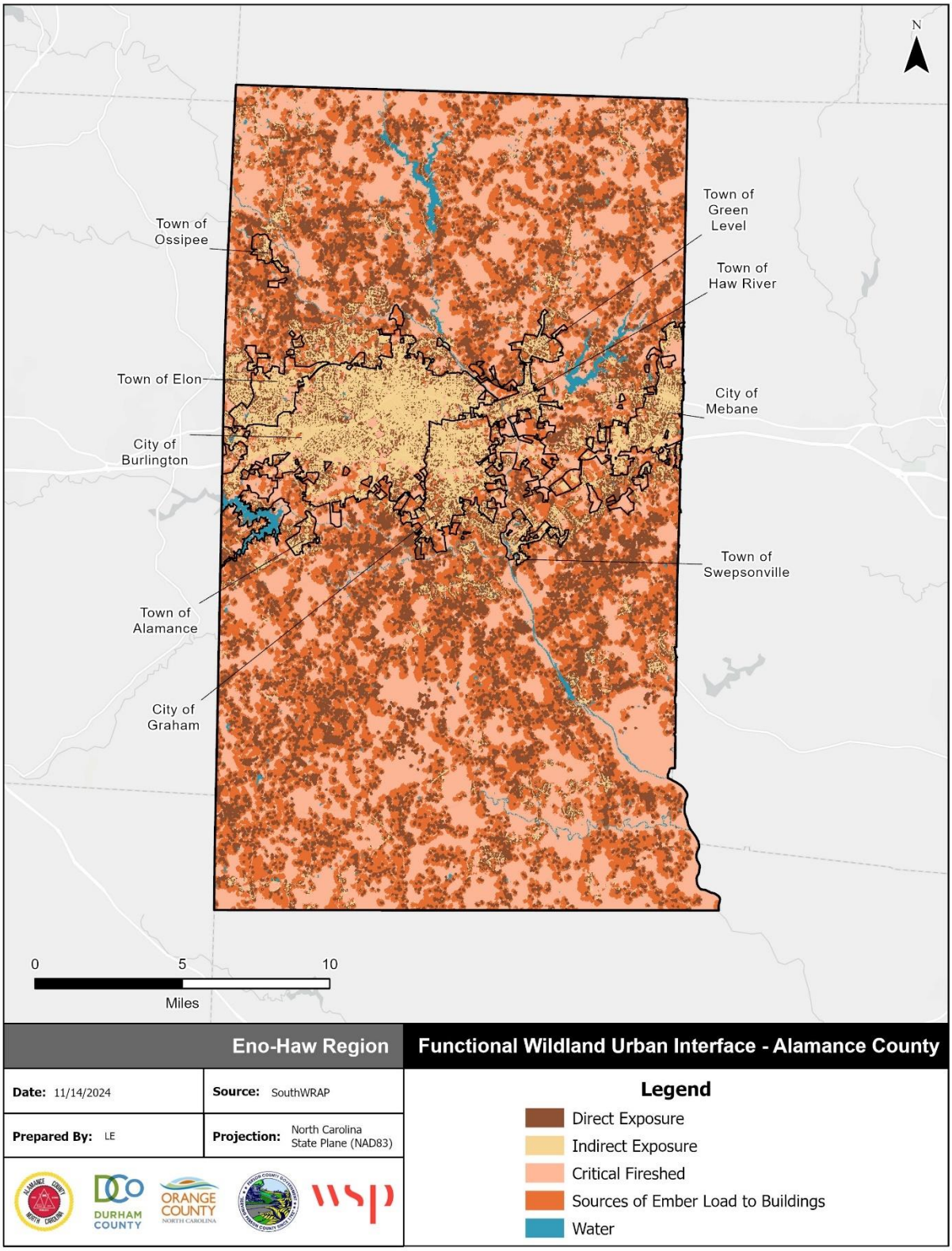
Source: Southern Wildfire Risk Assessment

Table A.30 – Critical Facilities Exposed to Wildfire, Village of Alamance

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	2	$725,009
Total	**2**	**$725,009**

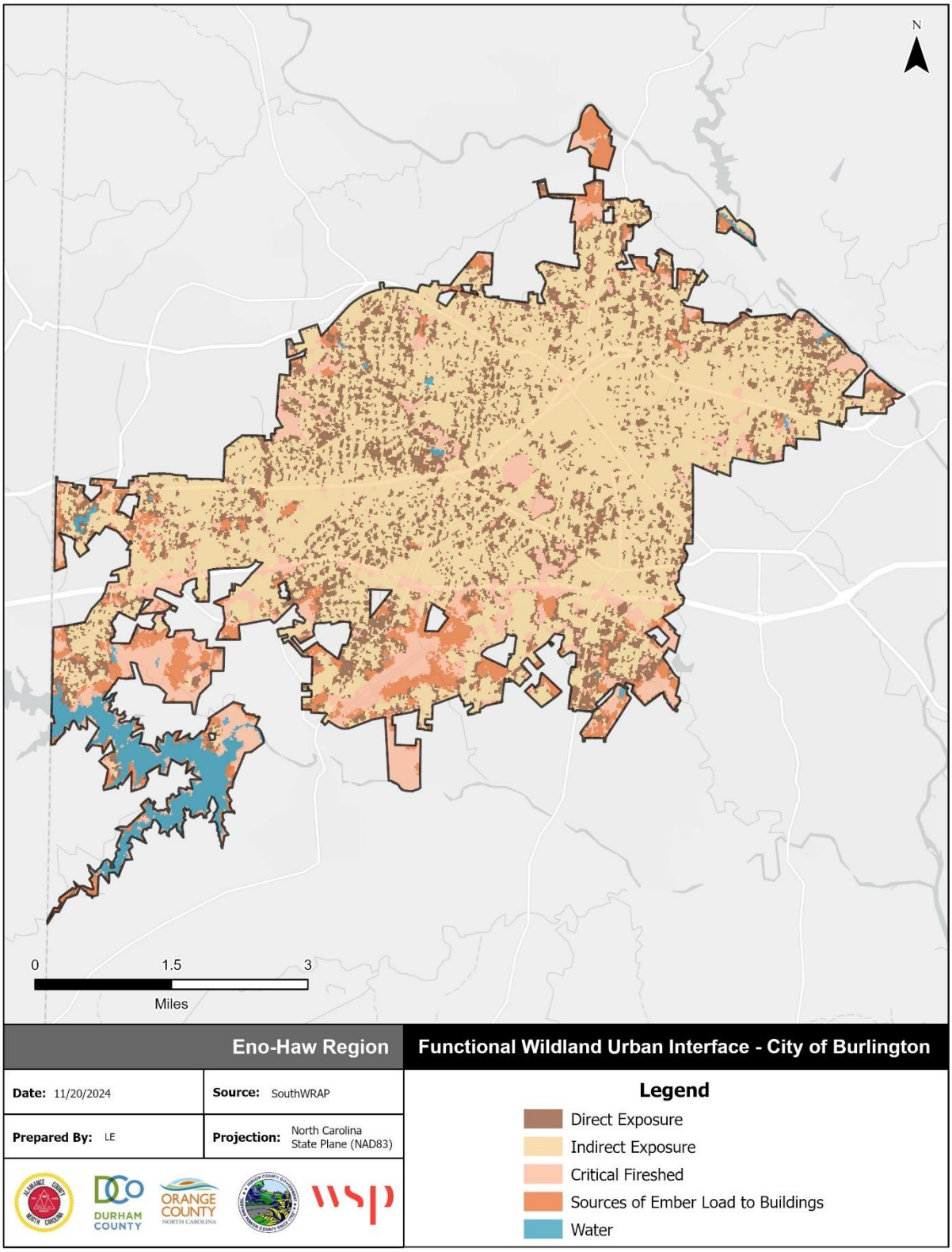
Source: Southern Wildfire Risk Assessment

Figure A.39 – Functional Wildland Urban Interface, Unincorporated Alamance County



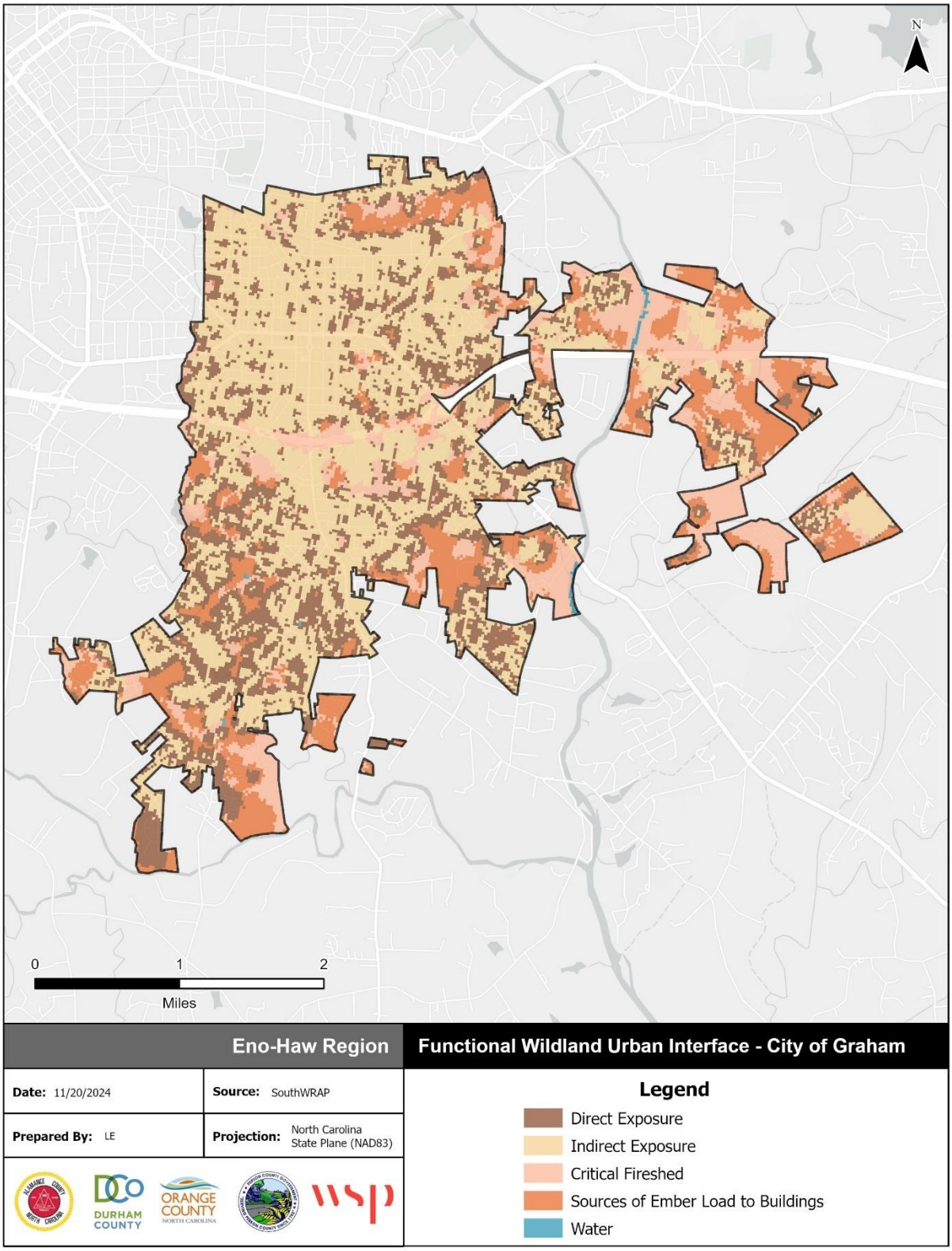
Source: Southern Wildfire Risk Assessment

Figure A.40 – Functional Wildland Urban Interface, City of Burlington



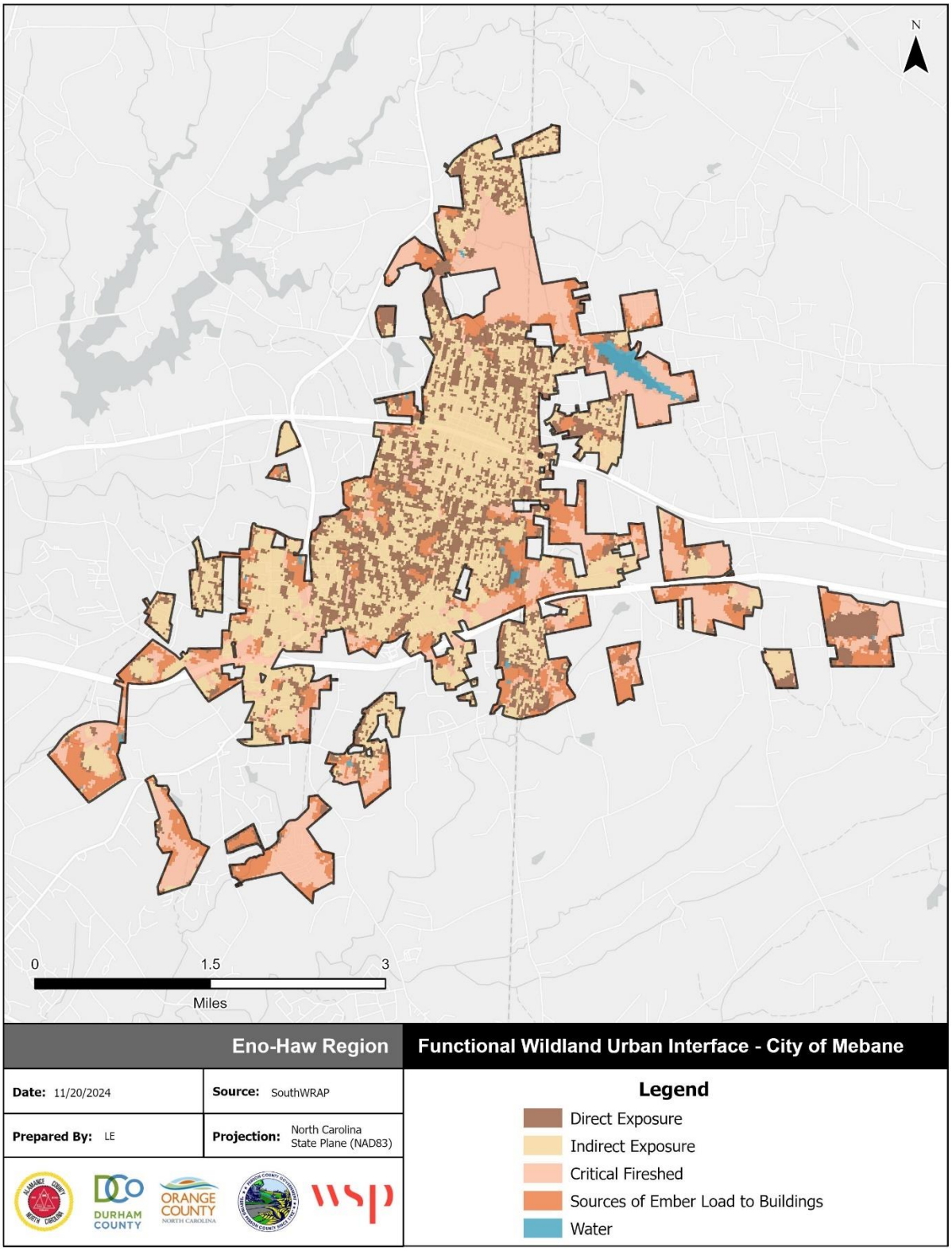
Source: Southern Wildfire Risk Assessment

Figure A.41 – Functional Wildland Urban Interface, City of Graham



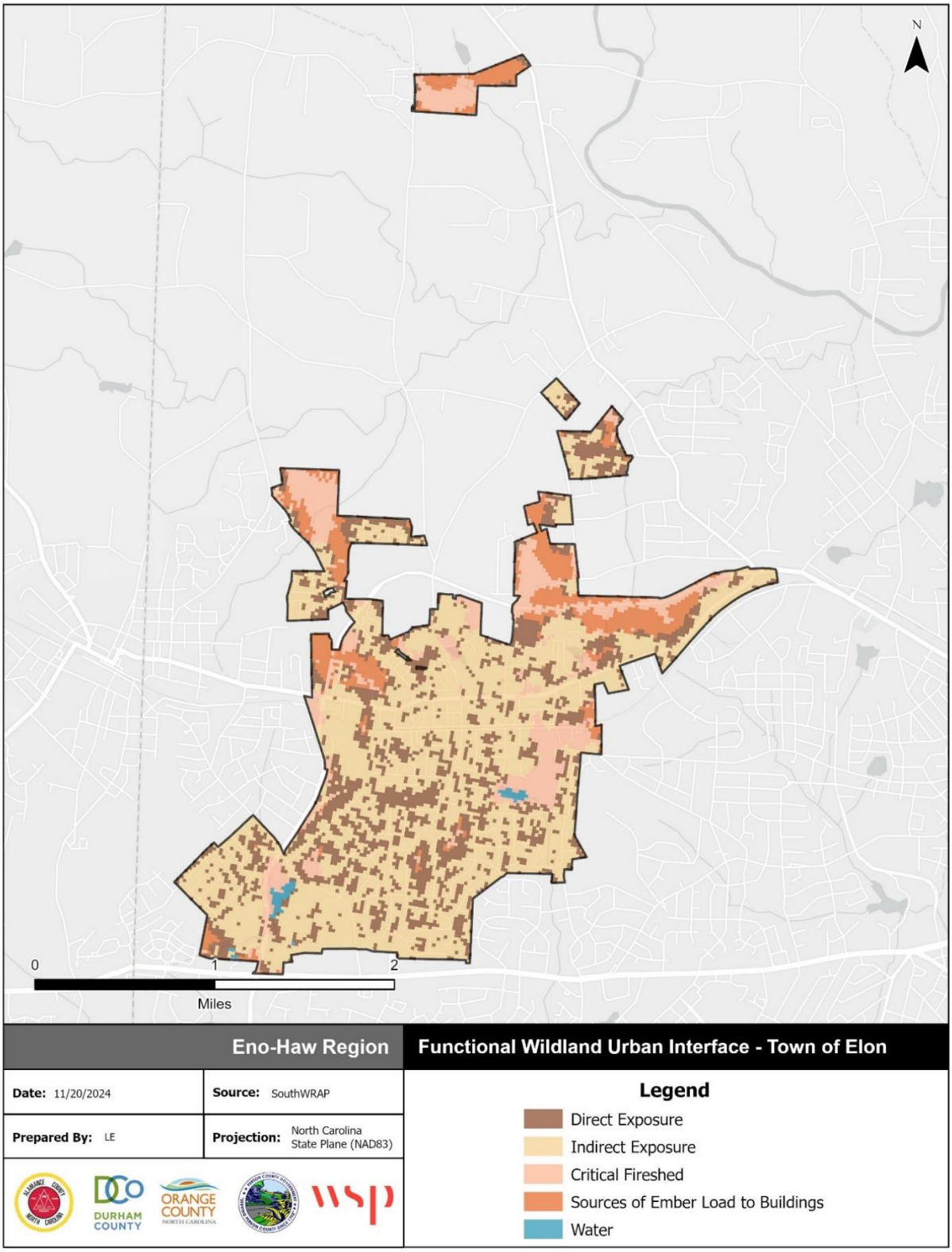
Source: Southern Wildfire Risk Assessment

Figure A.42 – Functional Wildland Urban Interface, City of Mebane



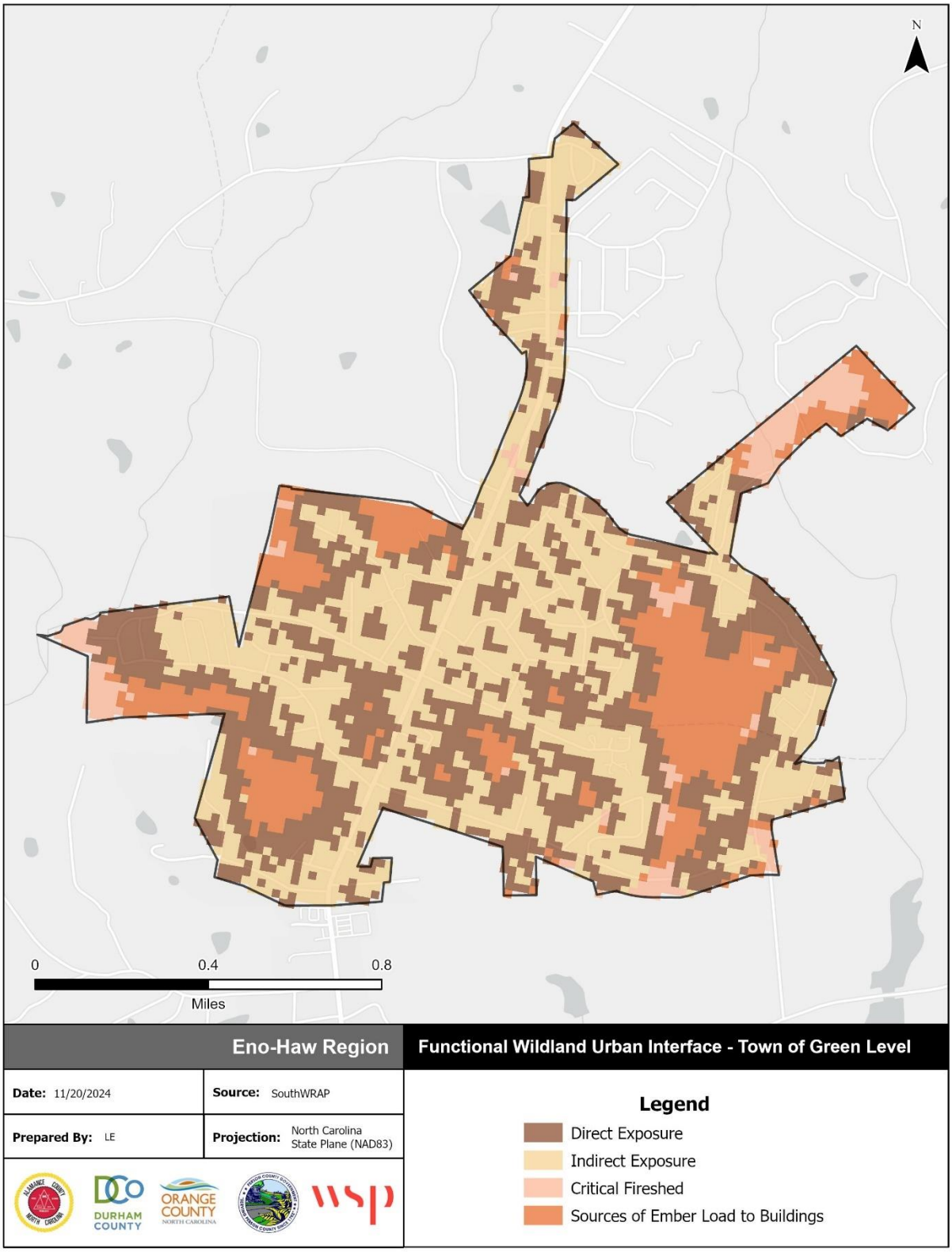
Source: Southern Wildfire Risk Assessment

Figure A.43 – Functional Wildland Urban Interface, Town of Elon



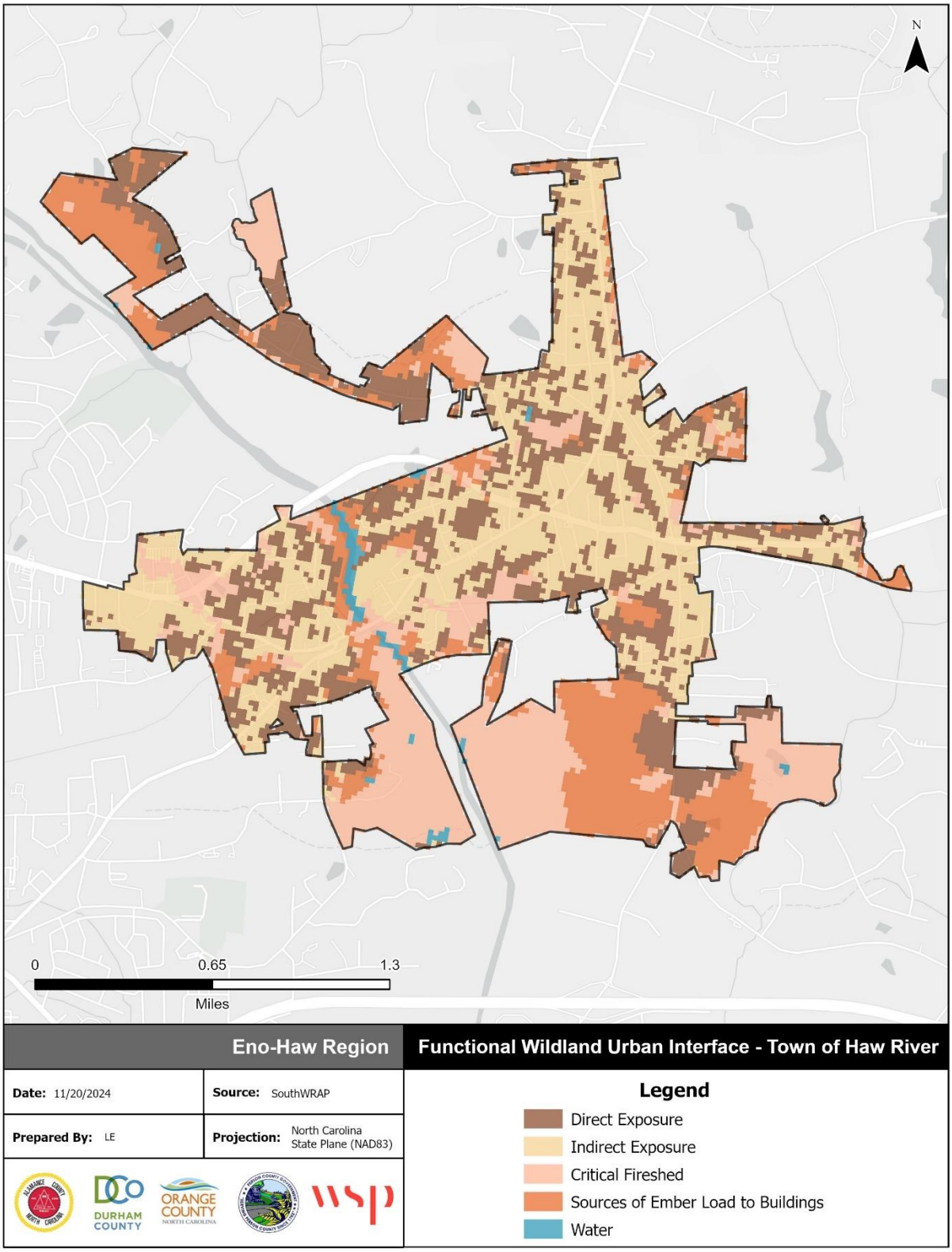
Source: Southern Wildfire Risk Assessment

Figure A.44 – Functional Wildland Urban Interface, Town of Green Level



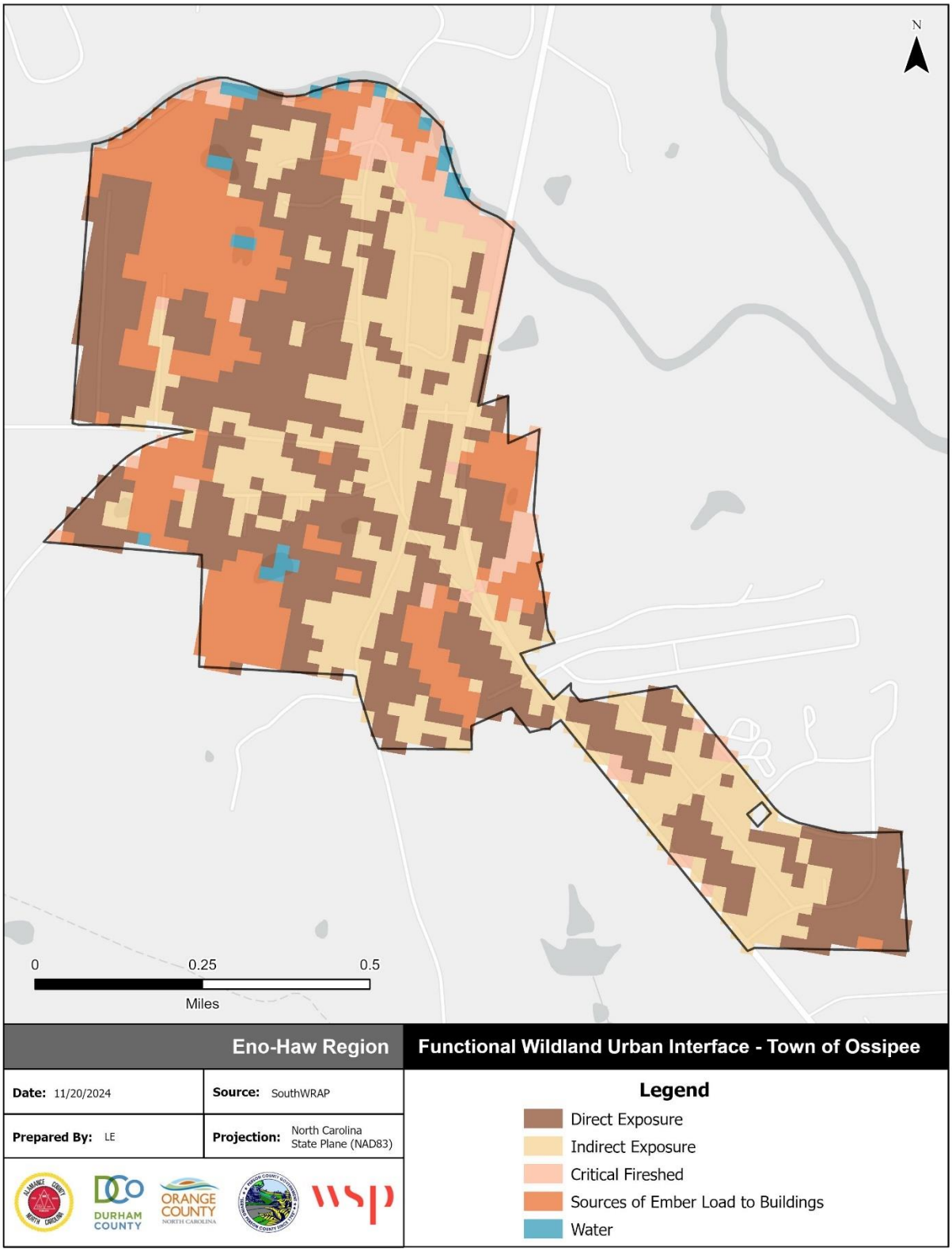
Source: Southern Wildfire Risk Assessment

Figure A.45 – Functional Wildland Urban Interface, Town of Haw River



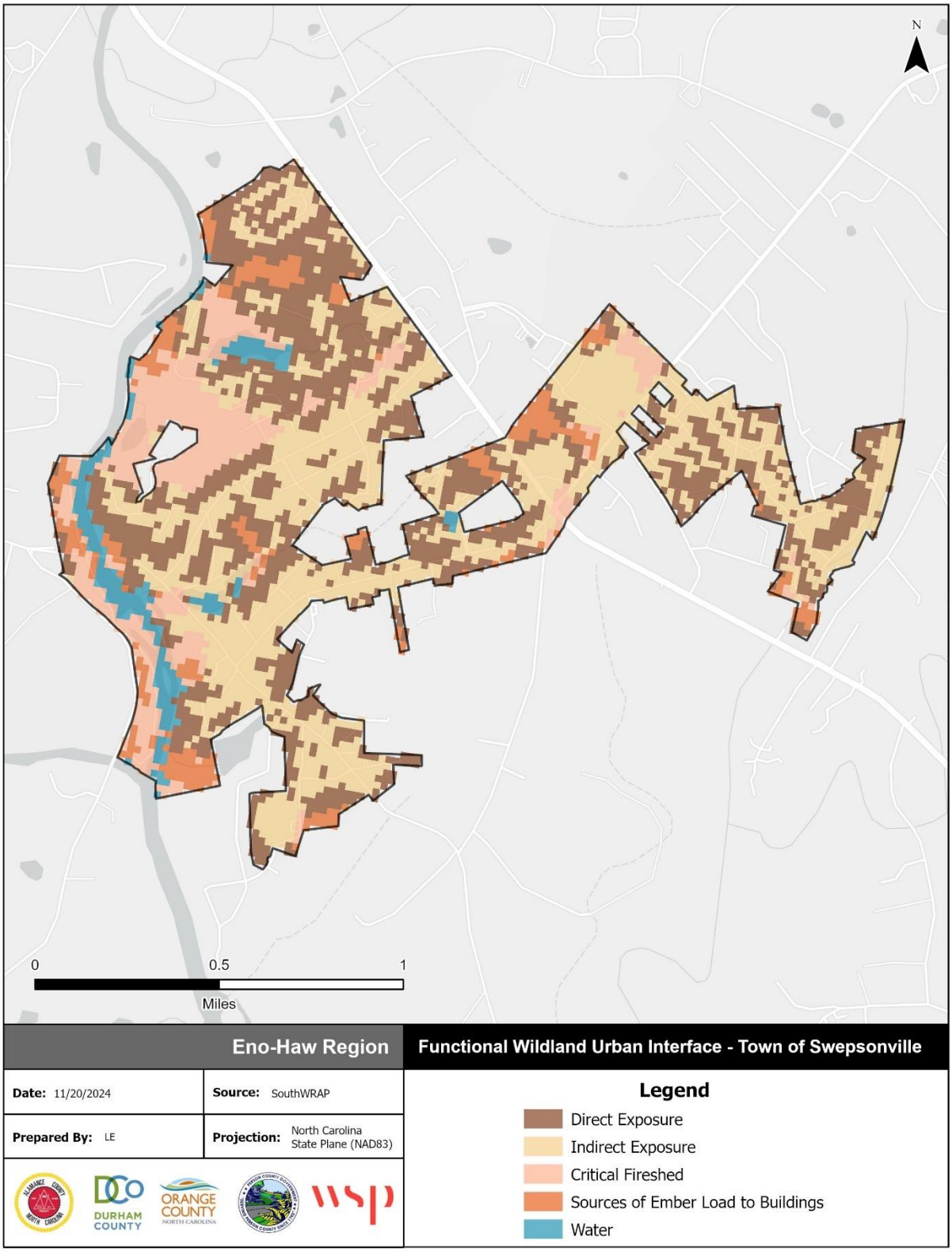
Source: Southern Wildfire Risk Assessment

Figure A.46 – Functional Wildland Urban Interface, Town of Ossipee



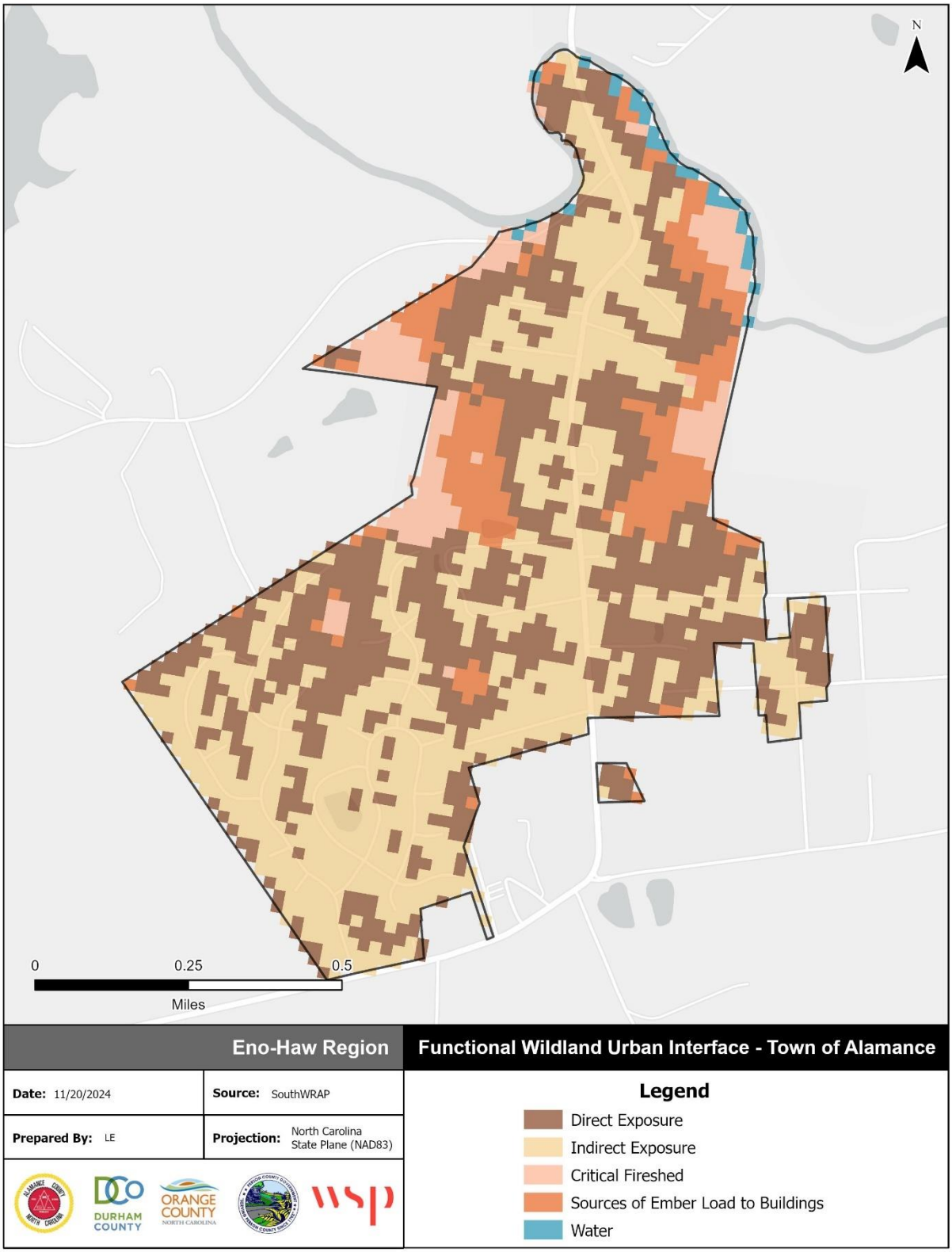
Source: Southern Wildfire Risk Assessment

Figure A.47 – Functional Wildland Urban Interface, Town of Swepsonville



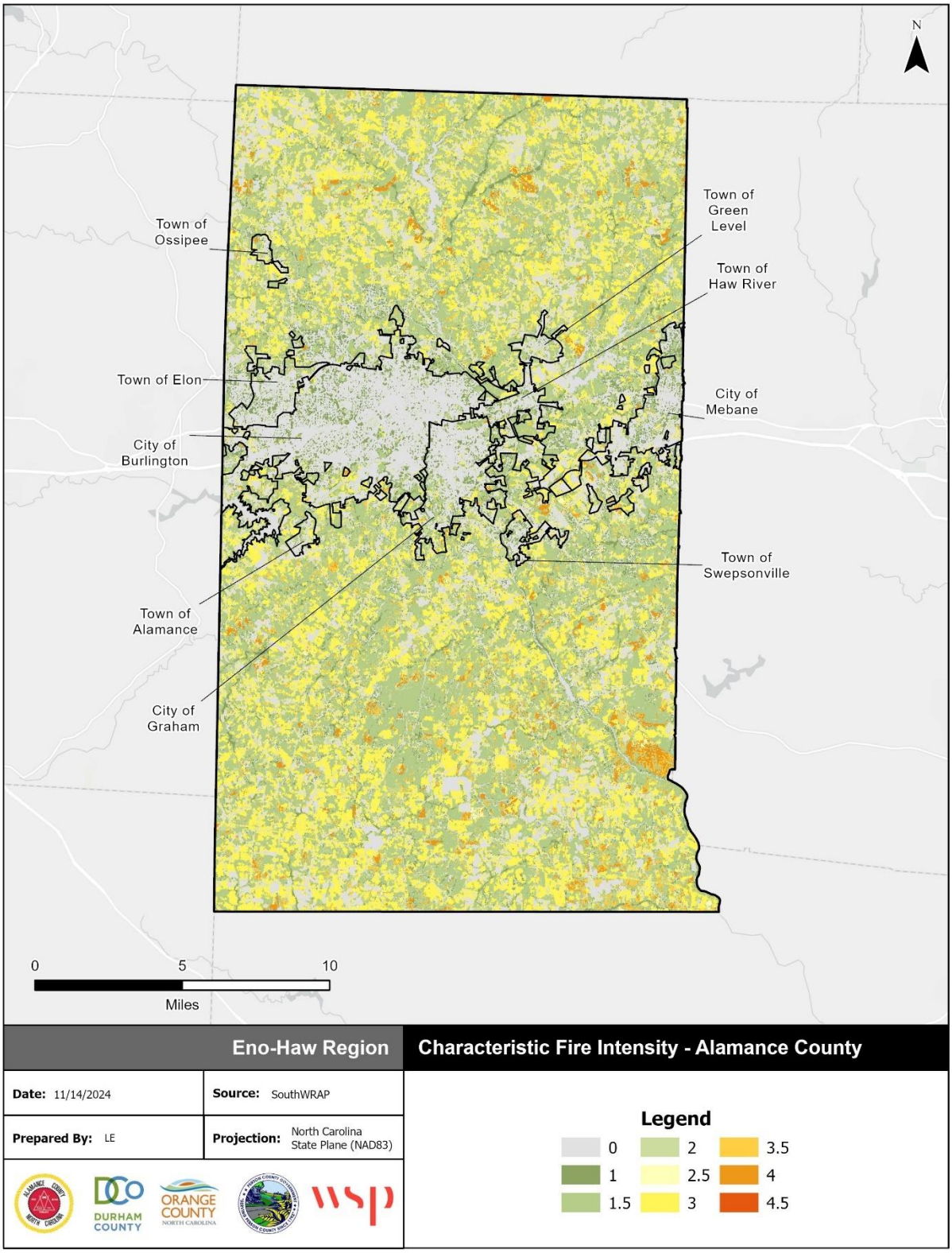
Source: Southern Wildfire Risk Assessment

Figure A.48 – Functional Wildland Urban Interface, Village of Alamance



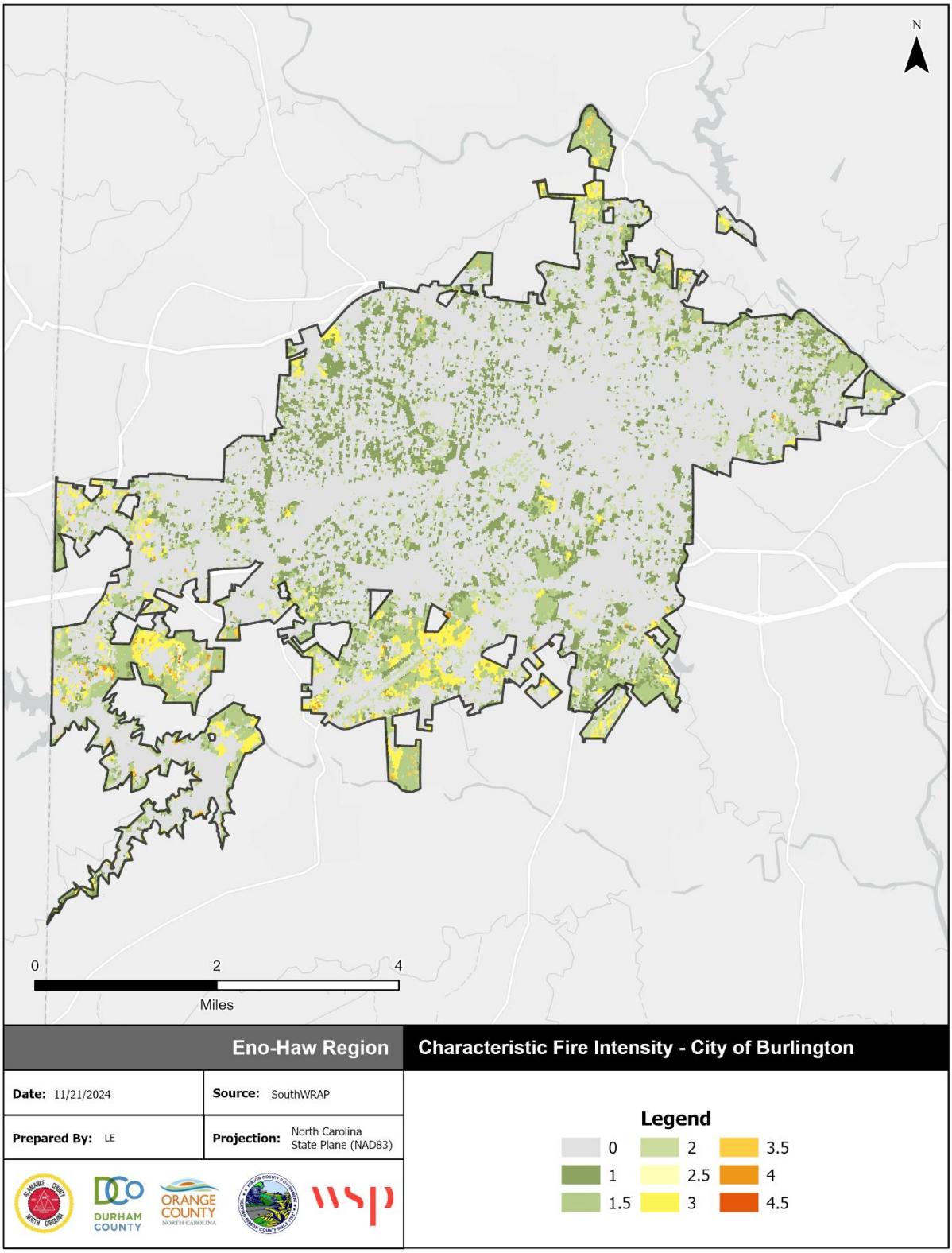
Source: Southern Wildfire Risk Assessment

Figure A.49 – Characteristic Fire Intensity, Unincorporated Alamance County



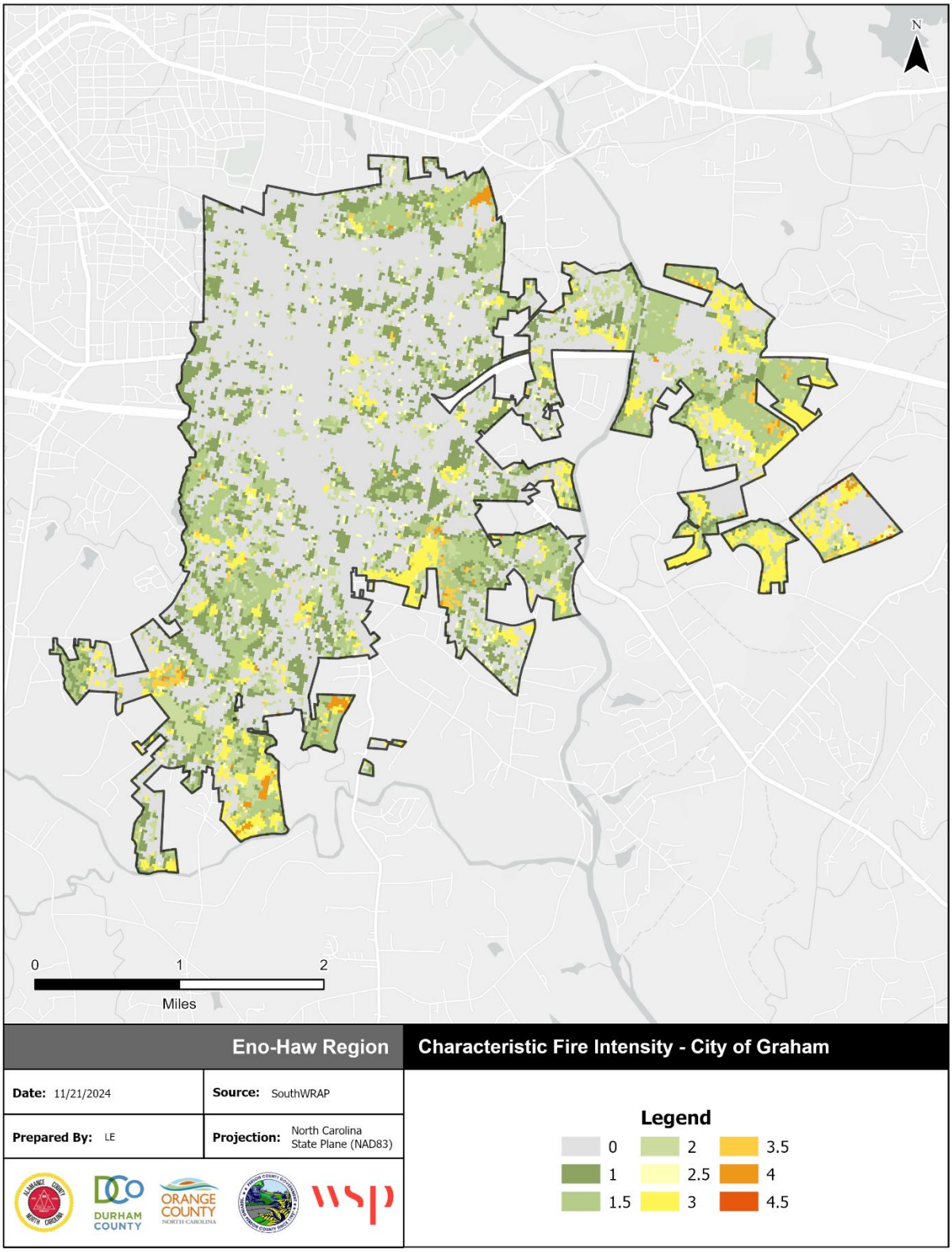
Source: Southern Wildfire Risk Assessment

Figure A.50 – Characteristic Fire Intensity, City of Burlington



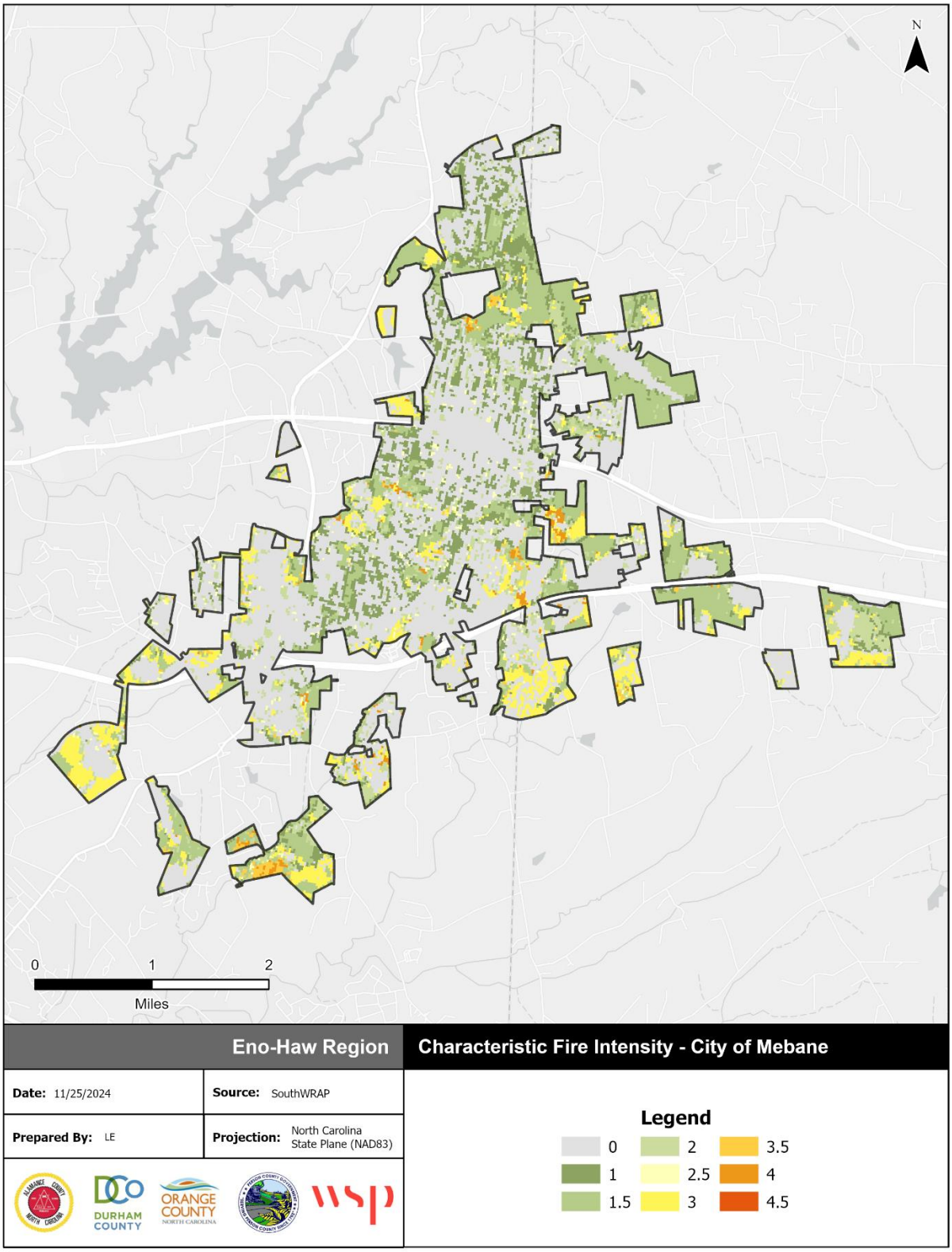
Source: Southern Wildfire Risk Assessment

Figure A.51 – Characteristic Fire Intensity, City of Graham



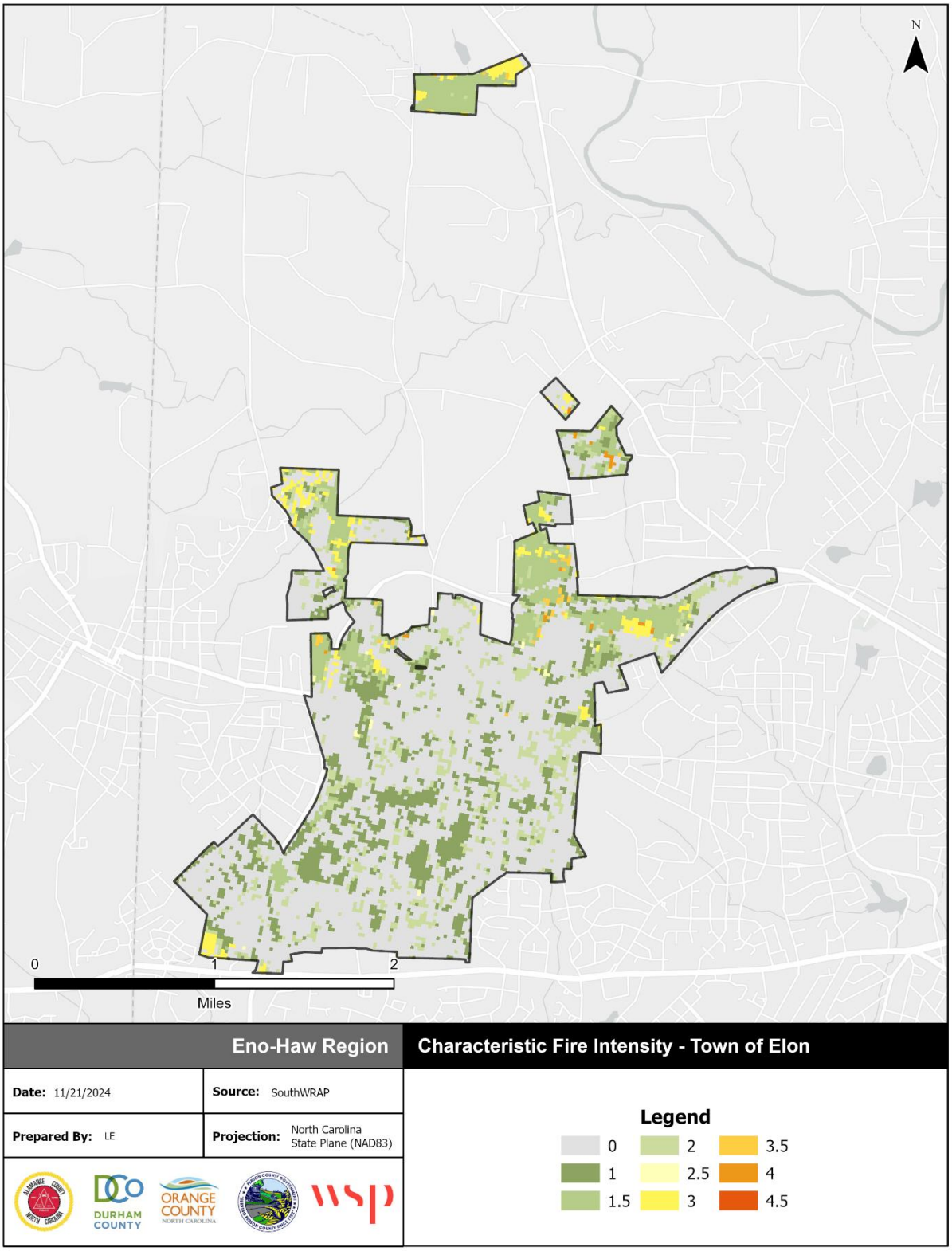
Source: Southern Wildfire Risk Assessment

Figure A.52 – Characteristic Fire Intensity, City of Mebane



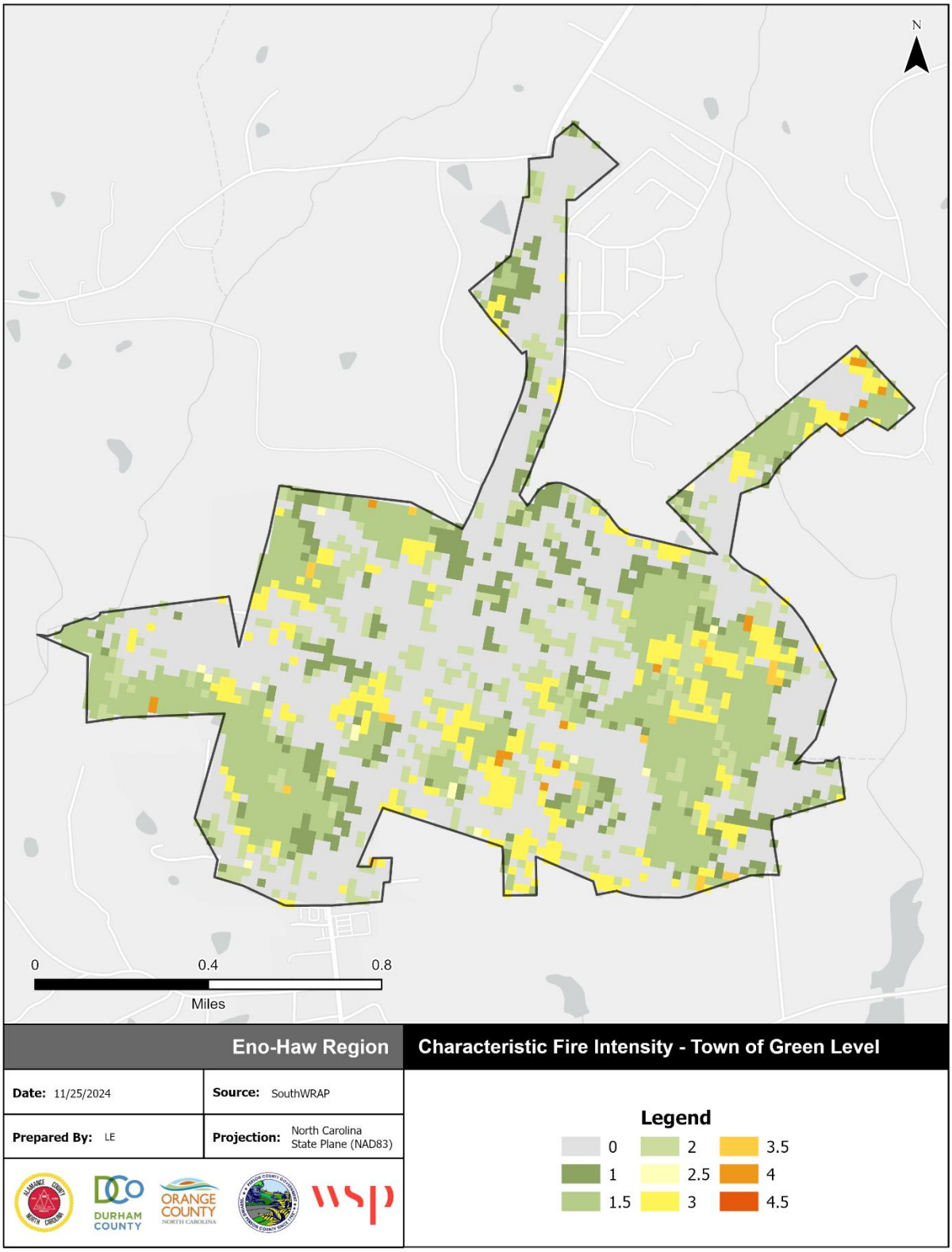
Source: Southern Wildfire Risk Assessment

Figure A.53 – Characteristic Fire Intensity, Town of Elon



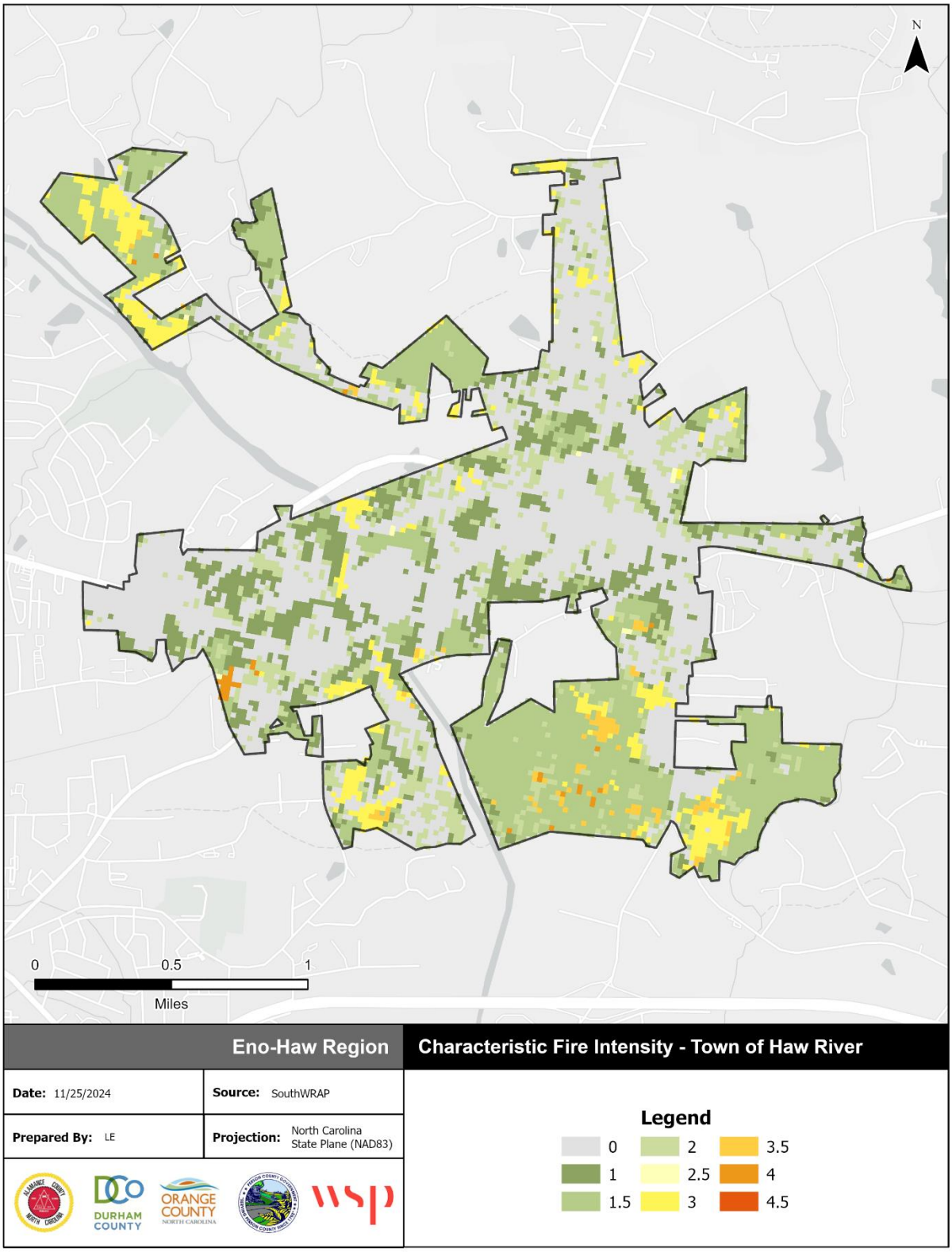
Source: Southern Wildfire Risk Assessment

Figure A.54 – Characteristic Fire Intensity, Town of Green Level



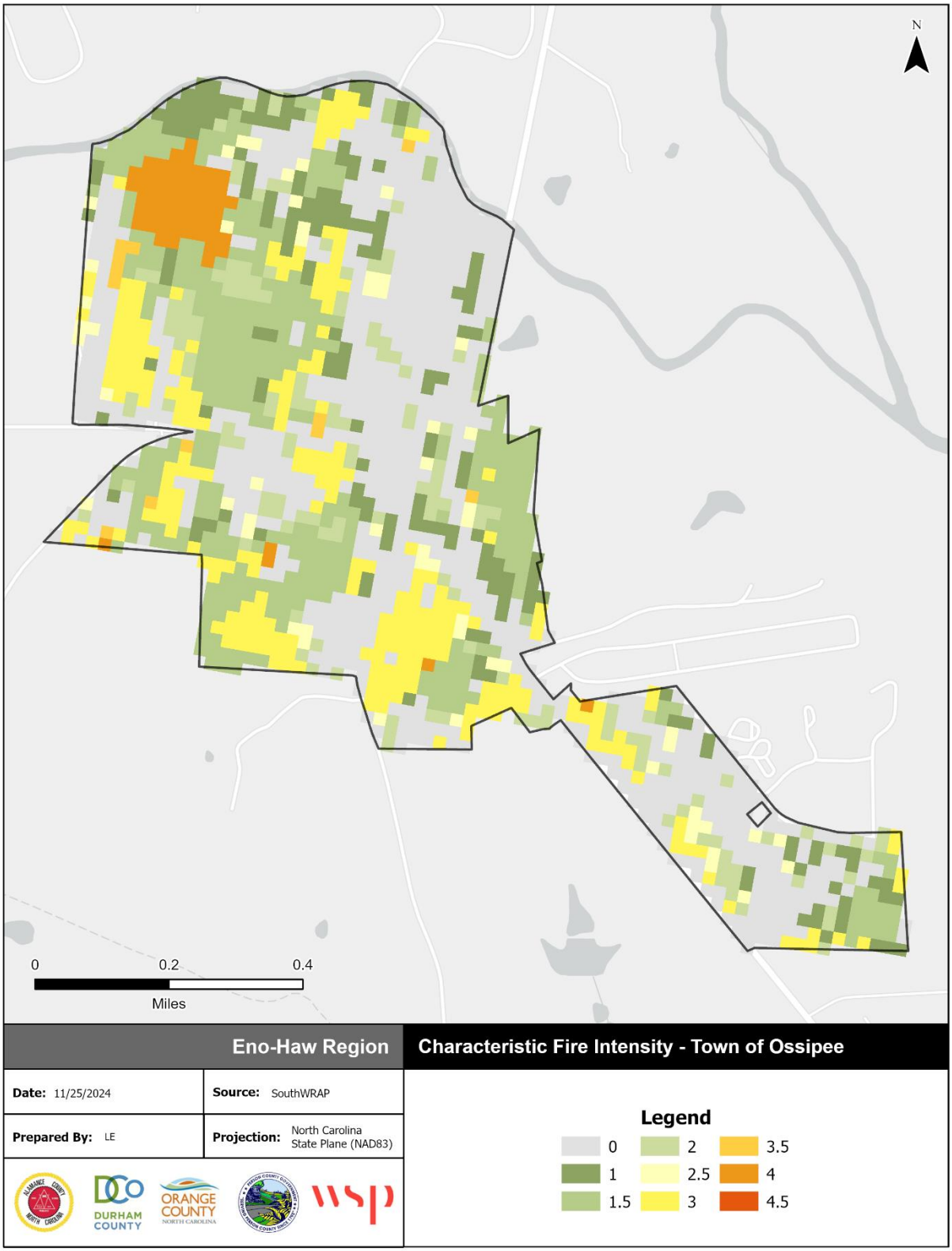
Source: Southern Wildfire Risk Assessment

Figure A.55 – Characteristic Fire Intensity, Town of Haw River



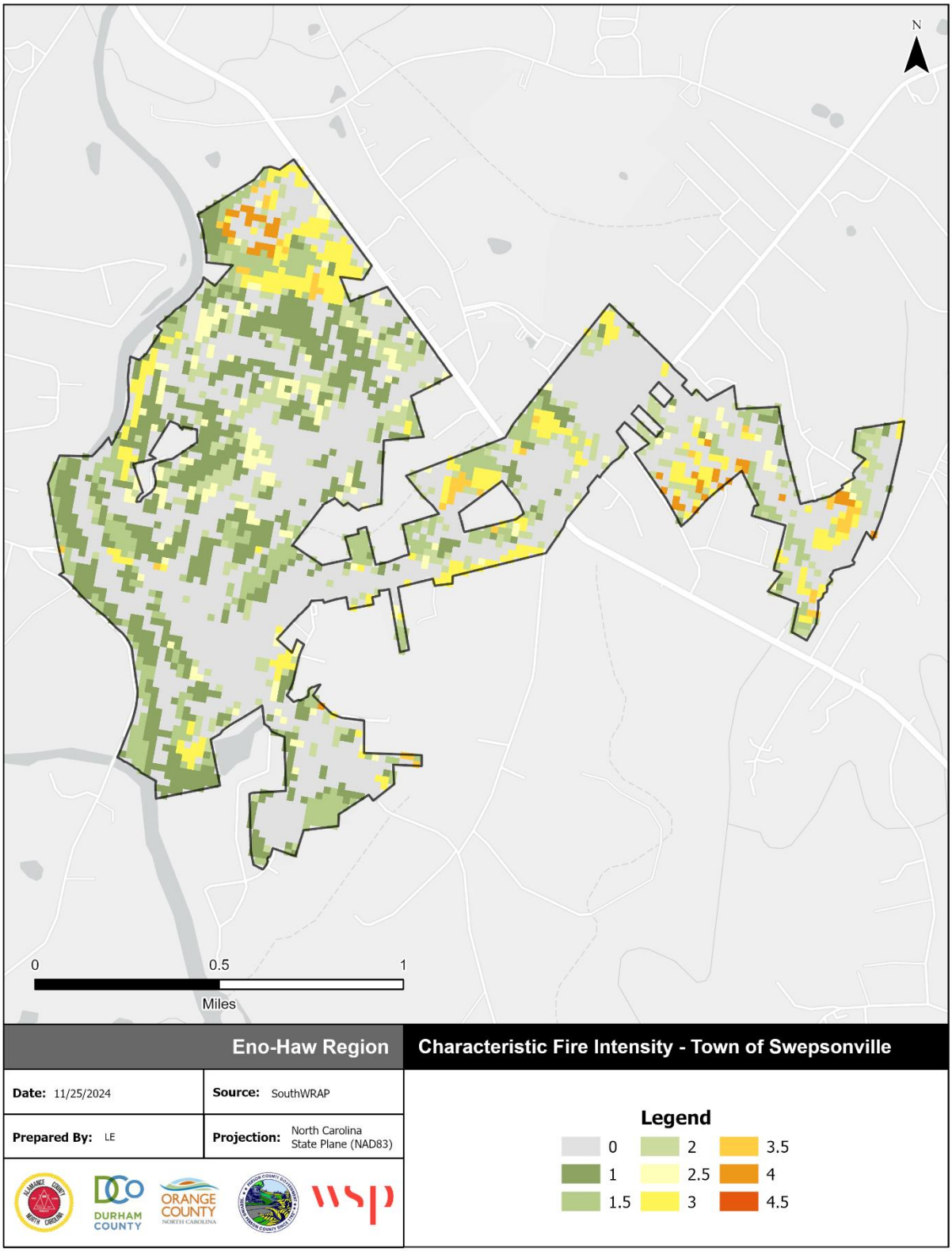
Source: Southern Wildfire Risk Assessment

Figure A.56 – Characteristic Fire Intensity, Town of Ossipee



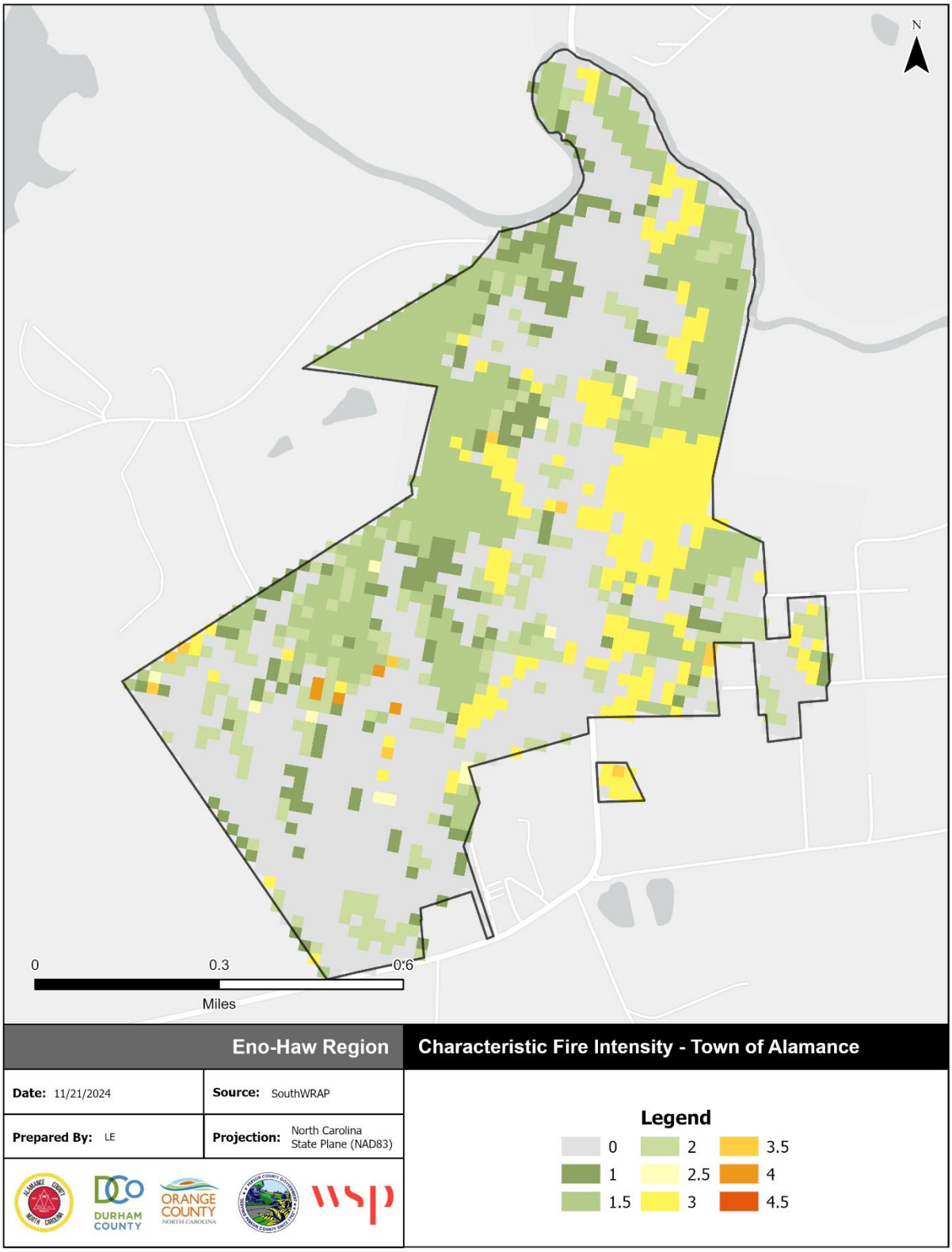
Source: Southern Wildfire Risk Assessment

Figure A.57 – Characteristic Fire Intensity, Town of Swepsonville



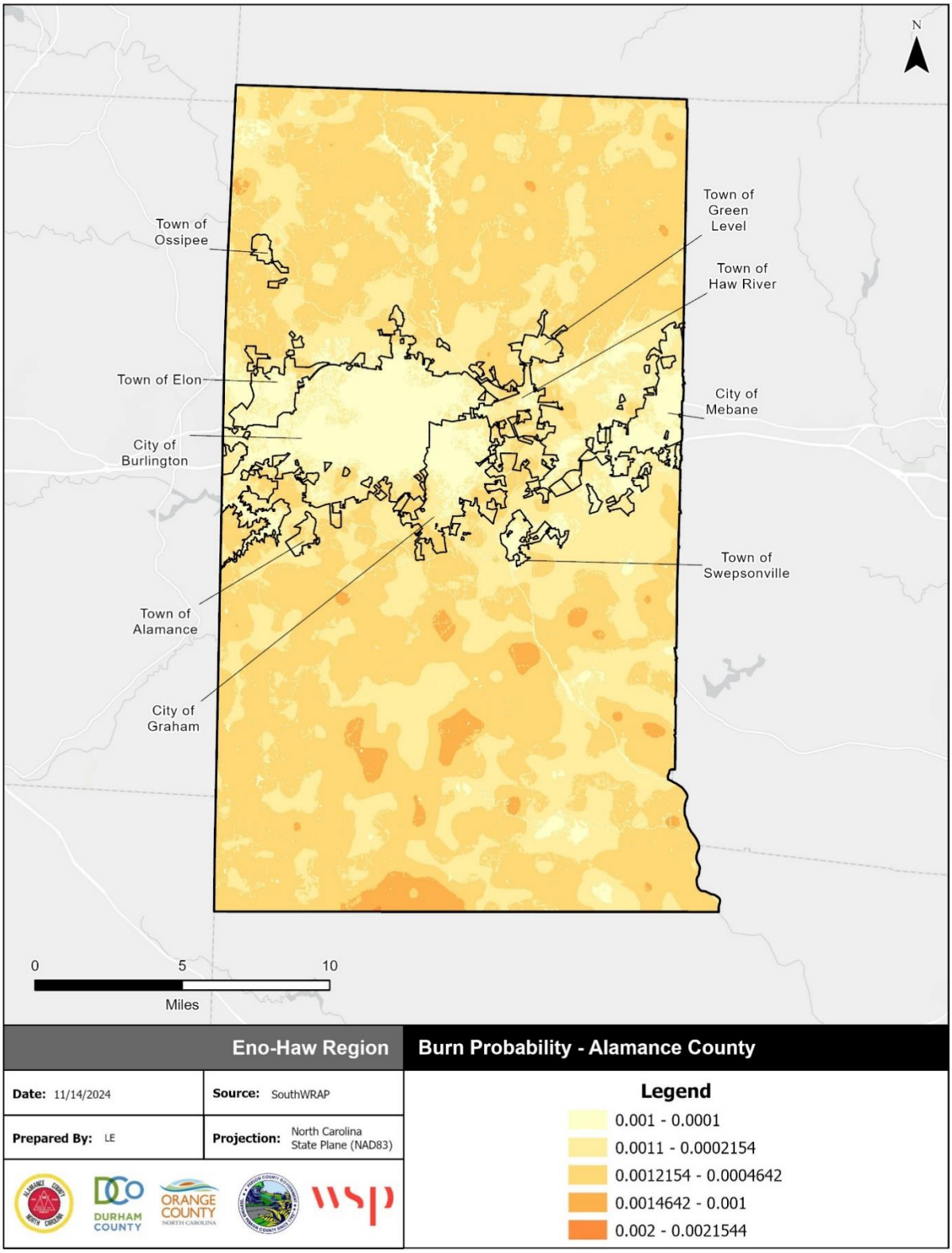
Source: Southern Wildfire Risk Assessment

Figure A.58 – Characteristic Fire Intensity, Village of Alamance



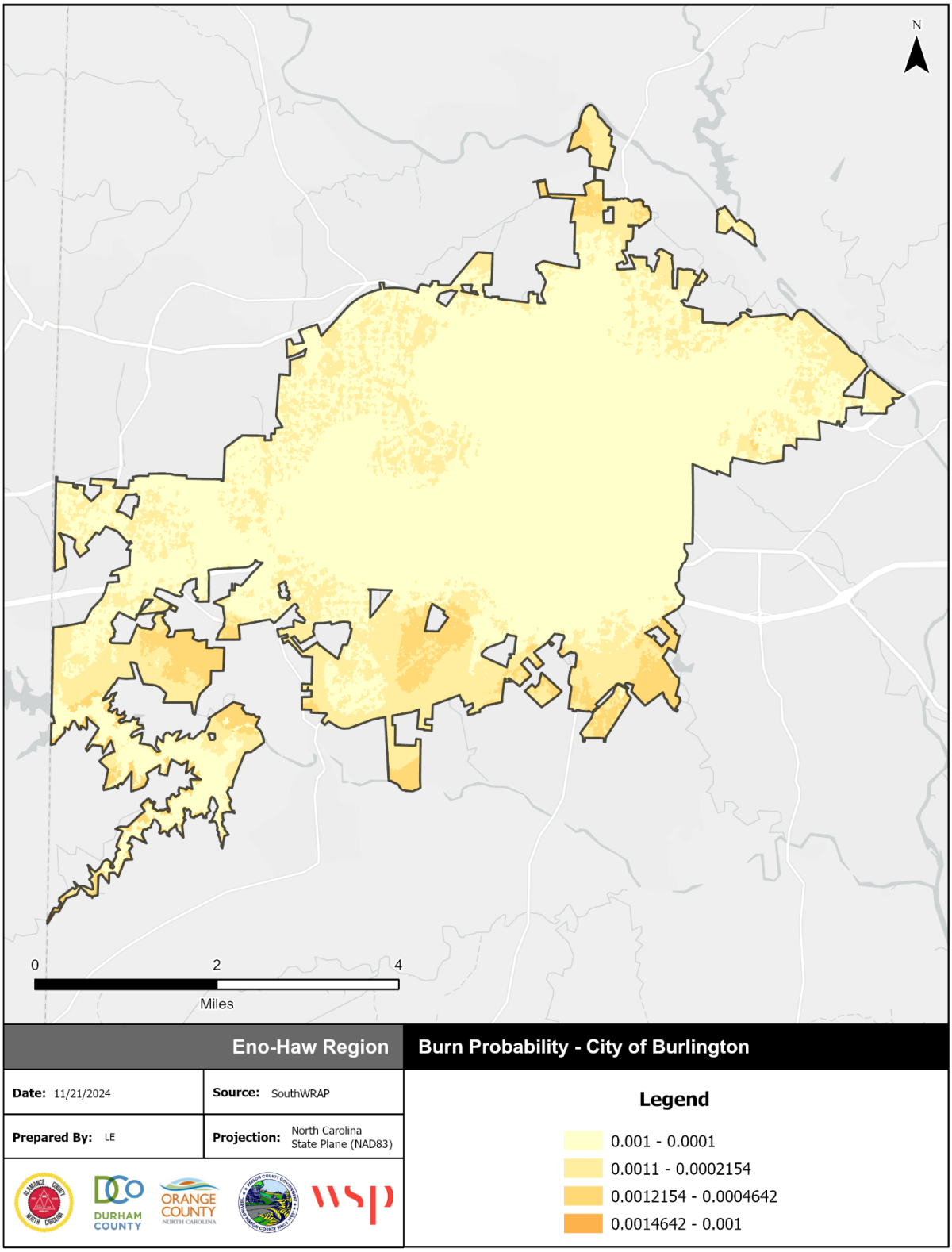
Source: Southern Wildfire Risk Assessment

Figure A.59 – Burn Probability, Unincorporated Alamance County



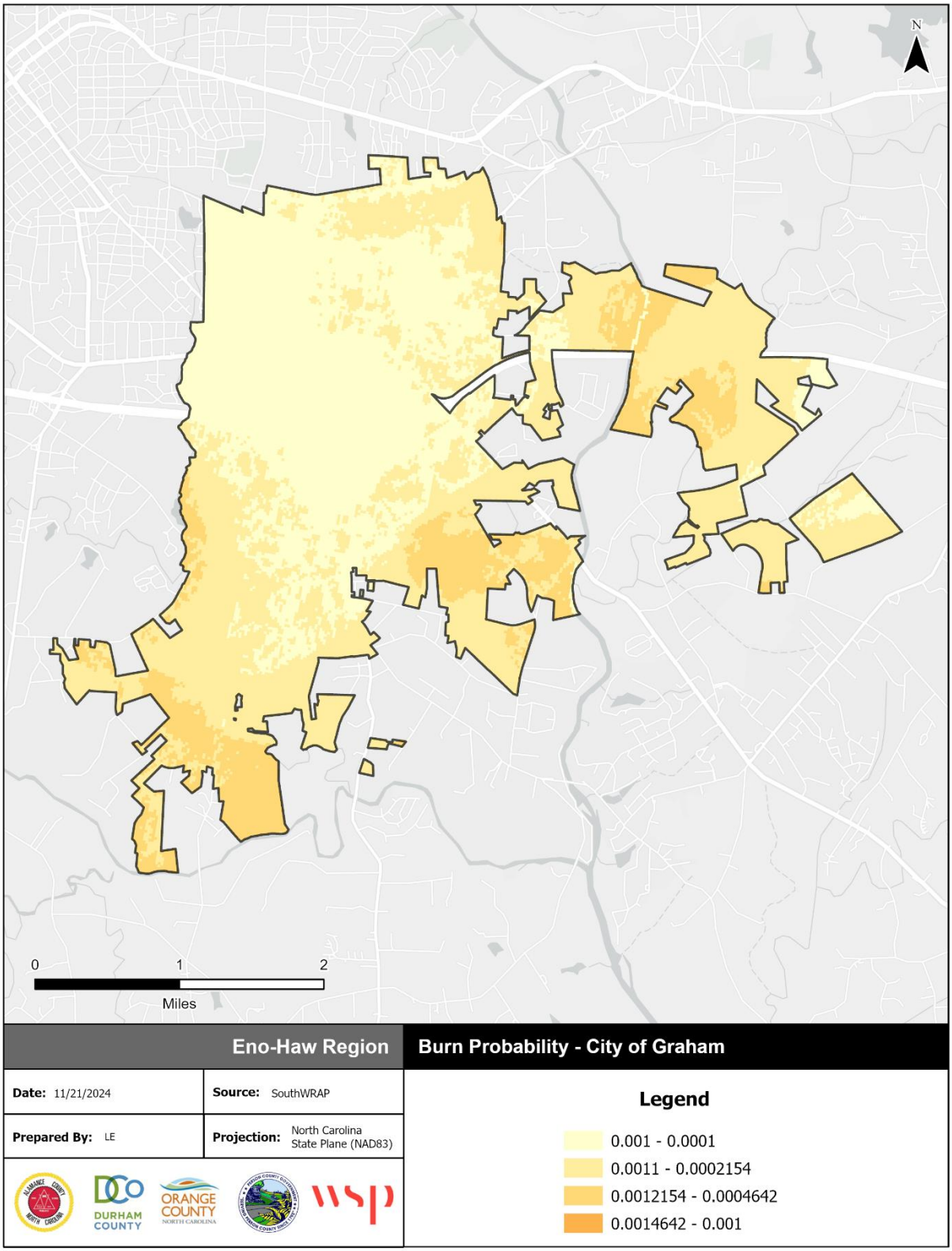
Source: Southern Wildfire Risk Assessment

Figure A.60 – Burn Probability, City of Burlington



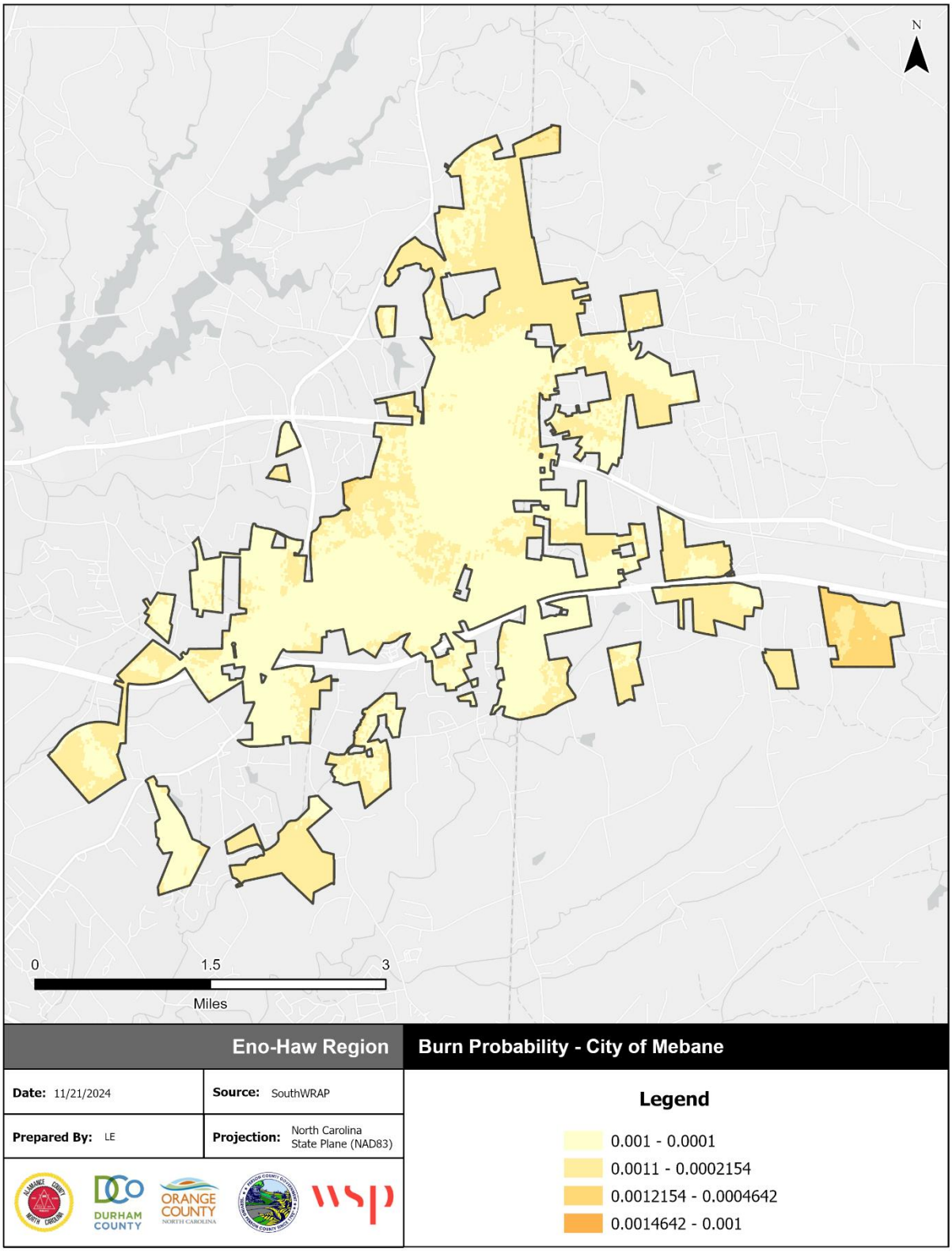
Source: Southern Wildfire Risk Assessment

Figure A.61 – Burn Probability, City of Graham



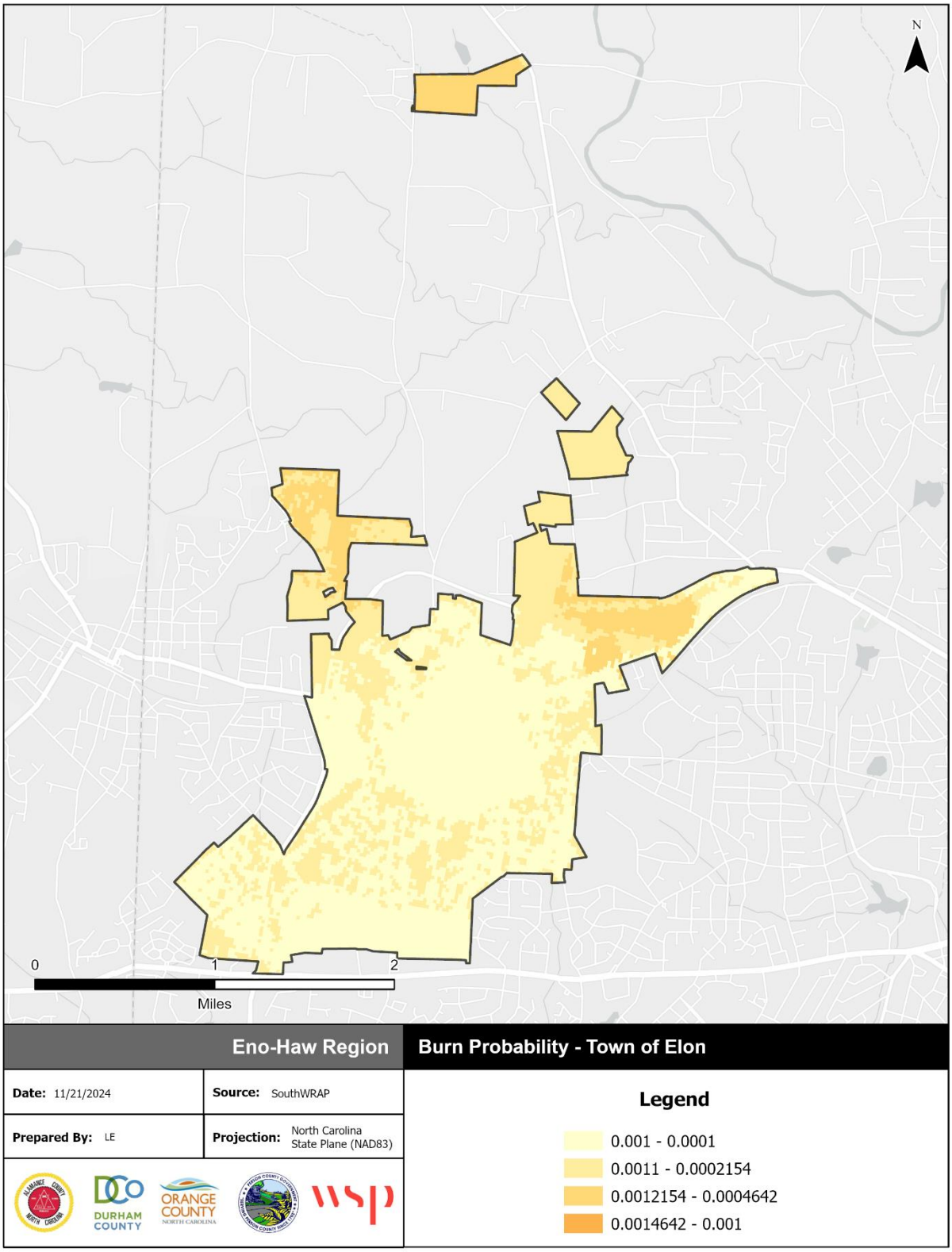
Source: Southern Wildfire Risk Assessment

Figure A.62 – Burn Probability, City of Mebane



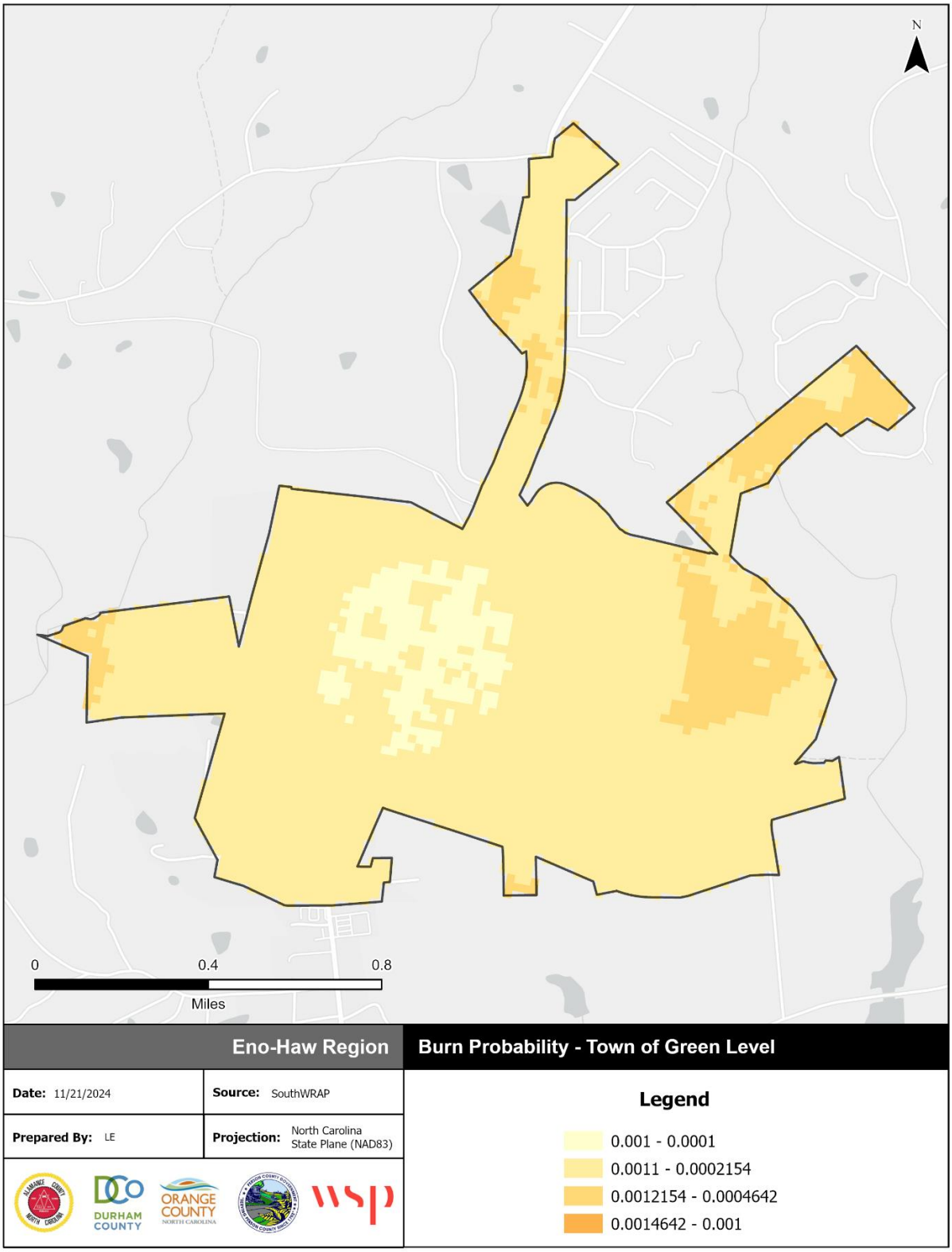
Source: Southern Wildfire Risk Assessment

Figure A.63 – Burn Probability, Town of Elon



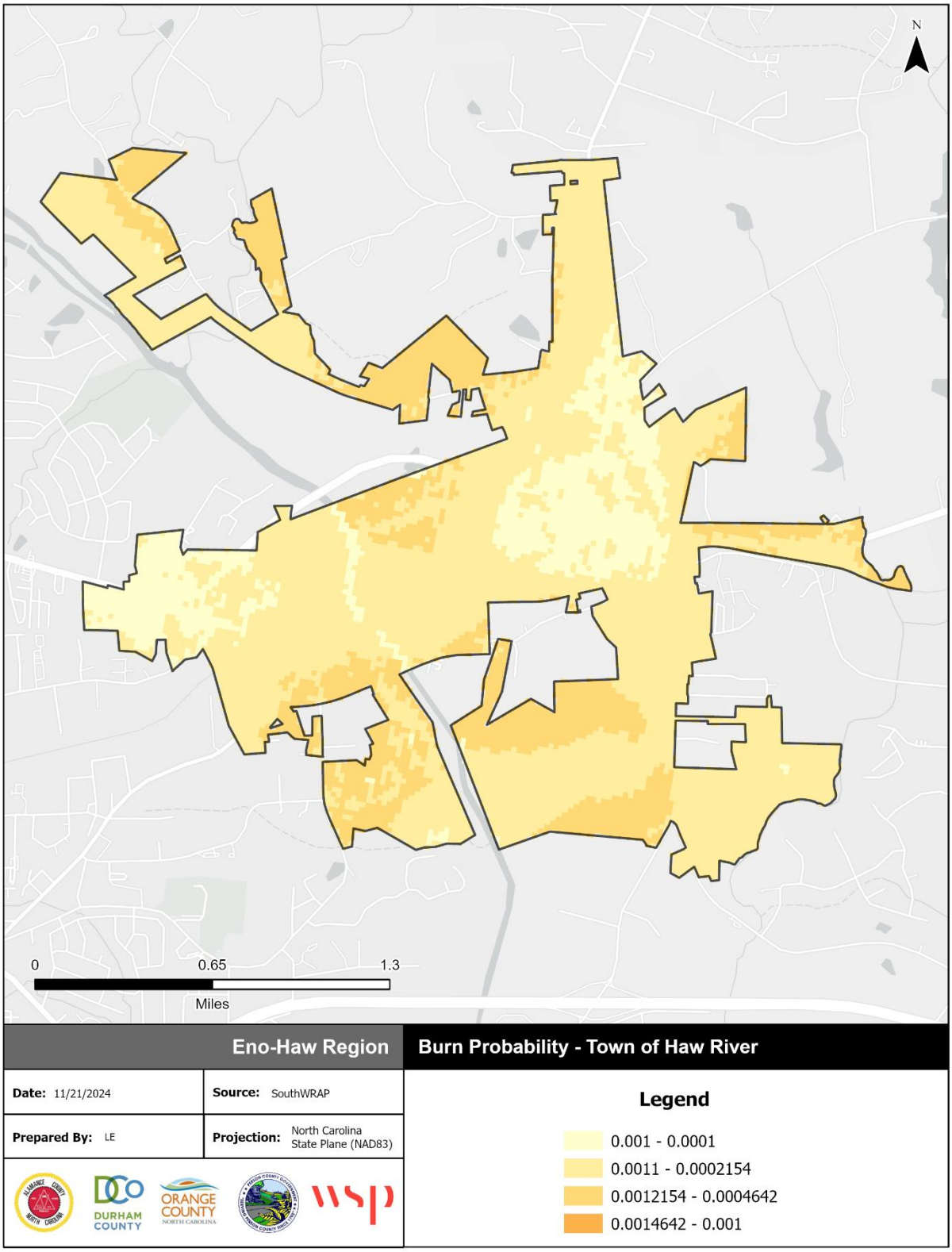
Source: Southern Wildfire Risk Assessment

Figure A.64 – Burn Probability, Town of Green Level



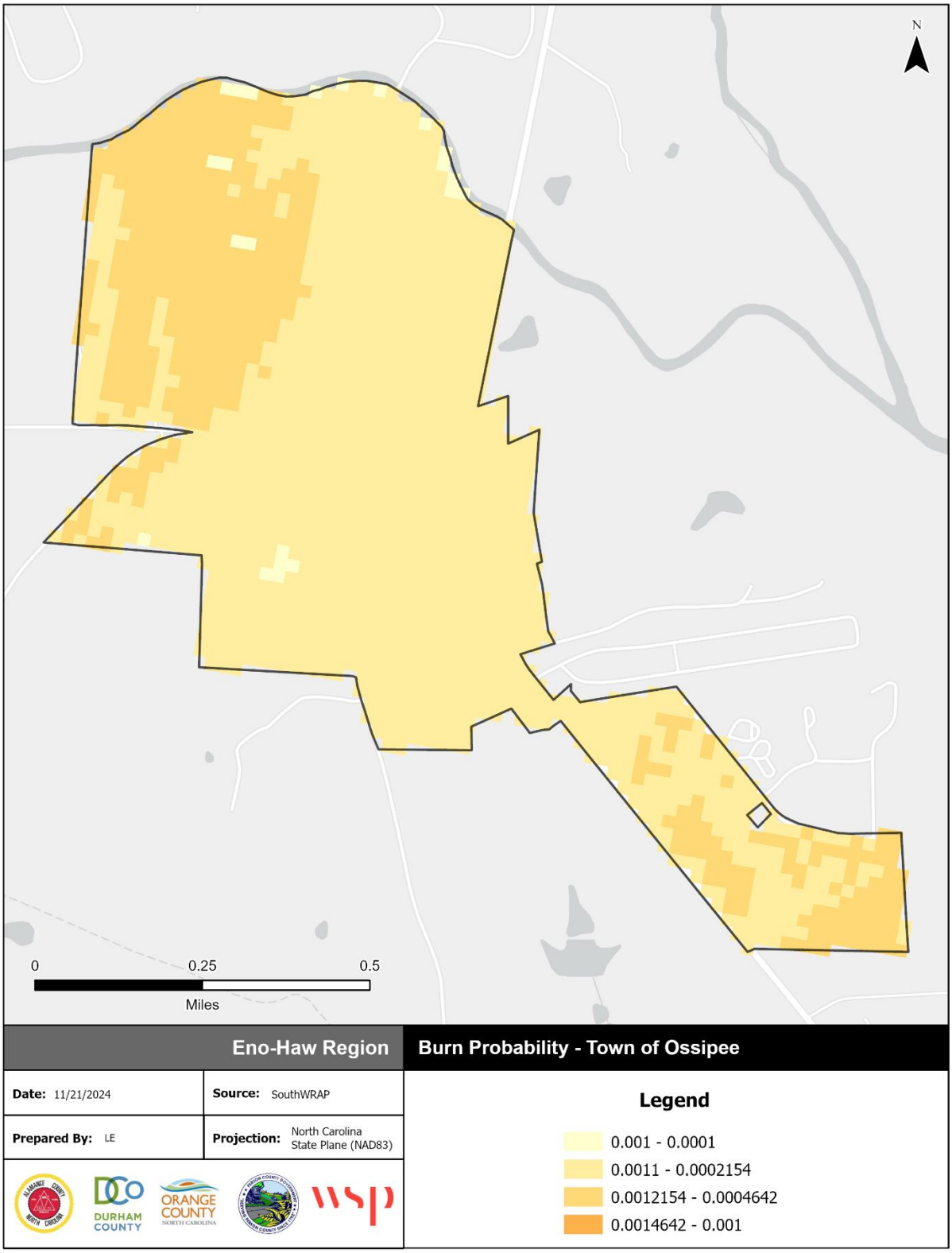
Source: Southern Wildfire Risk Assessment

Figure A.65 – Burn Probability, Town of Haw River



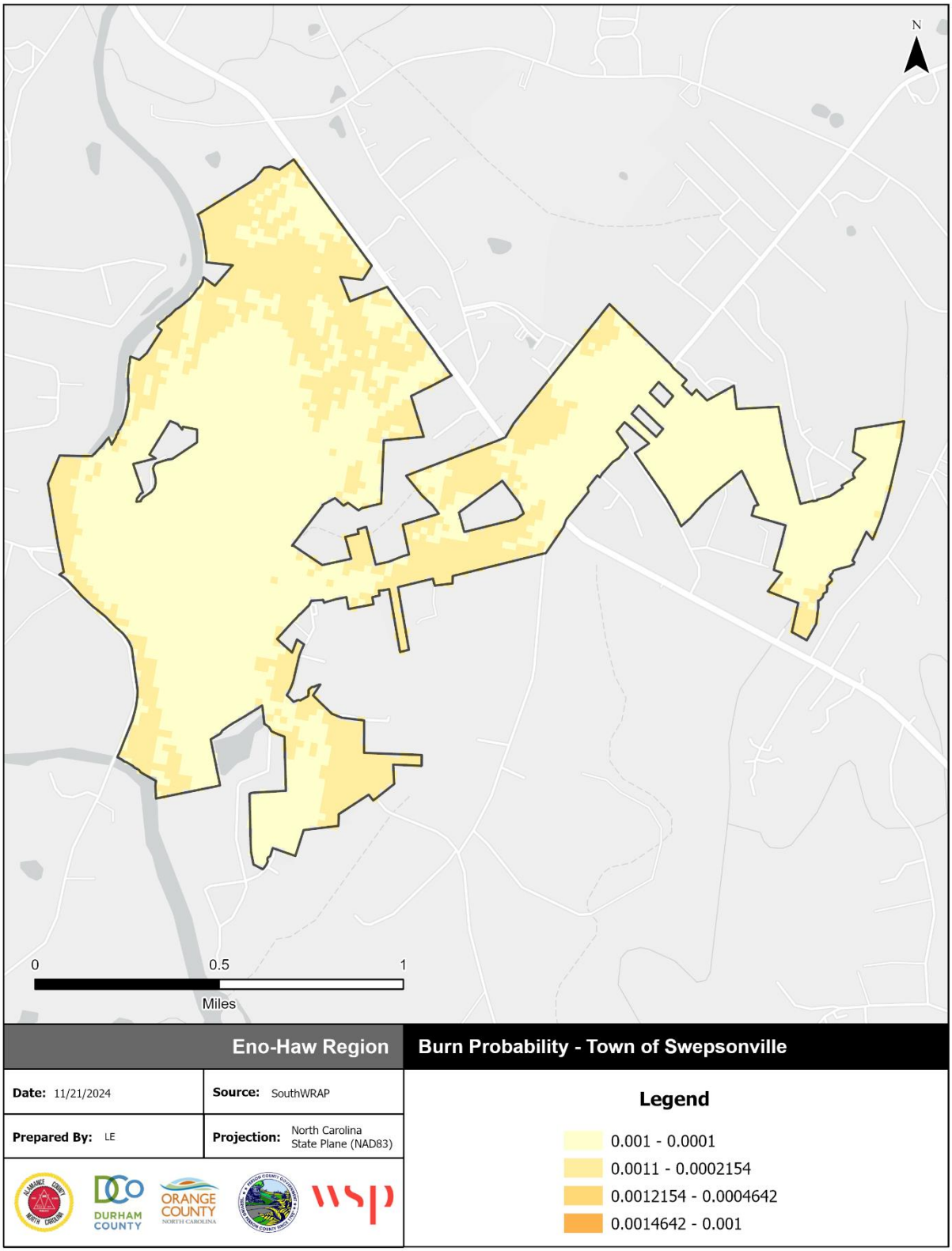
Source: Southern Wildfire Risk Assessment

Figure A.66 – Burn Probability, Town of Ossipee



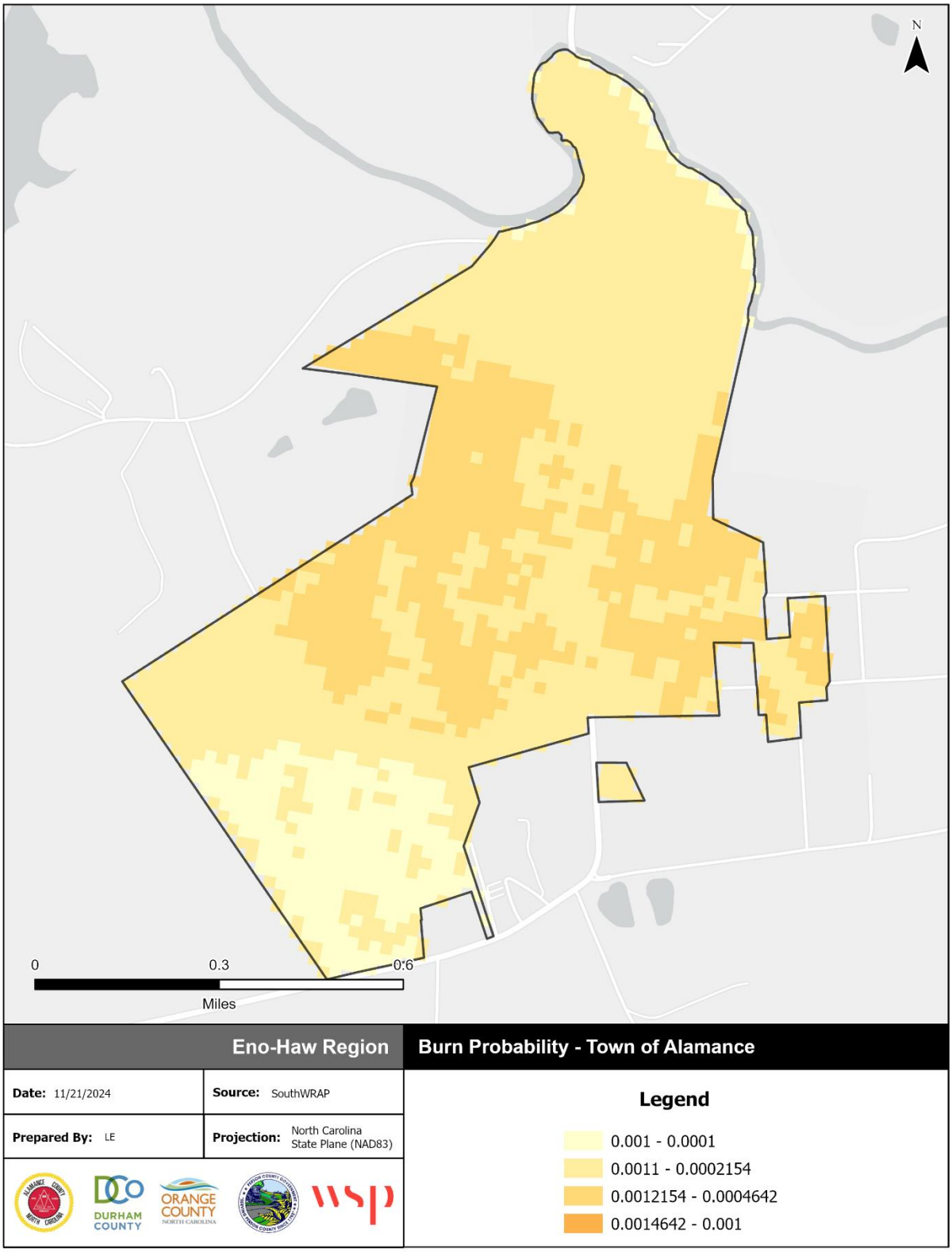
Source: Southern Wildfire Risk Assessment

Figure A.67 – Burn Probability, Town of Swepsonville



Source: Southern Wildfire Risk Assessment

Figure A.68 – Burn Probability, Village of Alamance



Source: Southern Wildfire Risk Assessment

A.3 MITIGATION STRATEGY

Table A.31 – Mitigation Action Plan, Alamance County

Action #	Action Description	Applicable Jurisdictions	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention										
P-1	Create or Update Community Wildfire Protection Plans in each fire district.	Alamance County, Town of Green Level, Town of Ossipee, Town of Swepsonville, Village of Alamance	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
P-2	Review methods of school construction to ensure that all new schools are constructed to the maximum cost feasible standards of wind resistance, flood resistance, and access so that they can be used as shelters for evacuees during and after natural hazard events.	Alamance County	All Hazards	1.2	Medium	Alamance County Inspections Department	General Fund	2025-2030	Carry Forward	No progress made due to administrative limitations. Our Inspections department will follow all guidelines on new projects.
P-3	Review the subdivision regulations and make appropriate changes to encourage alternatives to placing lots in flood-prone areas and to minimize impervious surface coverings, if necessary.	Alamance County	Flooding	1.2	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	Planning is still working on this. Progress is being made by adding details to subdivision regulations in flood prone areas.
Property Protection										
PP-1	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Alamance County	Flooding	4.2	Low	Alamance County Emergency Management, Alamance County Planning Department	General Fund	2025-2030	Carry Forward	EM monitors flood prone areas.
PP-2	Monitor structures affected by flood and track damages and repair costs. If damages and repair costs are high relative to the value of the structure, consider mitigation including elevation, acquisition, or floodproofing.	Alamance County	Flooding	4.2	High	Alamance County Emergency Management, Alamance County Planning Department	General Fund	2025-2030	Carry Forward	No progress was made on this project. The County will continue to monitor county properties which are or may be impacted by flooding events. No structures were impacted by flooding since last plan.
PP-3	Monitor recreational facilities located in the floodplain and evaluate flood resistance of county structures.	Alamance County	Flooding	4.2	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	No progress was made on this project. The County will monitor the county properties which are or may be impacted by flooding events.
PP-4	Monitor reservoirs for potential flooding problems and note any unexpected flooding issues.	Alamance County	Flooding	4.2	High	Alamance County Emergency Management	Staff time	2025-2030	Carry Forward	No progress was made on this project. The County will coordinate with Municipal watershed owners and operators to monitor levels and control of the dams and gates for flooding.

Action #	Action Description	Applicable Jurisdictions	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PP-5	Assess the need for Critical County Offices to bury overhead power, and data lines.	Alamance County	Severe Winter Weather		Medium	Alamance County Emergency Management	County	2025-2030	New	
Structural Projects										
SP-1	Seek funding to the retrofit of critical facilities and County-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	Alamance County	All Hazards	4.2	Medium	Alamance County Buildings and Inspections Department, Alamance County Planning Department, Alamance County Emergency Management	State grants, UHMA grants, other federal grants	2025-2030	Carry Forward	No progress was made on this project due to limited funding. Will evaluate resilience needs and look for grants and resource funding to retrofit county facilities.
SP-2	Implement drainage improvement projects to reduce flood risk.	Alamance County	Flooding	4.2	Medium	Alamance County Planning Department, Alamance County Emergency Management	State grants, UHMA grants, other federal grants	2025-2030	New	
Public Education & Awareness										
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM). This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcements from the Alamance County Inspections Department when builders and developers apply for permits.	Alamance County, Town of Green Level, Town of Haw River, Town of Swepsonville	Flooding	2.1	Medium	Alamance County Emergency Management	General Fund	2025-2030	Carry Forward	No progress was made on this project due to limited staff resources.
PEA-2	Encourage citizens and businesses/industries to develop emergency preparedness plans.	Alamance County, Town of Green Level	All Hazards	2.1	Medium	Alamance County Emergency Management; Alamance County LEPC	LEPC	2025-2030	Carry Forward	County EM has been working directly with local chemical facilities on developing Emergency Response Plans for 1st responder response. Also, Website, and social media campaigns have been completed with an all-hazards preparedness approach.
PEA-3	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	Alamance County	All Hazards	2.1	Medium	Alamance County Emergency Management	To be determined	2025-2030	Carry Forward	No progress made on this project due to limited staff. Plan to add this to the Emergency Management website.

Action #	Action Description	Applicable Jurisdictions	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-4	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	Alamance County	All Hazards	2.1	Medium	Alamance County Emergency Management	To be determined	2025-2030	Carry Forward	We have shared information via our website pertaining to preparation and planning for disasters. We have also created a social media campaign to target all hazards preparedness.
PEA-5	Discourage the public and developers from developing property in flood zones.	Alamance County	Flooding	1.2	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	Planning Department Staff makes citizens aware of the additional compliance of developing in a flood zone.
PEA-6	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Alamance County	Flooding	2.1	Medium	Alamance County Planning Department	General Fund	2025-2030	Carry Forward	No progress made on this project due to limited staff.
PEA-7	Maintain GIS system at www.alamance-nc.com. From this site anyone from a private citizen, builder, insurance company, etc. can see if a property is located in the 1-percent-annual-chance (100-year) floodplain.	Alamance County, Town of Haw River, Town of Ossipee, Town of Swepsonville, Village of Alamance	Flooding	2.1	Medium	Alamance County GIS Department	General Fund	2025-2030	Carry Forward	The County Land Use plan is in progress and a land-use GIS layer is expected as a deliverable once the plan is complete.
PEA-8	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	Alamance County,	Flooding	2.1	Medium	Alamance County Planning Department	To be determined	2025-2030	Carry Forward	In Progress. Implementation delayed due to limited staff resources.
PEA-9	Educate citizens to listen for the watches and warnings issued by the National Weather Service	Alamance County, Town of Green Level, Town of Haw River, Town of Ossipee, Village of Alamance	All Hazards	2.2	Medium	Alamance County Emergency Management	County	2025-2030	Carry Forward	The County has utilized our website and social media outlets to share information to the public and local municipalities on listening to and having a warning system in the home. The County is now working with hearing impaired and distributing hearing impaired weather alert radios devices to those who request them.
PEA-10	Maintain Alamance County Communications' capability to monitor weather conditions and advise all emergency services regarding watches and warnings.	Alamance County,	Flooding	2.2	Medium	Alamance County Emergency Management	County	2025-2030	Carry Forward	We have updated our Nixle alert system and are promoting personnel to sign up for the service. Will continue to monitor and push weather information to PSAP's and other Emergency Services in the county to keep them aware of impending weather.
PEA-11	Conduct focused public outreach events to educate the public on hazards faced by our community, and how they can properly prepare themselves and their family.	Alamance County	All Hazards	2.1	Medium	Alamance County Emergency Management	County	2025-2030	New	

Table A.32 – Mitigation Action Plan, City of Burlington

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Implementation Status Comments
Prevention									
P-1	Discourage the public and developers from developing property in flood zones.	Flooding	1.2	Medium	City of Burlington Building and Inspections	General fund	2025-2030	Carried Forward	This is ongoing as determined in Planning and Zoning ordinances. The City works with developers and property owners on a case-by-case basis.
P-2	Adopt policy prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist.	Flooding	1.2	Medium	City of Burlington Building and Inspections	General fund	2025-2030	Carried Forward	This activity is ongoing. This is not an adopted policy, but the City of Burlington Floodplain Manager oversees construction and acquisition of property in flood-prone areas. It is not the policy of the City to place critical systems in areas subject to flooding.
P-3	Expand the City's Geographic Information System (GIS) capabilities to include more hazard specific information.	All Hazards	1.2	Medium	City of Burlington GIS Division	Staff time	2025-2030	Carried Forward	This activity is ongoing and continually evaluated for effectiveness and modified as needed. Current capability includes the ability to define hazard areas from historical data as well as the ability to project potential areas of concern. GIS and EM are looking at ways to enhance dashboards to provide a common operating picture. Also, looking at products that are able to combine current and forecasted weather to create real-time flood modeling. The City will also continue to monitor opportunities to enhance GIS technologies and appropriate datasets for hazard mitigation planning.
P-4	Continue the City's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	City of Burlington Building and Inspections	General fund	2025-2030	Carried Forward	The City maintained active participation in the NFIP.
P-5	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	City of Burlington Fire Department, City of Burlington Water Department	Staff time	2025-2030	Carried Forward	This activity is ongoing based on regular maintenance schedules and is continually evaluated for effectiveness and modified as needed.
P-6	Develop a detailed hazard assessment for dams in Alamance County and add to county hazard mitigation plan.	Dam Failure	3.2	Medium	City of Burlington Office of Emergency Management	Local, County	2025-2030	Carried Forward	Dam Emergency Action Plans were updated in 2024/2025.
P-7	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor structures affected by flood and track damages and repair costs. If damages and repair costs are high relative to the value of the structure, consider mitigation including elevation, acquisition, or floodproofing.	Flooding	4.2	High	City of Burlington Office of Emergency Management, City Planning Department	General fund	2025-2030	Carried Forward	This activity was implemented as needed following hazard events. The City has the capability to conduct damage assessments with assistance from the County and the State.
PP-2	Monitor recreational facilities located in the floodplain and evaluate flood resistance of city structures.	Flooding	4.2	Medium	City of Burlington, City Planning Department	General fund	2025-2030	Carried Forward	No progress made due to limited administrative resources.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Implementation Status Comments
PP-3	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	1.1	High	City of Burlington	N/A	2025-2030	Carried Forward	All reservoirs and water sources located throughout the city have been processed by various companies (i.e. dam review, etc.). City of Burlington reservoirs are assessed each year for potential problems as well as security issues.
Structural Projects									
SP-1	Retrofit critical facilities and City-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	City of Burlington Building and Inspections, Office of Emergency Management, City Planning Department	Internal staff time	2025-2030	Carried Forward	No progress made due to fiscal limitations. The City will continue to seek opportunities to implement retrofits as needed.
SP-2	Install backup generators or quick connect hook ups for mobile generators on any newly constructed county/town critical facilities.	All Hazards	4.2	Medium	City of Burlington Building and Inspections, Office of Emergency Management, City Planning Department	Local, State grants, UHMA grants, other federal grants	2025-2030	Carried Forward	Some generators have been replaced (PD) or repaired (City Hall). Additional needs remain, such as adding an additional transfer switch to the generator at city hall so that should there be a failure in the main generator, a generator could be sourced and integrated seamlessly.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City of Burlington Office of Emergency Management, City Planning Department	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	City of Burlington Fire Department	Staff time	2025-2030	Carried Forward	This activity is implemented annually.
Public Education & Awareness									
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM).	Flooding	1.2	Medium	City of Burlington Building and Inspections, City of Burlington Office of Emergency Management	General fund	2025-2030	Carried Forward	No progress made due to limited staff resources.
PEA-2	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	City of Burlington Office of Emergency Management	Staff time	2025-2030	Carried Forward	In Progress. The City gives presentations to HOAs and neighborhood groups and distributes literature.
PEA-3	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	City of Burlington Office of Emergency Management, Burlington Office of Public Information	Staff time	2025-2030	Carried Forward	This activity is ongoing and continually evaluated for effectiveness and modified as needed. Recent outreach methods include giving presentations and maintaining a presence at public events.
PEA-4	Maintain documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Low	City of Burlington, Alamance County Planning Department	N/A	2025-2030	Carried Forward	This activity is ongoing. The City will continue to support maintaining these materials at local libraries and government offices.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Implementation Status Comments
PEA-5	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	Flooding	2.1	Low	City of Burlington, City Planning Department	Unknown	2025-2030	Carried Forward	No new resources were developed due to limited staff and fiscal resources.
PEA-6	Educate citizens to listen for the watches and warnings issued by the National Weather Service.	All Hazards	2.2	Medium	City of Burlington Office of Emergency Management	County	2025-2030	Carried Forward	The City of Burlington Office of Emergency Management conducted annual presentations to Burlington Housing authority, Burlington Senior center, and Burlington Community network and has maintained a presence at local community events such as the annual Carousel Festival. Presentations include NWS information as well as inclement and hazardous weather planning/preparation.

Table A.33 – Mitigation Action Plan, City of Graham

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Propose a policy prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist. Presently, most critical facilities located in the floodplain are waste pump stations because they must be located at low elevations because the handle gravity flowing sewage.	Flooding	1.2	Medium	City of Graham Public Works Department	General fund	2030	Carried Forward	Flood damage prevention regulations are included in the City of Graham Development Ordinance. Graham will consider future revisions to include critical facility protection and other higher standards.
P-2	Consider expanding the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Alamance County GIS Department	Staff time, General fund	2030	Carried Forward	Graham has centralized our Floodplain permitting and Elevation Certificates such that they are ready when requested. Further integration opportunities will be evaluated.
P-3	Continue City of Graham's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	Graham complied with the most recent update of the regulations and maps.
P-4	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	City of Graham Fire Department	Staff time	2030	Carried Forward	No progress reported due to administrative barriers. Timeline based on Rating Schedule dictated by Office of State Fire Marshal.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor recreational facilities located in the floodplain and evaluate flood resistance of county structures.	Flooding	4.2	Medium	City of Graham Public Works Department	Staff time	2025-2030	Carried Forward	Graham will continue to monitor and identify specific mitigation needs.
PP-2	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	City of Graham/ Alamance County EM	General fund	2025-2030	Carried Forward	Graham will continue to monitor and identify specific mitigation needs.
PP-3	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	City of Graham Public Works Department, Planning Department	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	City Buildings and Inspections Department, City Planning Department, City Emergency Services	Local, State grants, federal grants	2025-2030	Carried Forward	No completed projects to report. The City will continue to identify and implement retrofits as needed.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	City Buildings and Inspections Department, City Planning Department, City Emergency Services	Local, State grants, federal grants	2025-2030	Carried Forward	No new progress to report. Additional facilities to be identified.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City Planning Department, City Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	No progress to report. Fire Chief will coordinate with State Forester and reestablish this link.
ES-2	Coordinate with the North Carolina Department of Transportation (NCDOT) to maintain adequate and effective snow and ice removal plans by the towns/cities and NCDOT. "Adequate" means that all major thoroughfares are cleared and remain clear within 12 hours of last snowfall.	Severe Winter Weather	2.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	The City continues to coordinate with NCDOT and is attempting to take over some primary routes.
Public Education & Awareness									
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM). This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcements from the Alamance County Inspections Department when builders and developers apply for permits.	Flooding	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	The City of Graham works with Alamance County to ensure that developers are up-to-date when applying for permits and by attending workshops. City staff attends CFP trainings, and reviews all NFIP regulations.
PEA-2	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	No progress reported due to limited staff resources. The City will maintain an Emergency Preparedness page on the City website in conjunction with the County to help inform local residents.
PEA-3	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	No progress reported due to limited staff resources. The City will maintain an Emergency Preparedness page on the City website in conjunction with the County to help inform local residents.
PEA-4	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	The usage of NIXLE has increased awareness of the frequency of hazards. The City will continue to push notifications regarding hazardous weather over this and other media.
PEA-5	Discourage the public and developers from developing property in flood zones.	All Hazards	1.2	Medium	City of Graham	General fund	2025-2030	Carried Forward	Graham will continue to educate the public about the 2' freeboard requirement.
PEA-6	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	City of Graham	General fund	2025-2030	Carried Forward	Documents are made available at City Hall.

Table A.34 – Mitigation Action Plan, City of Mebane

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Maintain Shelter Agreements with the County Emergency Services	All Hazards	2.2	Medium	Alamance County/ City	General Fund	2025-2030	Carried Forward	The City has a contract with Alamance County Emergency Services and will assess the contract as-needed.
P-2	Continue the City of Mebane's participation in the National Flood Insurance Program	Flooding	1.2	Medium	City	Staff Time	2025-2030	Carried Forward	The City has maintained compliance with the NFIP and will continue to do so as part of plan review and permitting process.
P-3	Monitor Reservoirs, Lakes, and Streams for Potential Flooding Problems and Note any Unexpected Flooding Issues	Flooding	1.2	Medium	City	Staff Time	2025-2030	Carried Forward	City has checked culverts and streams along outfalls ahead of large predicted storm events and cleared debris as necessary to prevent flooding. The City of Mebane began a construction project to replace the Lake Michael Dam Spillway in 2024.
P-4	Review All Fire Districts Coverage to Ensure there are Adequate Quantities of Water for Fire Fighting Purposes and that all Water Points are Maintained on a Regular Basis	Wildfire	2.2	Medium	City	Staff Time	2025-2030	Carried Forward	OSFM conducted ISO inspections in 2022. Will review with OSFM upon next inspection.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor Structures Affected by Flood and Track Damages and Repair Costs.	Flooding	4.2	Low	City	Hazard Mitigation Grants	2025-2030	Carried Forward	No progress to report due to low priority. City owned structures will be monitored and tracked. Private structures will be tracked by building permits.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	City	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to retrofit critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	City	State Grants, UHMA Grants, other federal grants	2025-2030	Carried Forward	As buildings are upgraded, we will look into retrofitting facilities with the latest technology. Many facilities have backup generators installed and low water consumption fixtures.
SP-2	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed county/town critical facilities	All Hazards	4.2	Medium	City	Local, State Grants, UHMA Grants, other federal grants	2025-2030	Carried Forward	Backup generators have now been installed at nearly all existing facilities. All new construction facilities will be evaluated as part of plan review.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City	State grants, UHMA grants, other federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Emergency Services									
ES-1	Meet Annually with State Forester for Alamance County to Improve Coordination of Wildfire Control and Response	Wildfire	3.2	Medium	City	Staff Time	2025-2030	Carried Forward	No progress due to limited staff resources. Fire department to meet annually with State forester to coordinate Wildfire Control and Response.
Public Education & Awareness									
PEA-1	Encourage Familiarity with National Flood Insurance Program (NFIP)	Flooding	2.1	Medium	Planning, Zoning and Inspections	Staff Time	2025-2030	Carried Forward	No new progress to report due to limited administrative resources. Will continue existing outreach as part of plan review and permitting process.
PEA-2	Encourage Citizens and Businesses to Develop Emergency Preparedness Plans	All Hazards	2.1	Medium	City	Staff Time	2025-2030	Carried Forward	Relevant City departments will continue to work with the Public Information Officer to produce videos and post information on the website encouraging development of emergency preparedness plans. In 2024 and 2025, the City of Mebane has produced educational videos related to emergency preparedness and response.
PEA-3	Encourage Homeowners to Review Insurance Policies as Part of an Overall Family Disaster Plan	All Hazards	2.1	Medium	City	Staff Time	2025-2030	Carried Forward	Educational material is posted on website/handouts
PEA-4	Increase Awareness of the Natural Hazards Potential to Officials, Public and Industry	All Hazards	2.1	Medium	City	Staff Time	2025-2030	Carried Forward	Code Red information is placed on the City's website. Citizens are informed by Code Red notifications as hazards arise. The City of Mebane hired a Public Information Officer in 2022 and is actively using CodeRed and other tools to share information.
PEA-5	Provide Local Real Estate Agents with Handouts that Will Advise Potential Buyers to Investigate the Flood Hazards for the Property Under Consideration	Flooding	2.1	Low	City	Staff Time	2025-2030	Carried Forward	Planning department provides information to agents and developers.

Table A.35 – Mitigation Action Plan, Town of Elon

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Consider adopting a policy prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist. Presently, most critical facilities located in the floodplain are waste pump stations because they must be located at low elevations because the handle gravity flowing sewage.	Flooding	1.2	Medium	Town of Elon Public Works Department, Town of Elon Planning Department	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. The Town of Elon Public Works along with Town of Elon Planning(TRC) coordinate an inventory of all public facilities and identify the facilities that are within the 100 year floodplain-if any.
P-2	Expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Alamance County, Town of Elon	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. The Town of Elon works in conjunction with Alamance Co. GIS in computer based driven software on this.
P-3	Continue Town of Elon's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. Elon actively participates in the NFIP for its citizens.
P-4	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Alamance County, Town of Elon Fire Department	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. Town of Elon contracts with 3rd party testing company to model and project needed water supplies for firefighting and domestic use on a yearly basis to keep up with growth and to help with FD ISO rating. Estimated cost $10,000.
P-5	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	All Hazards	1.2	Medium	Town of Elon	N/A	2025-2030	Carried Forward	Completed and continuing ongoing implementation. Town participated with Alamance Co EM on flood mapping. Mapping was completed in 2015-2016.
P-6	Direct Town of Elon to assess how it can better incorporate hazard mitigation plan goals and objectives into its planning and implementation of its duties with the County's plans.	All Hazards	1.2	Medium	Alamance County/Town of Elon	General Fund	2025-2030	Carried Forward	Completed and continuing ongoing implementation. The Town of Elon Planning department has adopted the Land Management Ordinance which incorporates the use of the Flood Damage Prevention Ordinance and the Jordan Lake Riparian Buffer Ordinance at TRC.
P-7	Develop and implement policies to enhance the urban tree canopy in ways that protect pedestrians and bicyclists from heat and pollution exposure through the use of the Land Management Ordinance requirements for street trees and parking lot landscaping.	Excessive Heat	1.2	Medium	Town of Elon	Staff Time	2025-2030	New	
P-8	Integrate climate change planning and solutions into emergency planning and preparedness, with a focus on heat and flooding.	All Hazards	1.2	Medium	Town of Elon	Staff Time	2025-2030	New	
P-9	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	1.2	Medium	Town of Elon, Alamance County	N/A	2025-2030	Carried Forward	Completed and continuing ongoing implementation. No new flood risks were identified in the last five years, but the Town and the County will continue to monitor for any new potential flood issues within the area.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Elon	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	General Fund, Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	The Towns TRC committee together with plans review have been able to review and approve all new construction builds from 2015-2020 particularly with new construction at Elon University with backup generators (where applicable and required by the NC Fire Code) along with fire resistant materials, wind retrofits and upgrades, as well as 911 communications requirements in buildings for effective radio transmissions. The Town Hall has recently installed a generator to increase resiliency. As of 2025 the Town has also partnered with Waste Reduction Partners to conduct an energy audit on municipal buildings. Currently the Town Hall and Fire Station 8 been audited as of February 2025.
SP-2	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Planning Department, Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Strive to ensure future development occurs in a manner that protects floodplains, streams, wetlands, and other natural features which work to reduce flood hazard susceptibility and continue to enforce existing regulations pertaining to stormwater management and erosion control standards contained within the Town of Elon Land Management Ordinance, Jordan Lake Riparian Buffer Ordinance, and Flood Damage Prevention Ordinance	Flooding	1.1	High	Town of Elon	Staff Time	2025- 2030	New	
NRP-2	Implement the tree preservation and landscaping standards outlined in the Town of Elon Land Management Ordinance to preserve the tree canopy and reduce urban heat island effect.	Excessive Heat	1.1	Medium	Town of Elon	Staff Time	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Alamance County, Town of Elon Fire Department	NA	2025-2030	Carried Forward	The Town of Elon FD conducts monthly meeting with the local arson task force and topics such as wildland fires are discussed occasionally with local FS Rep.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
ES-2	Coordinate with the North Carolina Department of Transportation (NCDOT) to maintain adequate and effective snow and ice removal plans by the towns/cities and NCDOT. "Adequate" means that all major thoroughfares are cleared and remain clear within 12 hours of last snowfall.	Severe Winter Weather	2.2	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	The Town's Public Works Department provided completed snow removal from the Towns streets during every snow storm from 2015-2020. This was for any storm which produced enough precipitation to cover the roads and maintained them clear.
Public Education & Awareness									
PEA-1	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the North Carolina Division of Emergency Management (NCEM). This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcements from the Alamance County Inspections Department when builders and developers apply for permits.	Flooding	1.2	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	The Town of Elon along with Alamance County provides this information during the Town's Technical Review Committee meetings with contractors, architects, etc. The Town continues to provide this information to the institutions with the most development activity such as Elon University, Blakey Hall and Twin Lakes Retirement Centers. A link to the Flood Damage Prevention Ordinance has been placed on the Town's website.
PEA-2	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	Town of Elon	General Fund	2025-2030	Carried Forward	The Town will continue to coordinate efforts to meet with the major institutions and businesses (Elon University, Twin Lakes, Blakey Hall, Labcorp, Carolina Biological, Sonoco, and Engineering Controls) to encourage continued development of their plans as their operations expand.
PEA-3	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The Town of Elon FD's Emergency Management currently maintains an updated preparedness page on their website. This information will continue to be updated periodically to help inform town residents.
PEA-4	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	In the Town of Elon FD preparedness page on the Town's website and a link also is added to the Alamance Co. Emergency Preparedness website.
PEA-5	Maintain hazard mitigation plan and floodplain information on the Town's website (www.elonnc.com).	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The website carries you to the Hazard Mitigation Plan, NFIP website, and flood damage prevention ordinance (which is already in the Planning Departments documentation for download).
PEA-6	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	Town of Elon, Alamance County	General Fund	2025-2030	Carried Forward	The Town of Elon is the FEMA repository for all related documents within its jurisdiction. The Town also works closely in conjunction with Alamance County concerning flooding issues.
PEA-7	Maintain GIS system at www.alamance-nc.com. From this site anyone from a private citizen, builder, insurance company, etc. can see if a property is located in the 1-percent-annual-chance (100-year) floodplain.	Flooding	2.1	Medium	Alamance County	Staff Time	2025-2030	Carried Forward	The Town provides a link on the Town's website to the County's GIS. The Town will continue to maintain this link.
PEA-8	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	Flooding	2.1	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The Town provides links or info to the County GIS and NC FRIS website.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-9	Educate citizens to listen for the watches and warnings issued by the National Weather Service	Flooding	2.2	Medium	Town of Elon	Staff Time	2025-2030	Carried Forward	The Town of Elon in conjunction with Alamance Co. inform the residents via website as well as the countywide emergency alert system, Nixle, of upcoming warnings and watches.
PEA-10	During extreme heat and severe winter weather, organize community check-ins on elderly and sensitive populations. Program can be run at the neighborhood level through buddy systems where neighbors are aware of and check on those at risk of health impacts.	Excessive Heat, Severe Winter Weather	2.2	Medium	Town of Elon	Staff Time	2025-2030	New	
PEA-11	Develop a community-wide communications and outreach program on how to prepare and recover from climate hazards. The program may focus on a target population or a target hazard, or may be more broad.	All Hazards	2.1	Medium	Town of Elon	Staff Time	2025-2030	New	
PEA-12	Identify and plan for the use of municipal and county facilities (e.g., library, community buildings) as temporary shelter from storms or as cooling centers. Consider partnering with area nonprofits and faith-based organizations to help run the shelters during storms and extreme heat.	All Hazards	3.1	Medium	Town of Elon	General Fund and Partnerships with local non-profits	2025-2030	New	

Table A.36 – Mitigation Action Plan, Town of Green Level

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Review the subdivision regulations and make appropriate changes to encourage alternatives to placing lots in flood-prone areas and to minimize impervious surface coverings, if necessary.	Flooding	1.2	Medium	Town of Green Level	Local	2025-2030	Carried Forward	No progress was made due to administrative limitations.
P-2	Discourage the public and developers from developing property in flood zones.	Flooding	1.2	Medium	Town of Green Level	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
P-3	Expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database	Flooding	1.2	Low	Alamance County	Local, County	2025-2030	Carried Forward	The Town maintains ECs, but they are not yet made available on the County's GIS website.
P-4	Continue the Town of Green Level's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Green Level	Local, County	2025-2030	Carried Forward	The Town has remained an active participant in the NFIP.
P-5	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Green Level, Town of Haw River	Local, County	2025-2030	Carried Forward	No progress was made due to administrative limitations.
P-6	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	All Hazards	1.2	Medium	Town of Green Level	Local, County	2025-2030	Carried Forward	County land development plan was completed and adopted in 2020. Flood hazard and land use mapping remains to be completed.
Property Protection									
PP-1	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Low	Town of Green Level	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	No progress was made due to limited administrative and fiscal resources.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	No progress was made due to limited administrative and fiscal resources.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town Planning Department, Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Town of Green Level, Town of Haw River	Local, County	2025-2030	Carried Forward	No progress was made due to limited staff resources.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Public Education & Awareness									
PEA-1	Encourage residents to sign up for the countywide emergency notification system. Greater awareness of hazard events will help make residents more aware of their risks and encourage them to take preparedness and property protection actions to mitigate their individual hazard risk.	All Hazards	2.1	Medium	Town of Green Level	Local	2025-2030	Carried Forward	Green Level has an updated website and will work to incorporate links and information encouraging residents to sign up for the countywide emergency notification system.

Table A.37 – Town of Haw River

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Alamance County GIS Department	Local, County	2025-2030	Carried Forward	The Town of Haw River maintains ECs and will work in conjunction with Alamance County GIS Department to make them available in a computer database.
P-2	Continue Town of Haw River's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Town of Haw River has participated in the NFIP Program since 07/18/1975.
P-3	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Haw River Fire Department	Local, County	2025-2030	Carried Forward	Water/fire flow study completed in 2021. Maintenance and monitoring efforts will continue.
P-4	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Monitor recreational facilities located in the floodplain and evaluate flood resistance of county structures.	Flooding	4.2	Medium	Town of Haw River Public Works Department	Local, County	2025-2030	Carried Forward	Red Slide Park is in the floodplain and experiences regular flooding and has been closed on several occasions. Regular monitoring will continue.
PP-2	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Town of Haw River	Local, County	2025-2030	Carried Forward	The Town will continue to monitor flooding problems.
PP-3	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Haw River	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	The Town of Haw River will continue to look for grant money regarding upgrading critical facilities to improve resilience to all hazards and to improve energy usage.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town Buildings and Inspections Department, Town Planning Department, Town Emergency Services	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	Ongoing. The Haw River Police Department purchased a generator in 2021 using grant money. The Town will continue to upgrade pump stations to install generators when possible.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town Planning Department, Town Emergency Services	State grants, UHMA grants, other federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Town of Haw River Fire Department	Local, County	2025-2030	Carried Forward	This has been performed annually with the Haw River Fire Chief and the Alamance County Fire Marshall's office.
Public Education & Awareness									
PEA-1	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Haw River Fire Department has continued to work with business owners on developing emergency response plans.
PEA-2	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Haw River, Alamance County	Local	2025-2030	Carried Forward	The Haw River Fire Department continued to work with homeowners on developing family emergency plans.
PEA-3	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Haw River Fire Department continued to promote awareness on natural hazards through education at local schools.
PEA-4	Discourage the public and developers from developing property in flood zones.	All Hazards	1.2	Medium	Town of Haw River	Local	2025-2030	Carried Forward	No progress to report due to limited administrative capability. The Town of Haw River reviews all new development through the TRC process.
PEA-5	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	Alamance County, Town of Haw River	Local, County	2025-2030	Carried Forward	The Town of Haw River works in conjunction with Alamance County GIS Department on this, and the Town is the repository for all flood documents
PEA-6	Encourage residents to sign up for the countywide emergency notification system. Greater awareness of hazard events will help make residents more aware of their risks and encourage them to take preparedness and property protection actions to mitigate their individual hazard risk.	All Hazards	2.1	Medium	Town of Haw River	Local	2025-2030	Carried Forward	The Town of Haw River will continue to work in conjunction with Alamance County on this.

Table A.38 – Mitigation Action Plan, Town of Ossipee

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	No progress was made due to limited administrative resources.
P-2	When the county land use plan is complete, create a land use map with an overlay of flood hazards and any other natural hazards that can be mapped.	All Hazards	1.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	The County land use plan update was completed. Mapping for Ossipee remains to be done.
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	No progress was made due to limited administrative resources.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Ossipee	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town of Ossipee	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	No progress was made due to lack of funding.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town of Ossipee	Local, State Grants, UHMA Grants, other potential federal grants	2025-2030	Carried Forward	The Town has a new Town Hall and will seek funding to secure a backup generator.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Ossipee	State grants, UHMA grants, other federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Town of Ossipee	Local, County	2025-2030	Carried Forward	No progress was made due to limited administrative resources.
Public Education & Awareness									
PEA-1	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Ossipee	Local	2025-2030	Carried Forward	No progress was made due to administrative limitations.
PEA-2	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Ossipee	Local	2025-2030	Carried Forward	No progress was made due to administrative and technical limitations.
PEA-3	Encourage residents to sign up for the countywide emergency notification system. Greater awareness of hazard events will help make residents more aware of their risks and encourage them to take preparedness and property protection actions to mitigate their individual hazard risk.	All Hazards	2.1	Medium	Town of Ossipee	Local	2025-2030	Carried Forward	The Town of Ossipee will work with Alamance County on this effort.

Table A.39 – Mitigation Action Plan, Town of Swepsonville

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Review the subdivision regulations and make appropriate changes to encourage alternatives to placing lots in flood-prone areas and to minimize impervious surface coverings, if necessary.	Flooding	1.2	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to administrative limitations
P-2	Continue Town of Swepsonville's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	The Town has maintained compliance with NFIP requirements for continued participation.
P-3	Develop specific regulations that prohibit dumping in the county's watersheds	Flooding	1.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to administrative limitations
P-4	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Town of Swepsonville	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Town of Swepsonville	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Town of Swepsonville	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town of Swepsonville	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to staff and funding limitations.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Town of Swepsonville	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to staff and funding limitations.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Swepsonville	State grants, federal grants	2025-2030	New	
Public Education & Awareness									
PEA-1	Encourage citizens and businesses/industries to develop emergency preparedness plans.	All Hazards	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-2	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-3	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-4	Discourage the public and developers from developing property in flood zones.	All Hazards	1.2	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.
PEA-5	Maintain documents about flood insurance, flood protections, floodplain management, and natural and beneficial functions of floodplains at the local libraries and government offices.	Flooding	2.1	Medium	Town of Swepsonville	Local	2025-2030	Carried Forward	No progress made due to lack of administrative resources for outreach.

Table A.40 – Mitigation Action Plan, Village of Alamance

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Continue to expand the County's Geographic Information System (GIS) capabilities to include maintaining Elevation Certificates in a computer database.	Flooding	1.2	Medium	Village of Alamance	Local, County	2025-2030	Carried Forward	The Village will work to compile and provide ECs to the County.
P-2	Continue the Village of Alamance's participation in the National Flood Insurance Program (NFIP) so citizens are eligible for flood insurance.	Flooding	1.2	Medium	Village of Alamance	Local	2025-2030	Carried Forward	The Village has maintained compliance with the NFIP
P-3	Review all fire districts coverage to ensure that there are adequate quantities of water for firefighting purposes and that all water points are maintained on a regular basis.	Wildfire	2.2	Medium	Village of Alamance	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations.
Property Protection									
PP-1	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues.	Flooding	4.2	Medium	Village of Alamance	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
PP-2	Look for opportunities to acquire, relocate, or elevate structures vulnerable to floods	Flooding	4.2	Medium	Village of Alamance	General Fund	2025-2030	New	
Structural Projects									
SP-1	Seek funding to the retrofit of critical facilities and Village-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Village of Alamance	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to administrative and fiscal limitations.
SP-2	Seek funding for the installation of backup generators or quick connect hook ups for mobile generators on any newly constructed and existing county critical facilities.	All Hazards	4.2	Medium	Village of Alamance	Local, State Grants, federal grants	2025-2030	Carried Forward	No progress made due to administrative and fiscal limitations.
SP-3	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	City Planning Department, City Emergency Services	State grants, federal grants	2025-2030	New	
Emergency Services									
ES-1	Meet annually with State Forester for Alamance County to improve coordination of wildfire control and response.	Wildfire	3.2	Medium	Village of Alamance	Local, County	2025-2030	Carried Forward	No progress made due to administrative limitations.
Public Education & Awareness									
PEA-1	Encourage homeowners to review insurance policies as part of an overall family disaster plan.	All Hazards	2.1	Medium	Village of Alamance	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
PEA-2	Increase awareness of the natural hazards potential to local officials, the general public, and private industry.	All Hazards	2.1	Medium	Village of Alamance	Local	2025-2030	Carried Forward	No progress made due to administrative limitations.
PEA-3	Maintain hazard mitigation plan and floodplain information on the Village's website.	All Hazards	2.1	Medium	Village of Alamance	Local	2025-2030	Carried Forward	The Village has an updated website and will work to incorporate hazard mitigation and floodplain information.

ANNEX B. DURHAM COUNTY

B.1 ASSET INVENTORY

Durham County and the HMPC provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table B.1 and Table B.2 provide a count of critical facilities by FEMA lifeline category by jurisdiction in Durham County. Figure B.1 and Figure B.2 show the locations of all critical facilities by jurisdiction in Durham County.

Table B.3 provides a detailed inventory of the critical facilities in Durham County, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table B.1 – Critical Facilities by Type, Unincorporated Durham County

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	1	$-
Food, Hydration, Shelter	1	$5,342,951
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	10	$6,977,864
Transportation	0	$-
Water Systems	17	$9,315,000
Total	**29**	**$21,635,815**

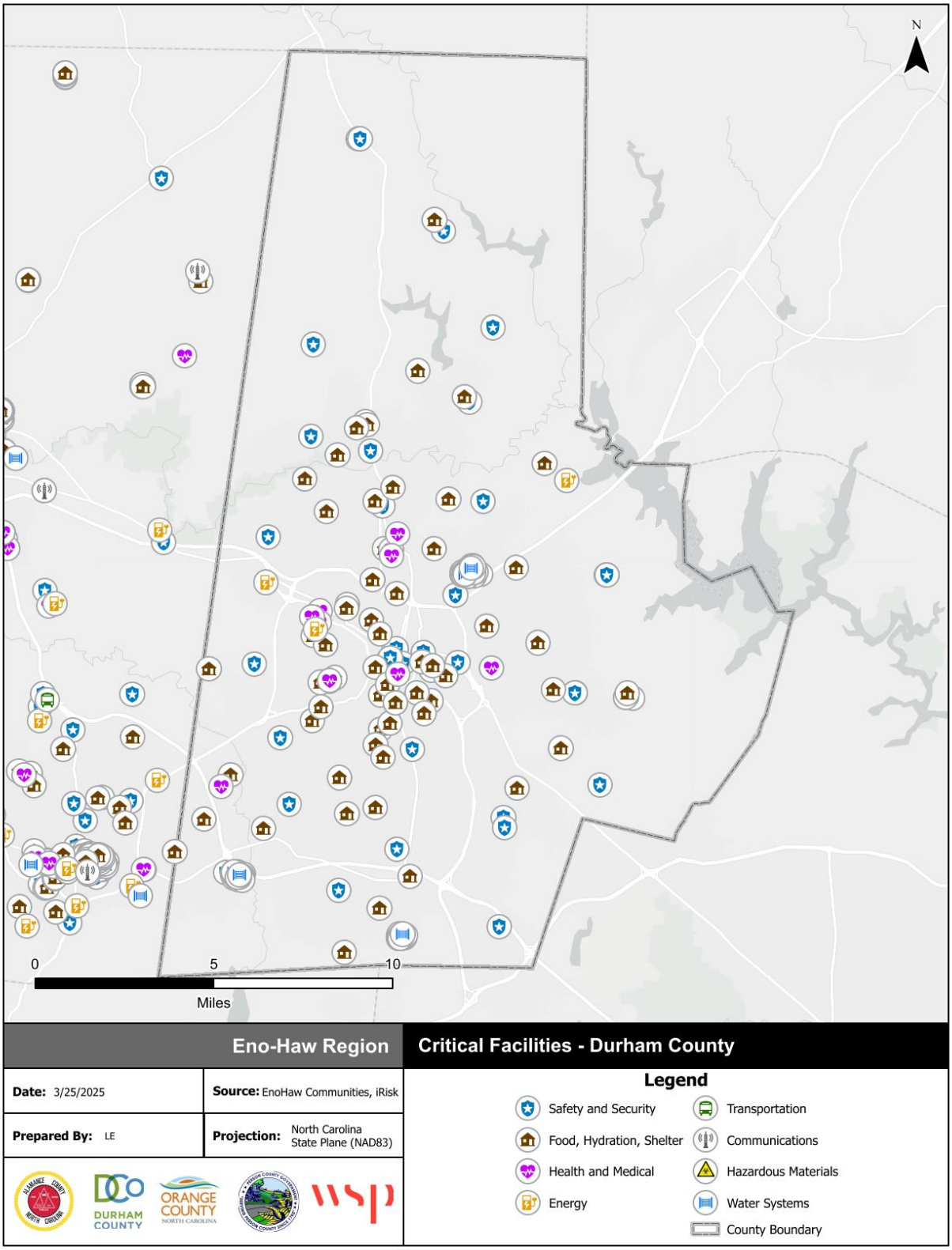
Source: Durham County, HMPC

Table B.2 – Critical Facilities by Type, City of Durham

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	1	$21,023,727
Food, Hydration, Shelter	56	$624,758,056
Hazardous Materials	0	$-
Health and Medical	10	$207,220,490
Safety and Security	34	$275,018,274
Transportation	0	$-
Water Systems	76	$30,014,999
Total	**177**	**$1,158,035,546**

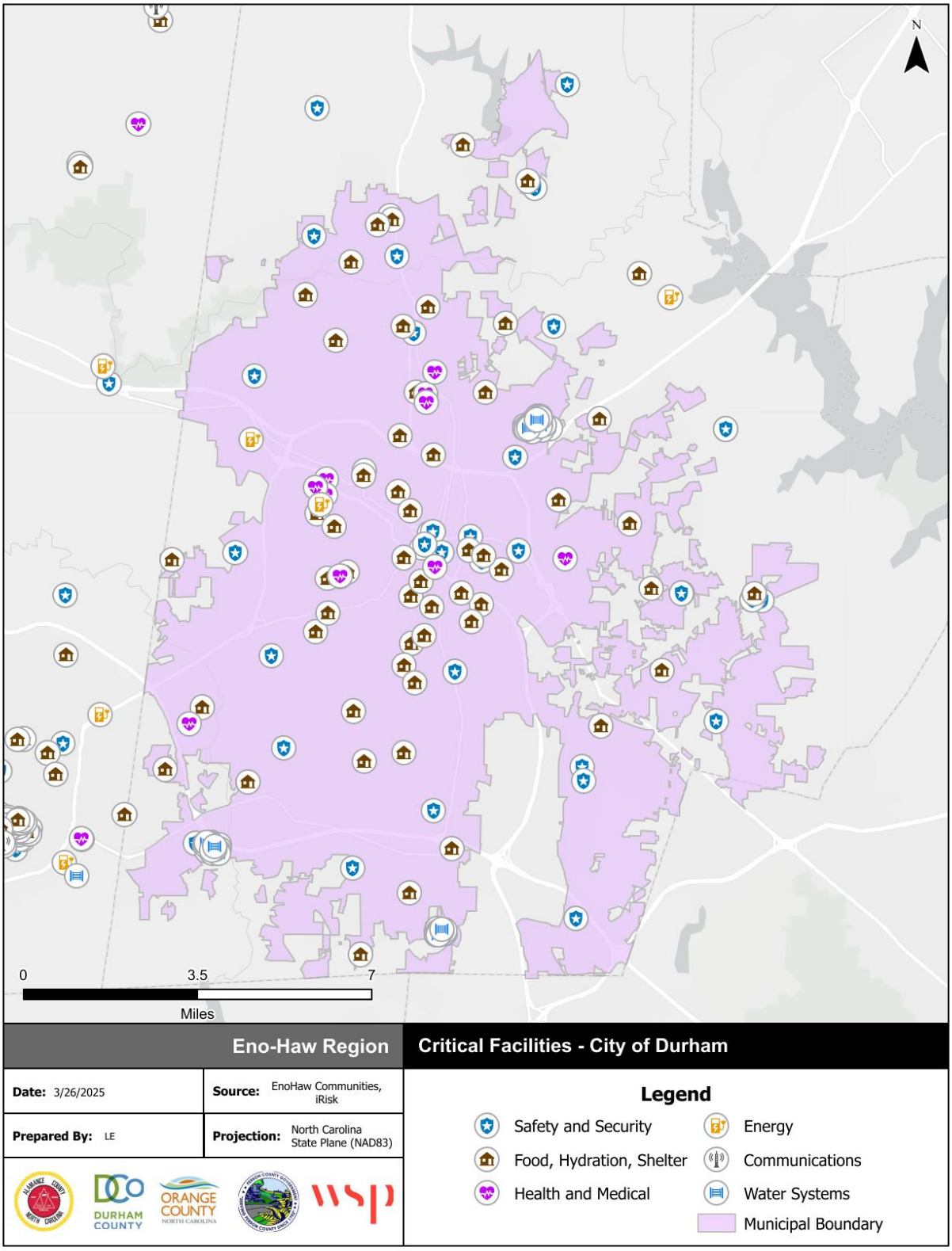
Source: Durham County, HMPC

Figure B.1 – Critical Facilities, Unincorporated Durham County



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure B.2 – Critical Facilities, City of Durham



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Table B.3 – Durham County Critical Facilities Inventory

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
City of Durham							
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		2.5
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded		2
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		2
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		2
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	5.86	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	11.63	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		2
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	2.70	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	3.20	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		0
Safety and Security	Fire Station	2212 CHAPEL HILL ROAD, DURHAM, NC, 27707	$248,042.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		2
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	22.85	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	23.04	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	23.14	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	5.63	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	0.92	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Treatment Plant	North Durham Wastewater Division	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Community College	1637 EAST LAWSON STREET, DURHAM, NC, 27703	$14,564,159.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		0
Safety and Security	Police Station	201 EAST MAIN STREET, DURHAM, NC, 27701	$33,239,329.00	NA	X, Unshaded		0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	2901 SOUTH MIAMI BOULEVARD, DURHAM, NC, 27703	$656,654.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded		0
Water Systems	Treatment Plant	North Durham Wastewater Division	$1,034,999.97	NA	X, Unshaded		0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	-	NA	X, Unshaded	Y	0
Energy	Power Plant	405 Research Drive, Durham, NC 27704	$21,023,726.75	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded		0
Health and Medical	Hospital	3643 N Roxboro Rd, Durham, NC 27704	$40,597,311.67	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	-	NA	X, Unshaded		2
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	2.12	X, Unshaded	Y	0
Water Systems	Treatment Plant	1900 E Club Blvd, Durham, NC 27704	$1,034,999.97	3.34	X, Unshaded	Y	0
Water Systems	Treatment Plant	6605 Farrington Rd, Chapel Hill, NC 27517	-	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	North Durham Wastewater Division	-	NA	X, Unshaded	Y	0
Safety and Security	Municipal	101 CITY HALL PLAZA, DURHAM, NC, 27701	$20,672,173.00	NA	X, Unshaded		0
Health and Medical	Hospital	3916 BEN FRANKLIN BOULEVARD, DURHAM, NC, 27704	$18,219,855.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	409 CHAPEL DRIVE, UNIT 7702, BUILDING 7702, DURHAM, NC, 27705	$21,023,726.75	NA	X, Unshaded	Y	0
Safety and Security	Police Station	8 CONSULTANT PL	$957,810.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	5285 N ROXBORO ST	$555,986.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	3005 GLENN RD	$497,457.00	NA	X, Unshaded		2
Safety and Security	Fire Station	1001 NINTH ST	$1,092,316.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1818 RIDDLE RD	$766,254.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	3700 SWARTHMORE RD	$428,620.00	NA	X, Unshaded		0
Safety and Security	Fire Station	3919 N DUKE ST	$257,660.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1805 COLE MILL RD	$353,885.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	2800 W CORNWALLIS RD	$687,888.00	NA	X, Unshaded		0
Safety and Security	Fire Station	1230 CARPENTER FLETCHER RD	$246,910.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1327 UMSTEAD RD	$865,476.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1648 MIDLAND TER	$1,939,680.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	225 Lick Creek Ln, Durham, NC 27703	$329,753.50	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	6303 FARRINGTON RD	$1,079,808.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	2060 TORREDGE RD	$989,495.00	NA	X, Unshaded		1
Safety and Security	Fire Station	226 MILTON RD	$722,099.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	2216 PRATT ST	$85,626,516.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	2725 HOLLOWAY ST	$131,647.00	NA	X, Unshaded		1
Health and Medical	EMS	2212 CHAPEL HILL RD	$248,042.00	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Safety and Security	Emergency Operations Center	2422 Broad St, Durham, NC 27704	$212,829.00	NA	X, Unshaded		0
Safety and Security	Fire Station	2008 EAST CLUB BLVD	$1,034,999.97	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	822 NORTH MIAMI BLVD	$636,138.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	139 EAST MORGAN ST	$2,529,493.00	NA	X, Unshaded		0
Safety and Security	Fire Station	6919 HERNDON RD	$1,376,085.00	NA	X, Unshaded		2
Safety and Security	Fire Station	225 LICK CREEK LN	$329,753.50	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	5503 LEESVILLE RD	$2,060,878.00	NA	X, Unshaded		2.5
Safety and Security	Fire Station	4716 OLD PAGE RD	$445,951.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	402 STADIUM DR	$40,597,311.67	NA	X, Unshaded	Y	0
Health and Medical	EMS	4200 FARRINGTON RD	$255,955.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2009 S MIAMI BLVD	$7,475,013.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	615 OLD FAYETTEVILLE ST	$520,125.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1500 MATHISON ST	$3,883,350.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	400 W CLUB BLVD	$6,461,534.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1531 S ROXBORO ST	$10,659,773.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	913 9TH ST	$12,646,491.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	5321 EPHESUS CHURCH RD	$19,552,243.00	NA	X, Unshaded	Y	1.5
Food, Hydration, Shelter	School	302 LEBANON CR	$9,350,184.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	610 ALSTON AVE	$8,636,520.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	2905 FAYETTEVILLE ST	$3,858,260.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	117 MILTON RD	$7,801,365.00	NA	X, Unshaded		2

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	School	700 WATTS ST	$10,634,372.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	3007 MT SINAI RD	$12,528,804.00	NA	X, Unshaded		2
Food, Hydration, Shelter	School	2415 E GEER ST	$7,833,610.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	3005 DIXON RD	$11,439,504.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2520 VESSON AVE	$4,777,586.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2730 HILLANDALE RD	$10,085,311.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4019 HOLT SCHOOL RD	$5,027,572.00	NA	X, Unshaded		1
Food, Hydration, Shelter	School	906 COBB ST	$4,636,915.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	906 SCOTT KING RD	-	NA	X, Unshaded		3
Food, Hydration, Shelter	School	2315 SNOW HILL RD	$8,386,329.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	2325 CHEEK RD	$7,619,982.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	5207 REVERE RD	$8,213,533.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	3901 S ROXBORO ST	$35,900,993.00	NA	X, Unshaded		1.5
Food, Hydration, Shelter	School	4915 BARBEE RD	$4,513,645.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	3810 WAKE FOREST RD	$5,824,397.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1520 COOPER ST	$5,096,790.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	2320 COOK RD	-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	3501 FAYETTEVILLE ST	$18,558,833.00	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	School	1417 OLD OXFORD HWY	$13,613,543.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2051 NORTHERN DURHAM PKWY	-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2410 E MAIN ST	$7,093,560.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1001 LEON ST	$14,730,673.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	227 MILTON RD	$15,149,847.00	NA	X, Unshaded		3
Food, Hydration, Shelter	School	923 SNOW HILL RD	$16,535,298.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	2119 CHAPEL HILL RD	$16,368,415.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4418 S ALSTON RD	$7,849,915.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4800 OLD CHAPEL HILL RD	$18,615,946.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	2401 DAKOTA ST	-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	201 BAPTIST RD	$3,173,248.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	911 W CORNWALLIS RD	$5,598,477.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	400 N DUKE ST	-	NA	X, Unshaded		0
Food, Hydration, Shelter	School	200 WISTERIA AVE	$40,597,311.67	NA	X, Unshaded		1
Food, Hydration, Shelter	School	3727 FAYETTEVILLE ST	$18,558,833.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	5001 RED MILL RD	$12,783,492.00	NA	X, Unshaded		2
Food, Hydration, Shelter	School	6806 GARRETT RD	$37,030,368.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	401 N DRIVER ST	$9,242,312.00	NA	X, Unshaded		0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	School	1801 FAYETTEVILLE RD	-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	4622 N ROXBORO RD	$36,066,555.00	NA	X, Unshaded		3
Food, Hydration, Shelter	School	800 CLAYTON RD	$135,262.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	3507 DEARBORN DR	$3,170,625.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	3218 ROSE OF SHARON RD	$40,429,854.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	1210 SAWYER ST	-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	1801 FAYETTEVILLE ST	-	NA	X, Unshaded	Y	0
Health and Medical	Hospital	2301 ERWIN RD	$21,023,726.75	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	2080 DUKE UNIVERSITY RD	$21,023,726.75	NA	X, Unshaded	Y	0
Health and Medical	Hospital	508 FULTON ST	-	NA	X, Unshaded	Y	0
Safety and Security	Police Station	921 HOLLOWAY ST	$2,922,974.00	NA	AE		0
Safety and Security	Police Station	2945 S MIAMI BLVD	$3,232,912.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	602 E MAIN ST	$36,508,384.00	NA	X, Unshaded		0
Safety and Security	Sheriff	510 S DILLARD ST	$76,983,666.50	NA	X, Unshaded		0
Safety and Security	Sheriff	5323 WAKE FOREST HWY	$3,173,248.00	NA	X, Unshaded		0
Safety and Security	Municipal	219 S MANGUM ST	$76,983,666.50	NA	X, Unshaded		0
Unincorporated Durham County							
Energy	Substation	RED MILL RD	-	NA	X, Unshaded		0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	7.41	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	AE	Y	0
Water Systems	Treatment Plant	5926 NC 55 HIGHWAY, DURHAM, NC, 27713	$547,941.18	NA	X, Unshaded		2.5
Safety and Security	Police Station	11821 N ROXBORO RD	-	NA	X, Unshaded		3
Safety and Security	Police Station	5323 Wake Forest Hwy, Durham, NC 27703	$3,173,248.00	NA	X, Unshaded		0
Safety and Security	Fire Station	4901 Cheek Rd, Durham, NC 27704	$222,046.00	NA	X, Unshaded		2
Safety and Security	Fire Station	7900 RUSSELL RD	$798,931.00	NA	X, Unshaded		0
Safety and Security	Fire Station	1814 BAHAMA RD	$1,875,208.00	NA	X, Unshaded		2
Safety and Security	Fire Station	6201 STAGVILLE RD	$435,287.00	NA	X, Unshaded		1.5
Food, Hydration, Shelter	School	9008 QUAIL ROOST RD	$5,342,951.00	NA	X, Unshaded		0
Safety and Security	Fire Station	11819 NORTH ROXBORO RD	-	1.10	AE		0
Safety and Security	Fire Station	4901 CHEEK RD	$222,046.00	NA	X, Unshaded		2
Safety and Security	Fire Station	1730 HAMLIN RD	$100,603.00	NA	X, Unshaded		1.5
Safety and Security	Fire Station	5420 WAKE FOREST HWY	$150,495.00	NA	X, Unshaded		0

B.2 RISK ASSESSMENT

This section contains a summary of the County's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Dam Failure, Flood, and Wildfire.

B.2.1 DAM FAILURE

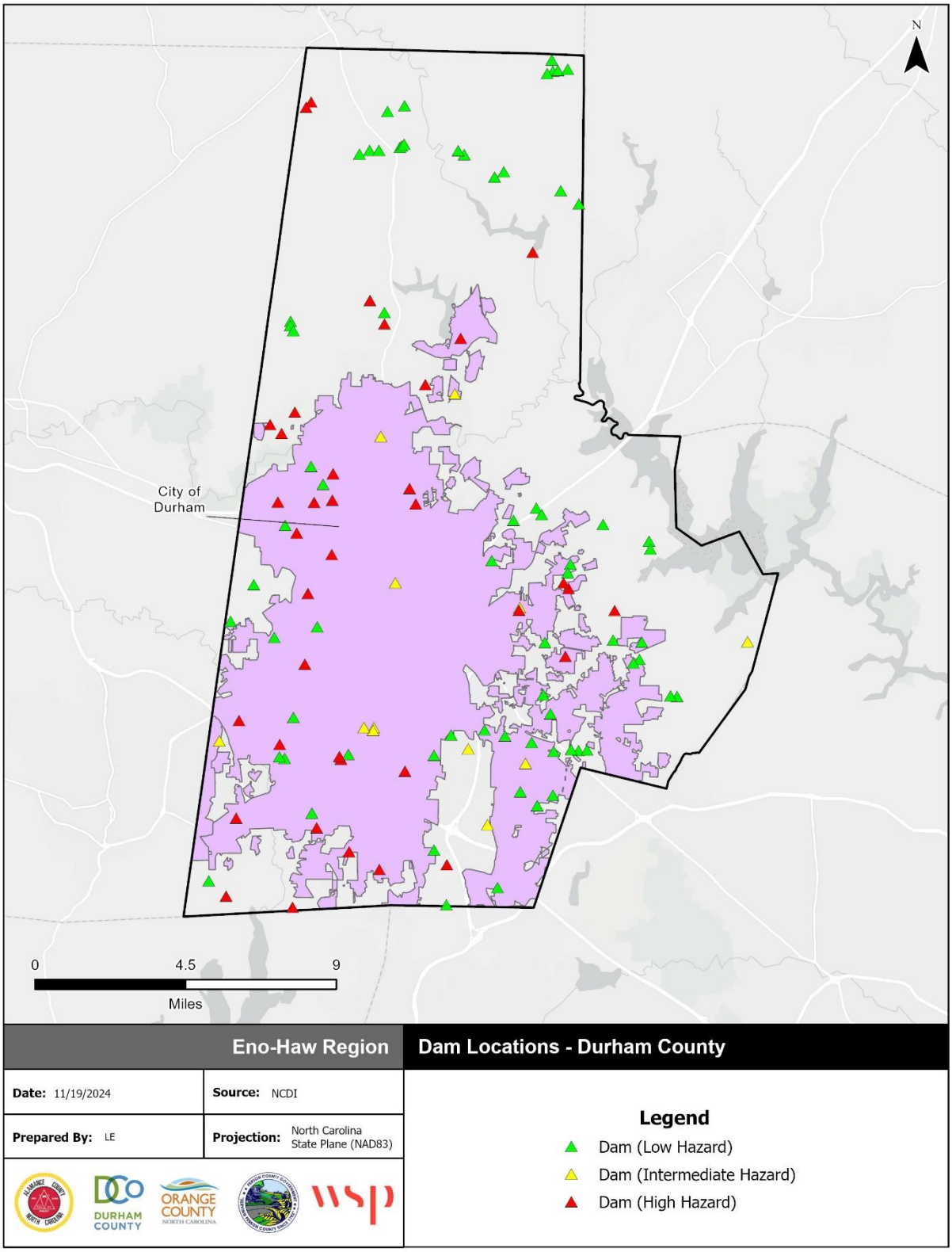
Table B.4 lists all high hazard dams located in unincorporated Durham County that have been identified by the North Carolina Dam Inventory with a condition assessment of "fair" or "poor." Figure B.3 and Figure B.4 show the location of all dams by jurisdiction in Durham County.

Table B.4 – High Hazard Dams in Unincorporated Durham County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Sykes Lake Dam	NC01028	Fair	100	Durham
Twin Lake Dam #2	NC05216	Fair	78	Oak Grove
Bailey Lake Dam	NC01032	Fair	80	Falls
Lake Elton Dam	NC01037	Fair	155	Parkwood
Eden Lake Dam	NC01043	Poor	140	Falls
Bay Meadows Lake Dam	NC01046	Fair	96	Farrington
Thompson Lake Dam	NC01047	Fair	60	Farrington
Cole Lake Dam	NC01049	Fair	81	Durham
Willowhaven Lake Dam #2	NC01050	Fair	58	Durham
Grove Park Dam	NC02323	Fair	302	N/A
Lake Swannanoa Dam	NC06420	Fair	-	N/A
Tcheng Dam	NC06964	Fair	-	N/A

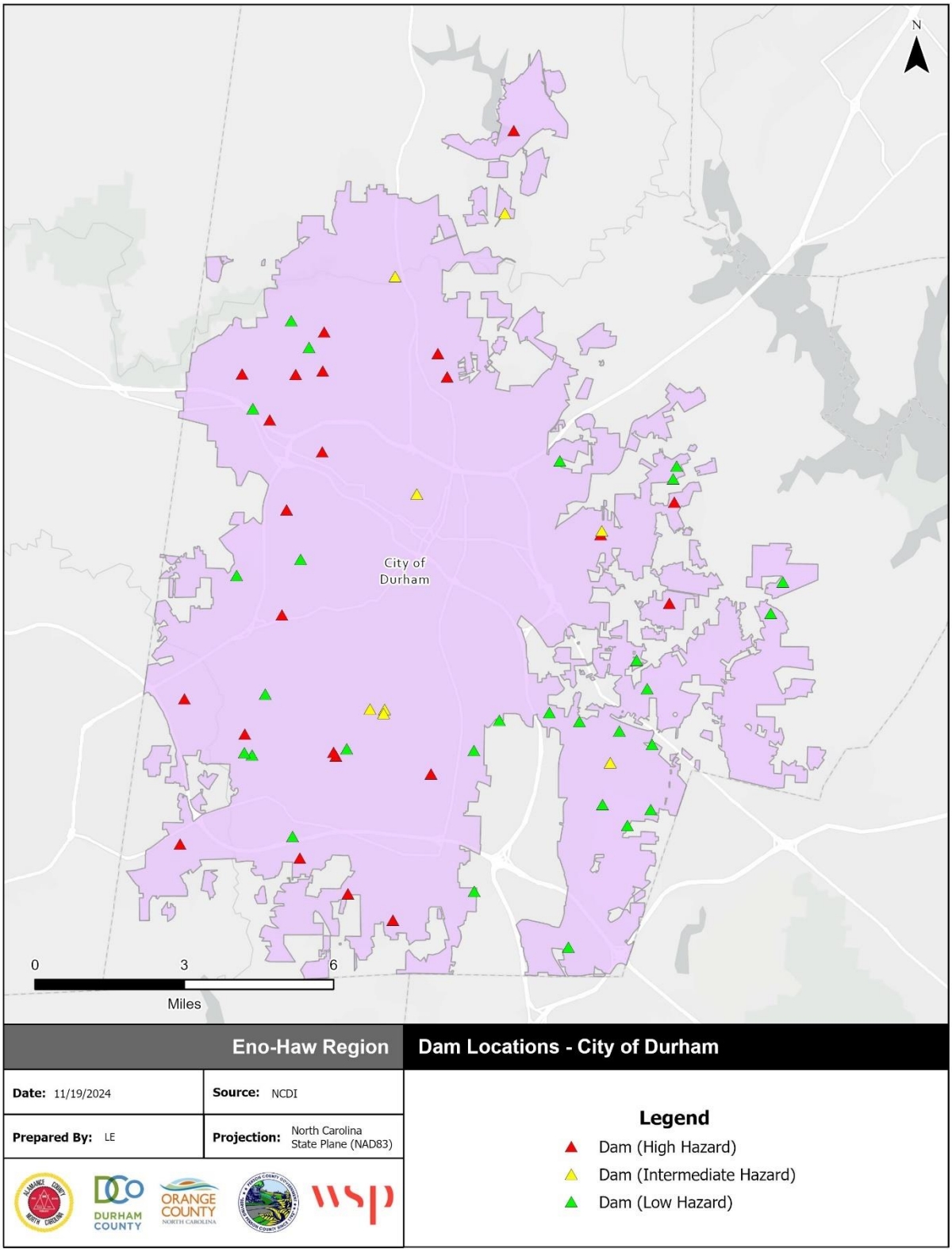
Source: NC Dam Inventory, November 2024

Figure B.3 – Dam Inventory, Unincorporated Durham County



Source: NC Dam Inventory, November 2024

Figure B.4 – Dam Inventory, City of Durham



Source: NC Dam Inventory, November 2024

B.2.2 FLOODING

Table B.5 details the acreage of Durham County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, the City of Durham has 0.4 percent of its land area within the mapped 1%-annual-chance floodplain while the total of unincorporated Durham County has over 1 percent. Overall, 0.8 percent of the total land in the county is within the mapped 1%-annual-chance floodplain.

Table B.5 – Flood Zone Acreage by Jurisdiction, Durham County

Flood Zone	Acreage	Percent of Total (%)
Unincorporated Durham County		
Zone AE	19,667.6	17.4
Zone X (500-year)	1,294.6	1.1
Zone X Unshaded	92,330.2	81.5
Total	**113,292.4**	--
City of Durham		
Zone AE	8,165.8	10.7
Zone AO	8.2	0.0
Zone X (500-year)	272.5	0.4
Zone X Unshaded	67,570.0	88.9
Total	**76,016.5**	--
County Total	**189,308.9**	--

Source: FEMA Effective DFIRM

Figure B.5 and Figure B.6 reflect the effective mapped flood hazard zones for all jurisdictions in Durham County with land in or near the SFHA, and Figure B.7 through Figure B.8 display the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table B.6 provides building counts and values for critical facilities by flood zone in Durham County and participating jurisdictions.

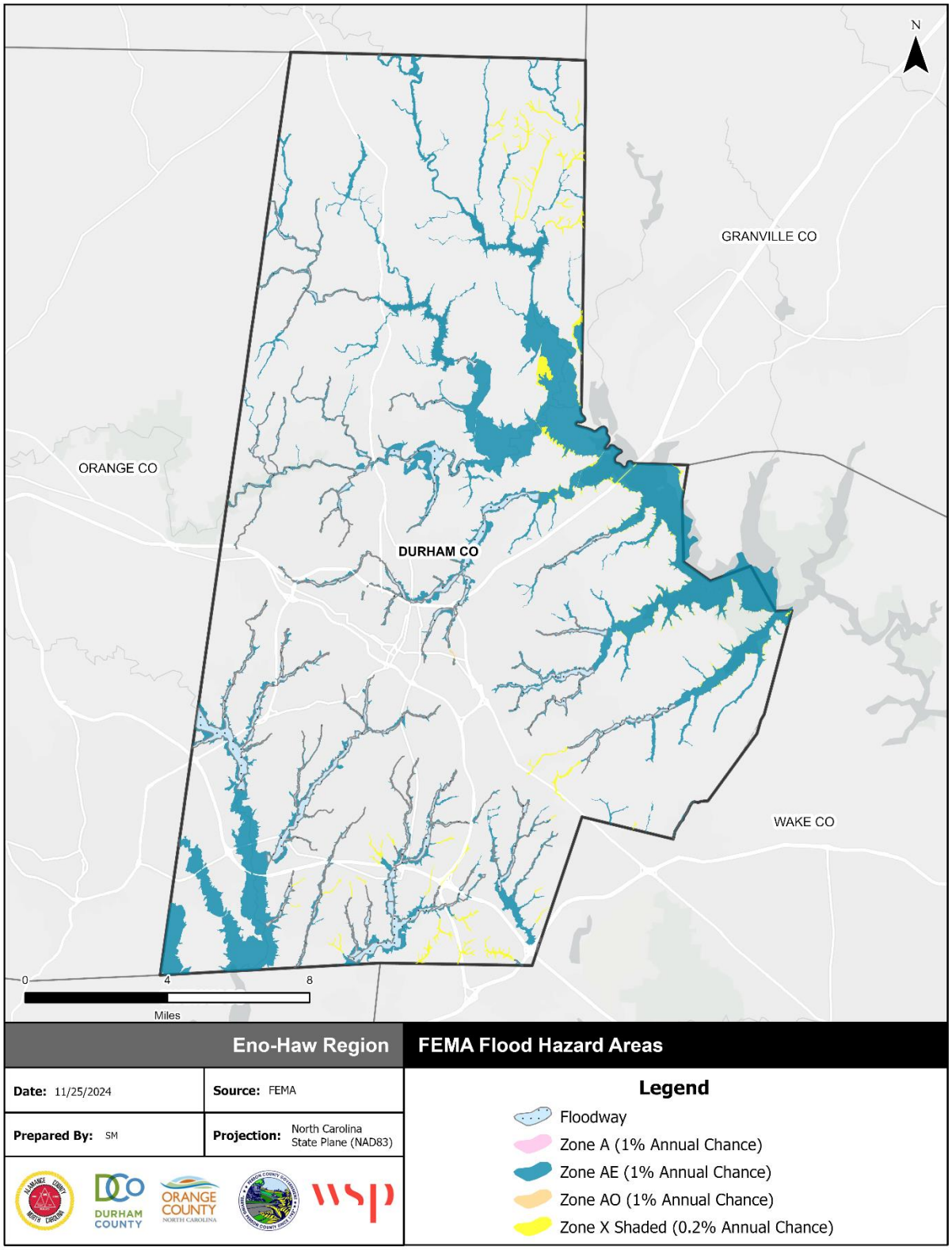
Table B.6 – Critical Facilities Exposed to Flooding, Durham County

Flood Zone	Critical Facility Count	Structure Value
Unincorporated Durham County		
Zone AE	16	$8,219,118
Zone X (500-year)	0	$-
Zone X Unshaded	13	$13,416,697
Total	**29**	**$21,635,815**
City of Durham		
Zone AE	1	$2,922,974
Zone X (500-year)	0	$-
Zone X Unshaded	176	$1,155,112,572
Total	**177**	**$1,158,035,546**
Durham County Total		

Flood Zone	Critical Facility Count	Structure Value
Zone AE	17	$11,142,091.65
Zone X (500-year)	0	$-
Zone X Unshaded	189	$1,168,529,269.35
County Total	**206**	**$1,179,671,361**

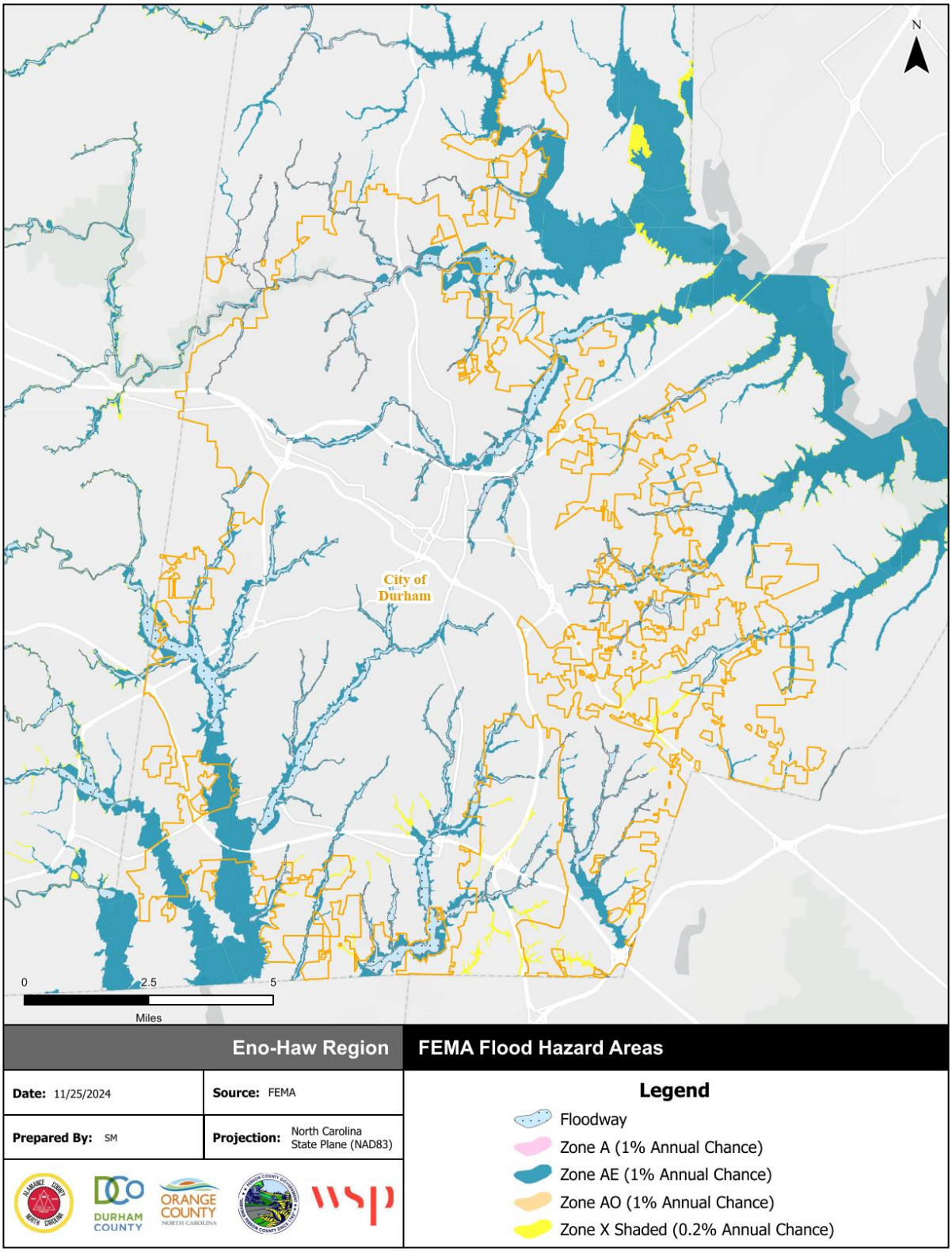
Source: FEMA Effective DFIRM, HMPC

Figure B.5 – FEMA Flood Hazard Areas, Durham County



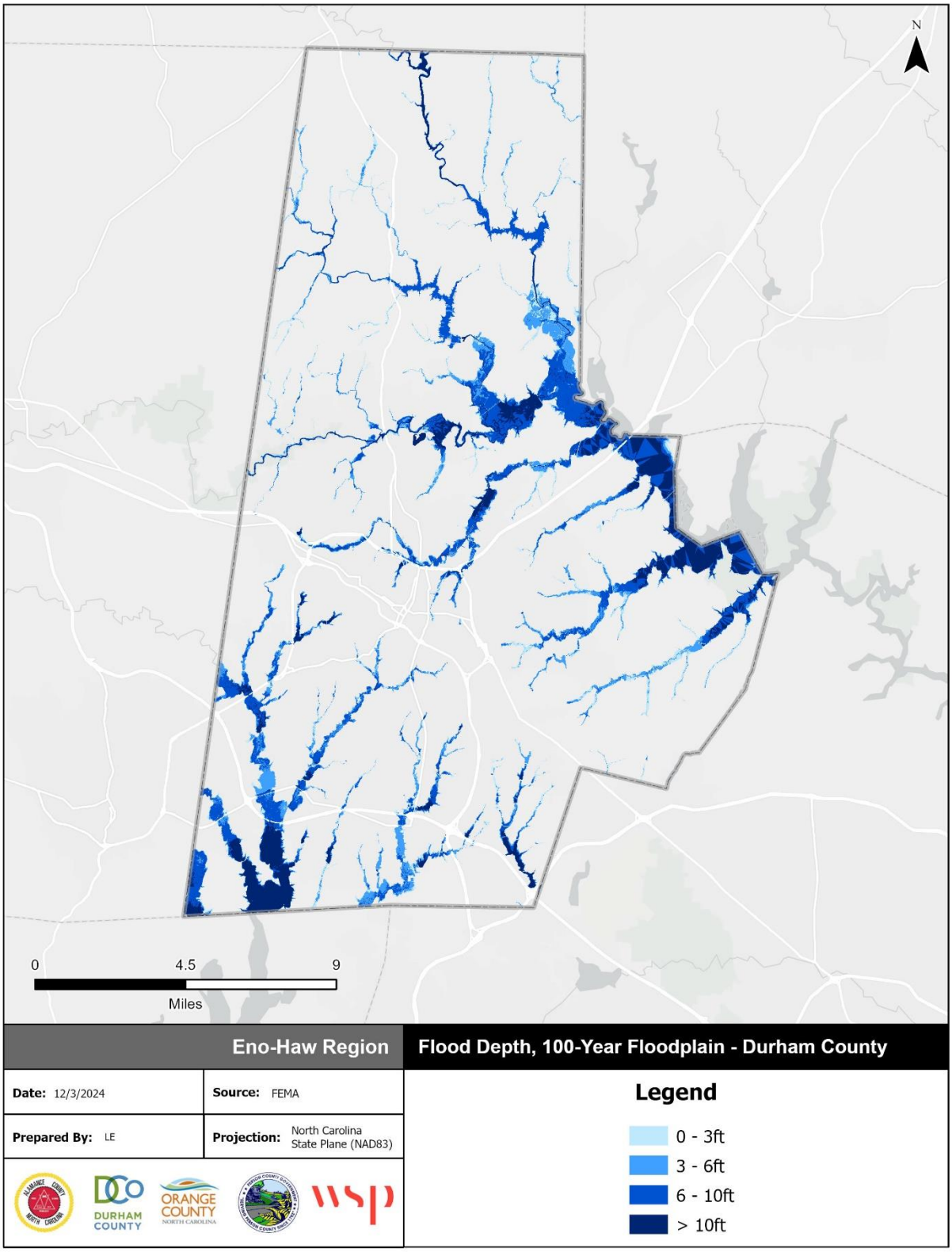
Source: FEMA Effective DFIRM

Figure B.6 – FEMA Flood Hazard Areas, City of Durham



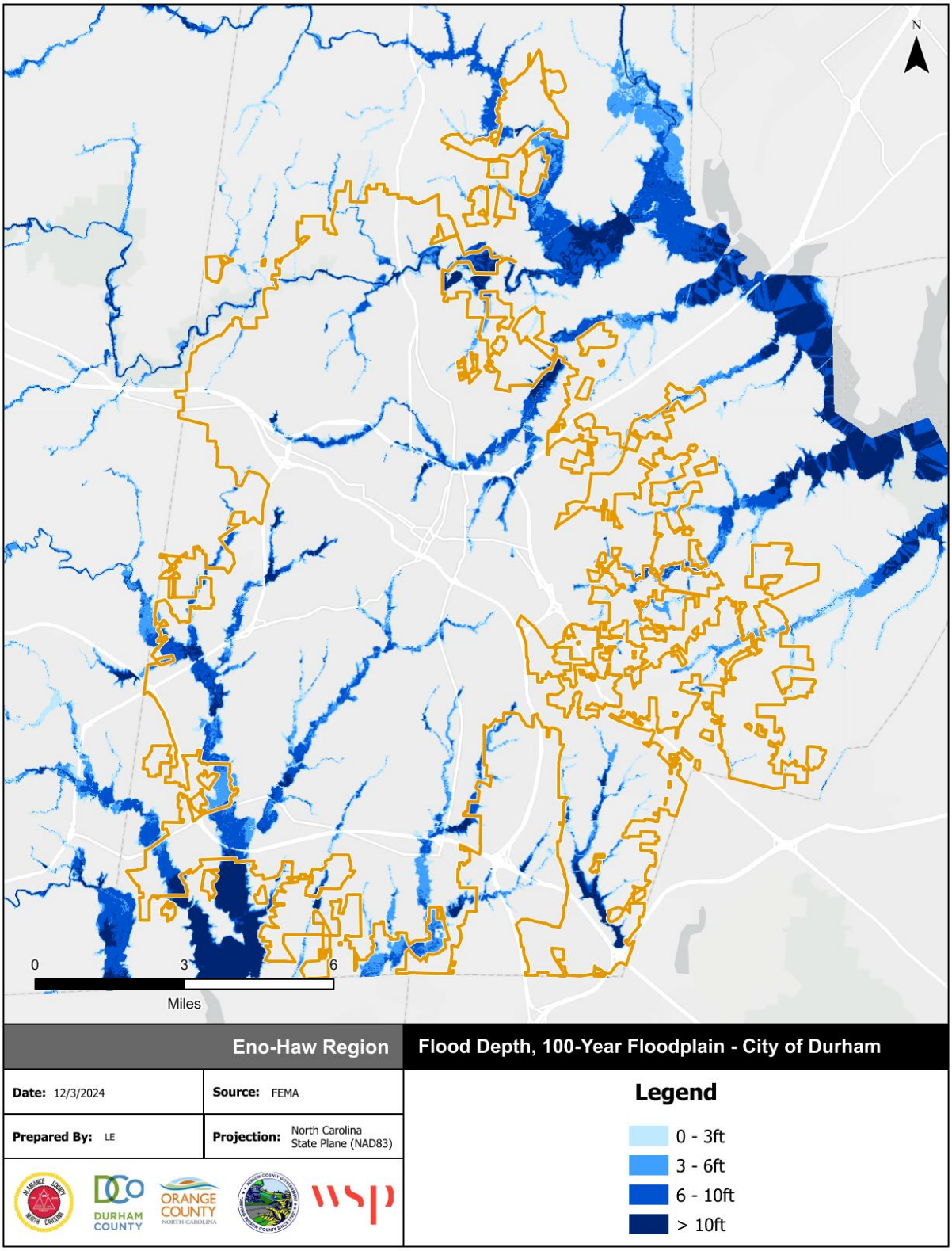
Source: FEMA Effective DFIRM

Figure B.7 – Flood Depth, 1%-Annual-Chance Floodplain, Durham County



Source: FEMA Effective DFIRM

Figure B.8 – Flood Depth, 1%-Annual-Chance Floodplain, City of Durham



Source: FEMA Effective DFIRM

B.2.2.1 *FLOOD INSURANCE DATA*

The following tables reflect NFIP policy and claims data for the County and incorporated jurisdictions categorized by structure type, flood zone, Pre-FIRM and Post-FIRM. Durham County also participates in the CRS program and is currently rated as a Class 8 community.

Table B.7 – NFIP Program Entry Dates

Community	Regular Program Entry	Emergency Program Entry
Durham County	2/15/1979	3/16/1973
City of Durham	1/17/1979	7/13/1973

Source: FEMA Community Information System

Table B.8 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Durham County					
Single Family	134	$95,860	$39,293,000	49	$508,478.46
All Other Residential	0	$0	$0	22	$237,771.32
Non-Residential	1	$1,437	$500,000	2	$9,480.90
Total	**135**	**$97,297**	**$39,793,000**	**73**	**$755,730.68**
City of Durham					
Single Family	643	$494,373	$176,606,000	227	$2,261,253.89
2-4 Family	16	$13,496	$3,783,000	8	$41,330.63
All Other Residential	32	$43,694	$12,492,000	22	$908,686.75
Non-Residential	47	$123,506	$22,639,000	26	$894,288.51
Total	**738**	**$675,069**	**$215,520,000**	**283**	**$4,105,559.78**

Source: FEMA Community Information System, accessed April 2025

Table B.9 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Durham County					
A01-30 & AE Zones	34	$33,943	$8,420,000	19	$260,758.69
A Zones	1	$543	$202,000	2	$27,379.82
B, C & X Zone					
Standard	100	$62,811	$31,171,000	30	$250,110.83
Preferred	0	$0	$0	22	$217,481.34
Total	**135**	**$97,297**	**$39,793,000**	**73**	**$755,730.68**
City of Durham					
A01-30 & AE Zones	283	$356,069	$74,979,000	133	$1,823,861.50
A Zones	0	$0	$0	10	$24,703.74
B, C & X Zone					
Standard	453	$317,155	$139,541,000	56	$1,145,215.31
Preferred	0	$0	$0	80	$791,158.19
Total	**736**	**$673,224**	**$214,520,000**	**279**	**$3,784,938.74**

Source: FEMA Community Information System, accessed April 2025

Table B.10 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Durham County					
A01-30 & AE Zones	15	$18,255	$3,774,000	16	$259,026.78
A Zones	0	$0	$0	1	$4,312.77
B, C & X Zone	22	$14,718	$6,867,000	39	$375,181.05
Standard	22	$14,718	$6,867,000	29	$247,168.20
Preferred	0	$0	$0	10	$128,012.85
Total	**37**	**$32,973**	**$10,641,000**	**56**	**$638,520.60**
City of Durham					
A01-30 & AE Zones	129	$198,568	$30,873,000	109	$1,600,795.74
A Zones	0	$0	$0	10	$24,703.74
B, C & X Zone	128	$86,911	$38,823,000	88	$1,264,264.46
Standard	128	$86,911	$38,823,000	39	$801,136.27
Preferred	0	$0	$0	50	$522,422.42
Total	**257**	**$285,479**	**$69,696,000**	**207**	**$2,889,763.94**

Source: FEMA Community Information System, accessed April 2025

Table B.11 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Durham County					
A01-30 & AE Zones	19	$15,688	$4,646,000	3	$1,731.91
A Zones	1	$543	$202,000	1	$23,067.05
B, C & X Zone	78	$48,093	$24,304,000	13	$92,411.12
Standard	78	$48,093	$24,304,000	1	$2,942.63
Preferred	0	$0	$0	12	$89,468.49
Total	**98**	**$64,324**	**$29,152,000**	**17**	**$117,210.08**
City of Durham					
A01-30 & AE Zones	154	$157,501	$44,106,000	24	$223,065.76
B, C & X Zone	325	$230,244	$100,718,000	47	$612,814.81
Standard	325	$230,244	$100,718,000	17	$344,079.04
Preferred	0	$0	$0	30	$268,735.77
Total	**479**	**$387,745**	**$144,824,000**	**71**	**$835,880.57**

Source: FEMA Community Information System, accessed April 2025

B.2.3 WILDFIRE

Table B.12 summarizes the acreage in Durham County that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 25 percent of Durham County is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table B.12 – Functional Wildland Urban Interface Acreage, Durham County

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	48,330	25%
	Indirect Exposure	37,516	20%
	Critical Fireshed	67,946	36%
	Sources of Ember Load to Buildings	28,819	15%
	Little to No Exposure	1,427	1%
	Water	6,595	3%
	Total	**190,632**	**100%**

Source: Southern Wildfire Risk Assessment

Figure B.9 and Figure B.10 depict the Functional WUI with the location of critical facilities for unincorporated Durham County and all participating jurisdictions. Figure B.13 and Figure B.14 depict the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure B.13 and Figure B.14 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Functional WUI areas with direct exposure to wildfire are distributed throughout the county with the highest densities around the norther edge of the City of Durham. Burn probability is low throughout the county with clusters of slightly elevated burn probability in northern Durham County. A small portion, potential fire intensity is also slightly higher in these areas but is otherwise generally low throughout the county.

Table B.13 and Table B.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table B.13 – Critical Facilities Exposed to Wildfire, Unincorporated Durham County

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	1	$-
Food, Hydration, Shelter	3	$21,299,691
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	8	$8,175,301
Transportation	0	$-
Water Systems	1	$547,941
Total	**13**	**$30,022,933**

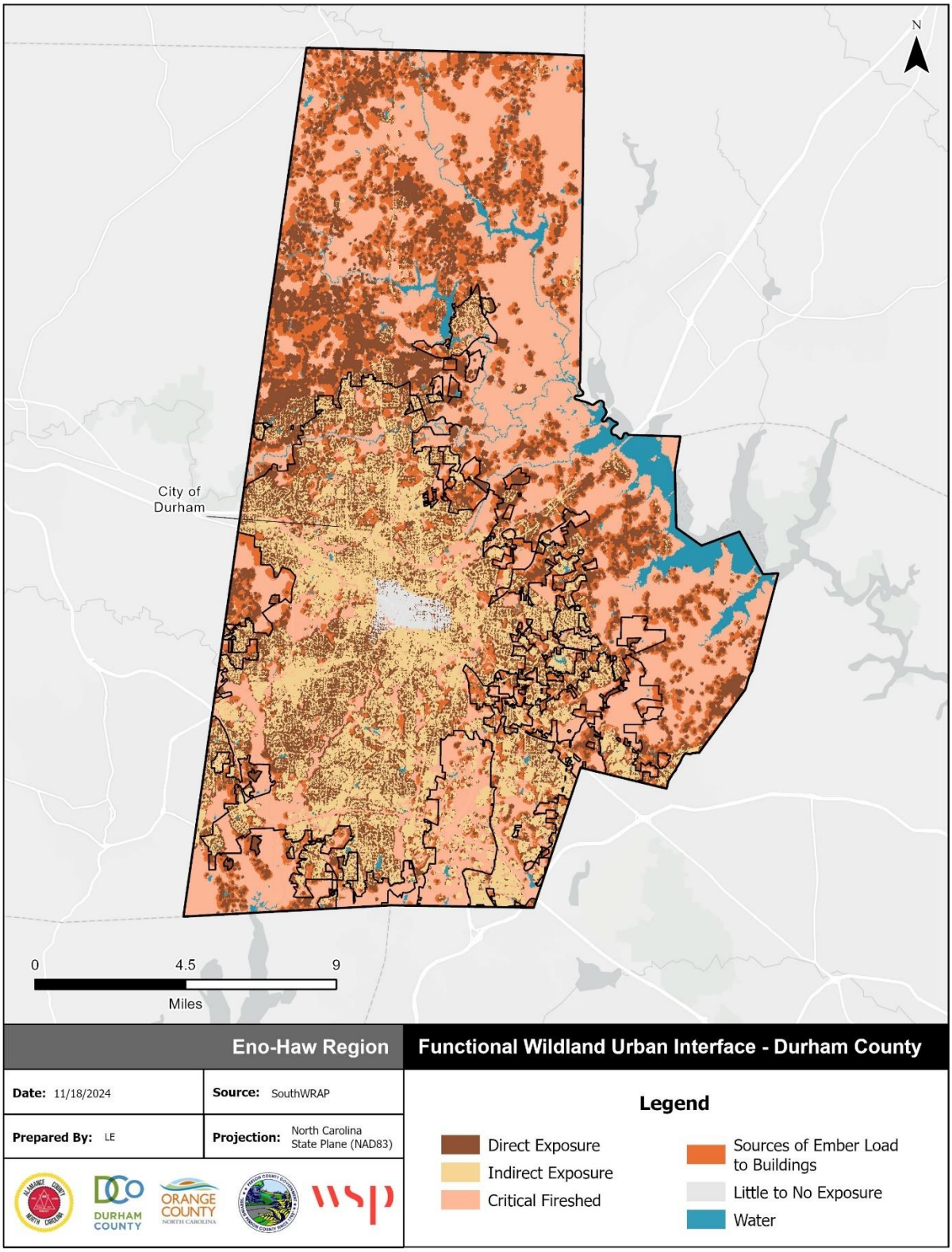
Source: Southern Wildfire Risk Assessment

Table B.14 – Critical Facilities Exposed to Wildfire, City of Durham

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	4	$73,320,304
Hazardous Materials	0	$-
Health and Medical	1	$131,647
Safety and Security	4	$4,622,308
Transportation	0	$-
Water Systems	8	$1,035,000
Total	**17**	**$79,109,259**

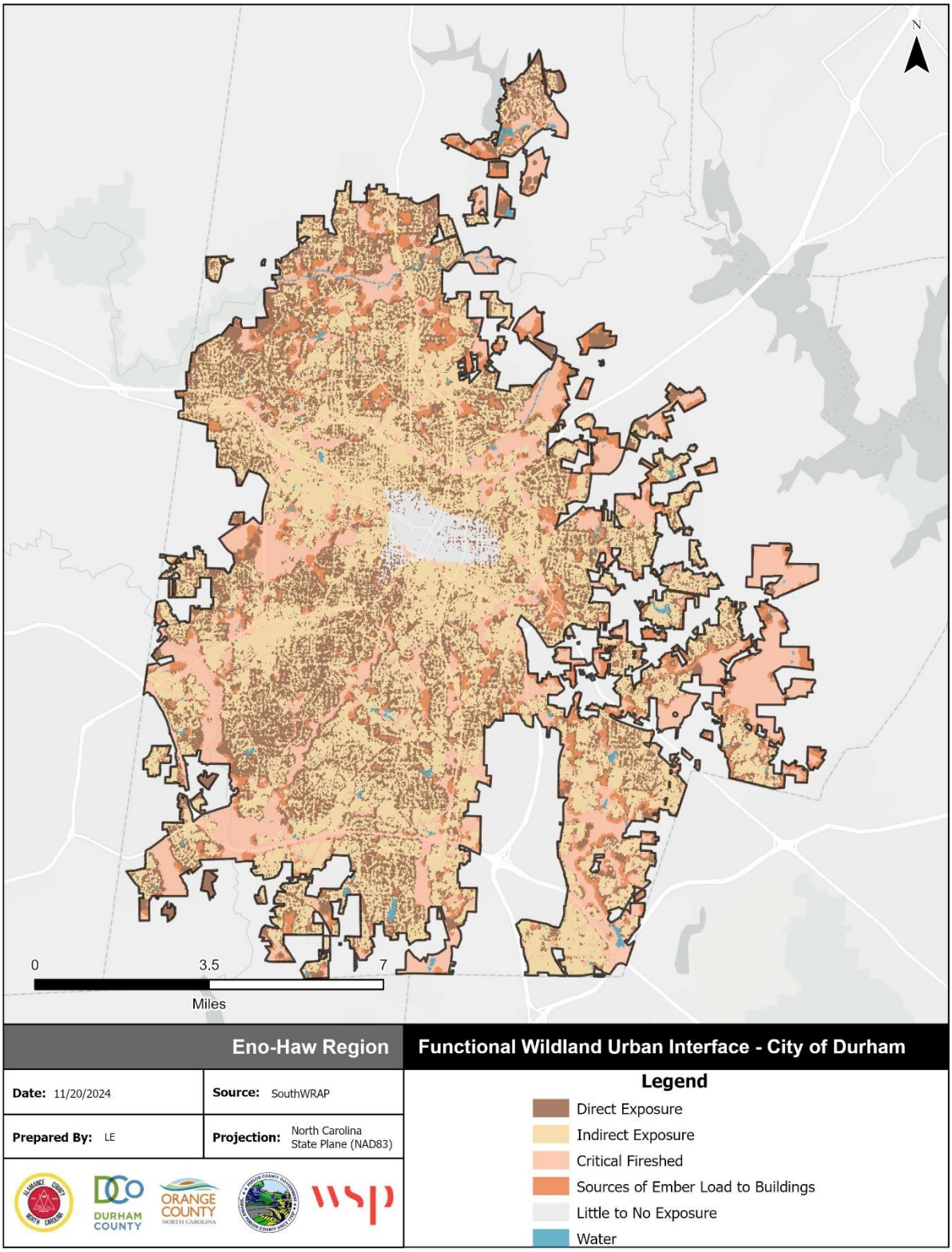
Source: Southern Wildfire Risk Assessment

Figure B.9 – Functional Wildland Urban Interface, Unincorporated Durham County



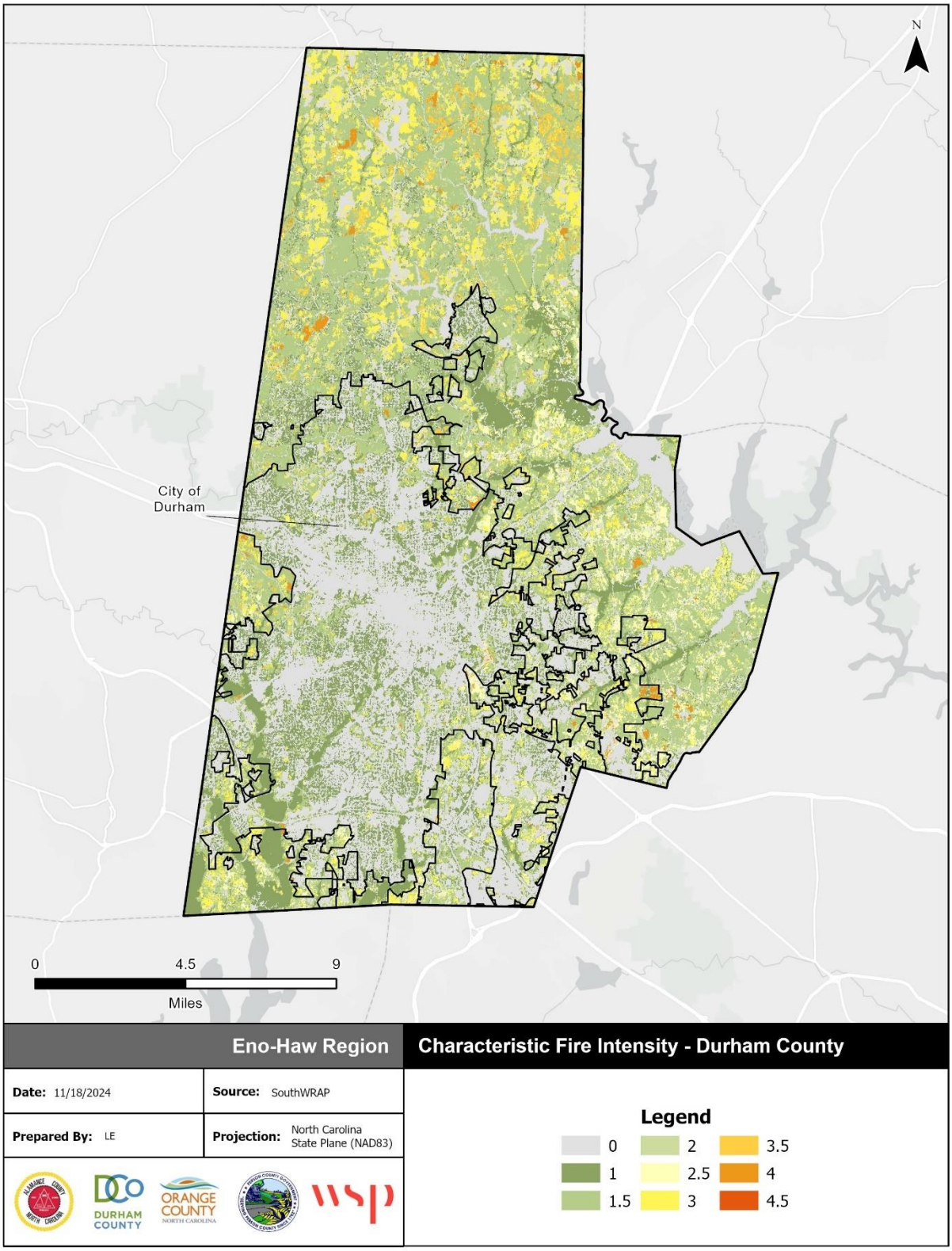
Source: Southern Wildfire Risk Assessment

Figure B.10 – Functional Wildland Urban Interface, City of Durham



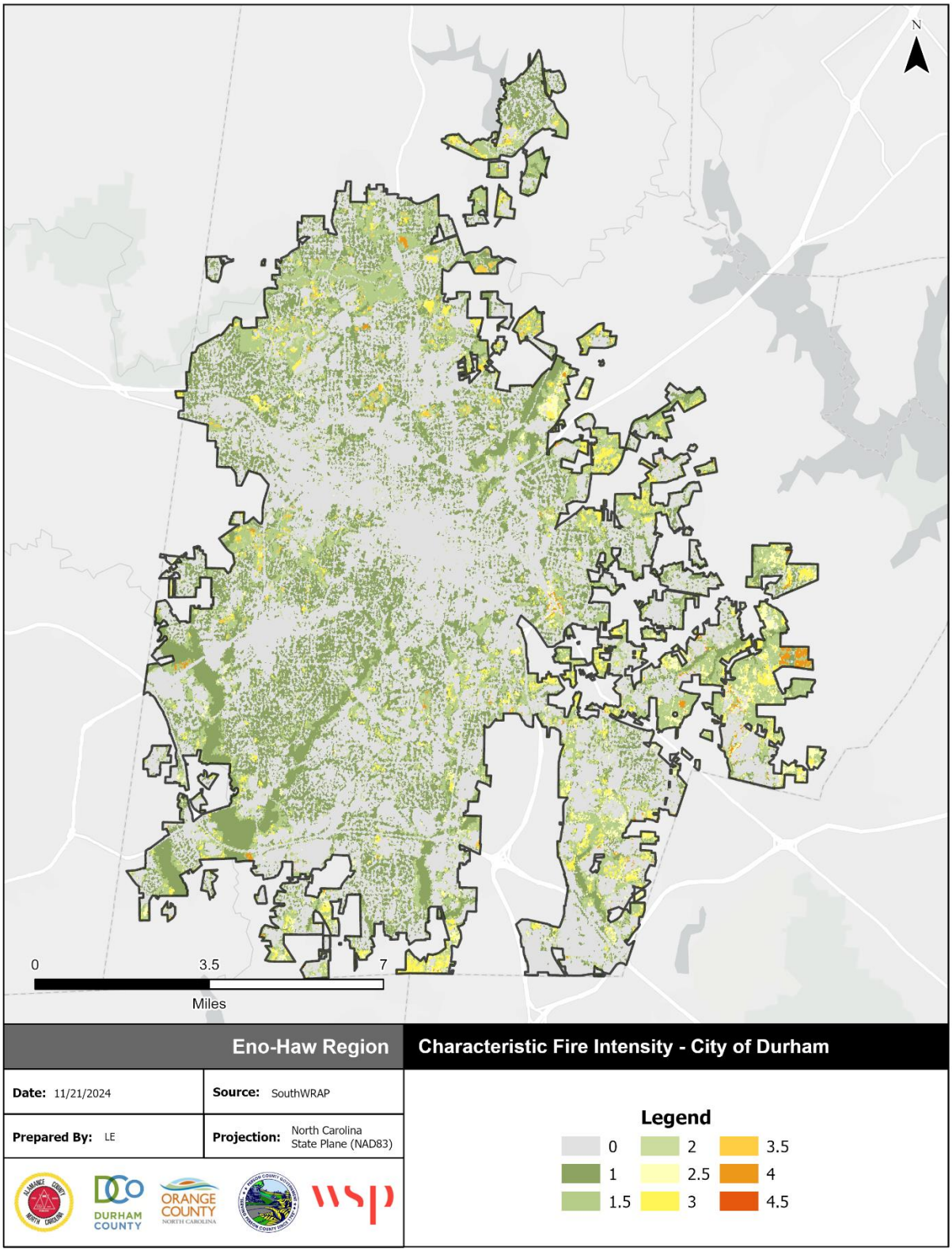
Source: Southern Wildfire Risk Assessment

Figure B.11 – Characteristic Fire Intensity, Unincorporated Durham County



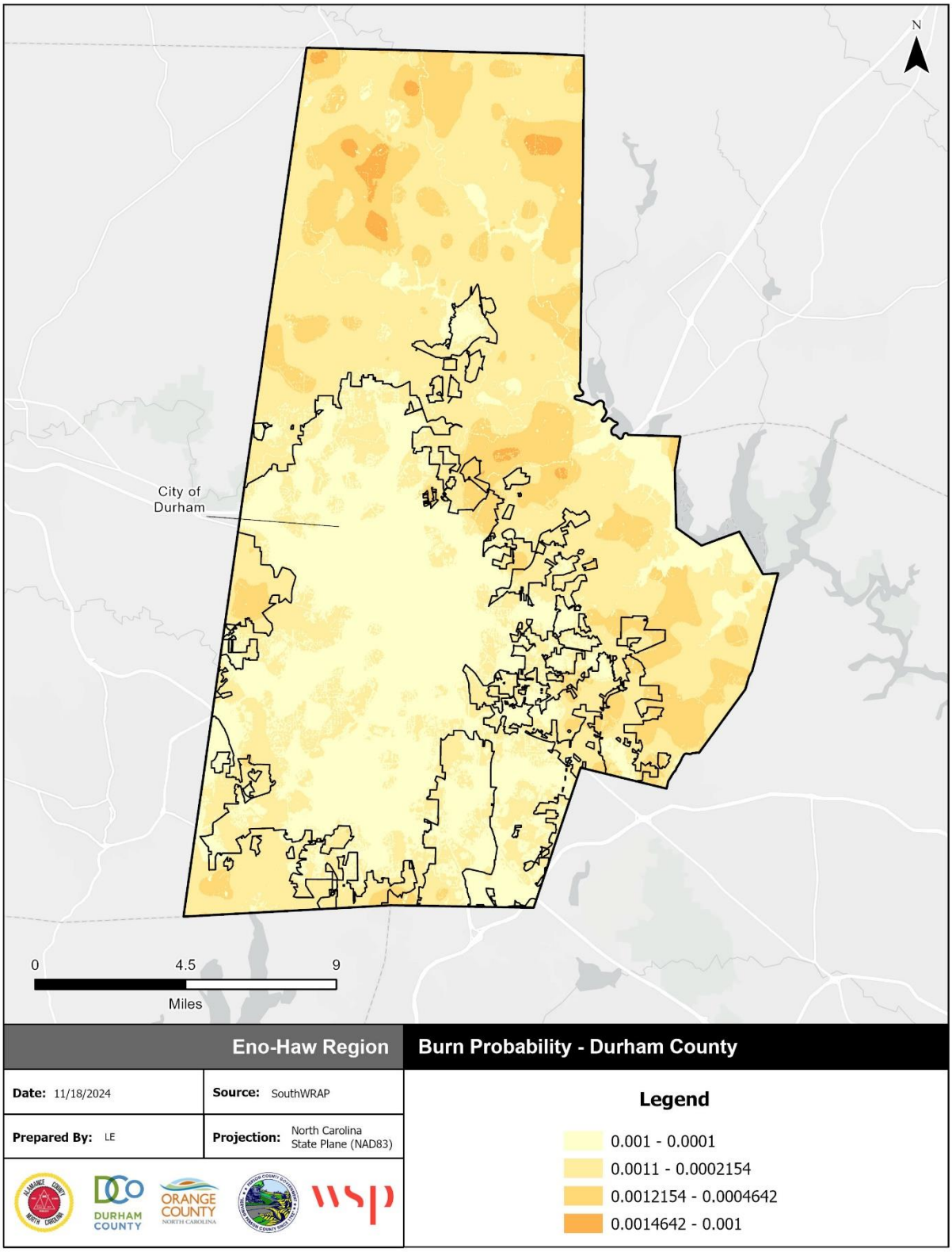
Source: Southern Wildfire Risk Assessment

Figure B.12 – Characteristic Fire Intensity, City of Durham



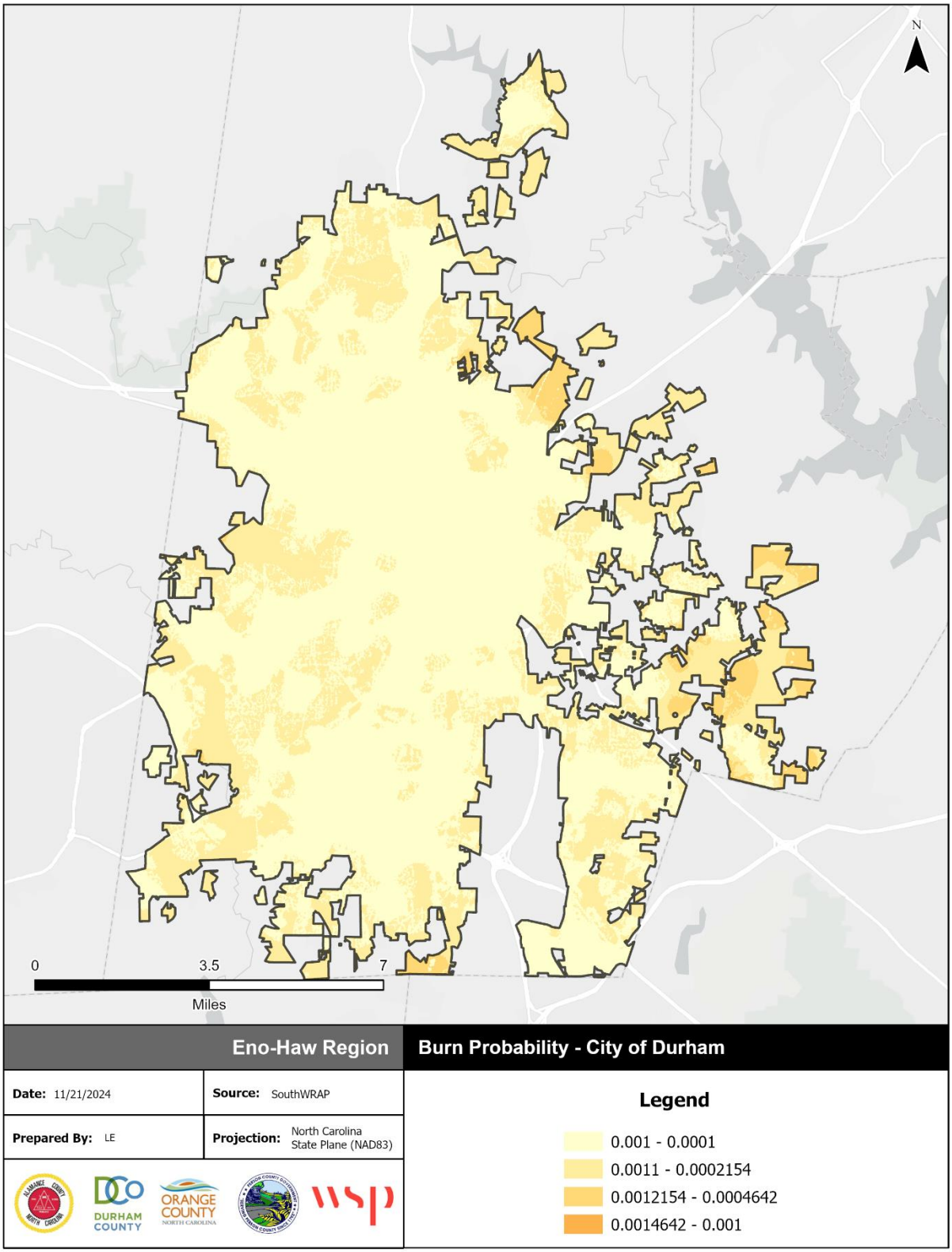
Source: Southern Wildfire Risk Assessment

Figure B.13 – Burn Probability, Unincorporated Durham County



Source: Southern Wildfire Risk Assessment

Figure B.14 – Burn Probability, City of Durham



Source: Southern Wildfire Risk Assessment

B.3 MITIGATION STRATEGY

Table B.15 – Mitigation action Plan, Durham County – Durham City

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed County or City critical facilities	All Hazards	4.2	Medium	Buildings and Inspections Department, Planning Department, Emergency Services, Public Works	Local, State grants, UHMA grants, other federal grants	2025-2030	Carried Forward	Emergency Services will continue to seek funding for back-up generators.
PP-2	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	County Engineering and Environmental Services, Public Works	Local, State grants, UHMA grants, other federal grants	2025-2030	New	Acquisition and elevation projects were completed and are in progress in the City.
Natural Resource Protection									
NRP-1	Identify and obtain additional properties to increase protected open space as a land-use tool to reduce adverse impacts from floods.	Flooding	1.2	Medium	City-County Planning Department, Public Works	HMGP or BRIC with local or State match	2025-2030	Carried Forward	Acquisition projects were completed and are in progress in the City. City and County will work to identify more properties to pursue additional acquisitions.
NRP-2	Complete one (1) stream restoration project to reduce flooding risk by restoring or enhancing stream channels to improve natural flow and capacity of streams, allowing them to better handle increased water volume during storms.	Flooding	1.1, 4.2	Medium	County Engineering and Environmental Services; Stormwater and Erosion Control Division	County Stormwater Utility fee	2025-2030	New	The Stormwater and Erosion Control Division is working on this plan now and plan to begin construction in 2026.
Structural Projects									
SP-1	Seek funding to retrofit critical facilities and City- and County-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Buildings and Inspections Department, Planning Department, Emergency Services, Public Works	Local, State grants, UHMA grants, other federal grants	2025-2030	Carried Forward	The City and County will work to identify existing facilities in need of retrofits. Emergency Services will continue to seek funding for those retrofits. The County is currently prioritizing suggestions from an assessment done to reduce the carbon footprint and increase energy efficiency throughout the buildings.
SP-2	Complete at least one (1) stormwater management project. The stormwater management project will include either a new stormwater control measure (SCM) to treat previously untreated impervious area or retrofit an existing SCM to increase runoff capture and treatment.	All Hazards	4.1, 4.2	Moderate	County Engineering and Environmental Services; Stormwater and Erosion Control Division, Public Works	County Stormwater Utility fee	2025-2030	New	

ANNEX C. ORANGE COUNTY

C.1 ASSET INVENTORY

Orange County and the HMPC provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table C.1 through Table C.4 provides a count of critical facilities by FEMA lifeline category by jurisdiction in Orange County. Figure C.1 through Figure C.4 show the locations of all critical facilities by jurisdiction in Orange County.

Table C.5 provides a detailed inventory of the critical facilities in Orange County, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table C.1 – Critical Facilities by Type, Unincorporated Orange County

Facility Type	Count of Facility Type	Structure Value
Communications	2	$23,800
Energy	7	$124,100
Food, Hydration, Shelter	30	$85,548,900
Hazardous Materials	0	$-
Health and Medical	3	$1,650,400
Safety and Security	13	$9,186,300
Transportation	0	$-
Water Systems	1	$262,000
Total	**56**	**$96,795,500**

Source: Orange County, HMPC

Table C.2 – Critical Facilities by Type, Town of Carrboro

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	1	$-
Food, Hydration, Shelter	10	$73,187,800
Hazardous Materials	0	$-
Health and Medical	3	$413,350
Safety and Security	4	$1,946,050
Transportation	0	$-
Water Systems	1	$11,198,000
Total	**19**	**$86,745,200**

Source: Orange County, HMPC

Table C.3 – Critical Facilities by Type, Town of Chapel Hill

Facility Type	Count of Facility Type	Structure Value
Communications	1	$21,855,785
Energy	8	$25,950,085
Food, Hydration, Shelter	82	$1,603,440,562
Hazardous Materials	0	$-
Health and Medical	2	$23,380,685
Safety and Security	13	$84,734,985
Transportation	1	$1,880,000
Water Systems	1	$5,708,900
Total	**108**	**$1,766,951,000**

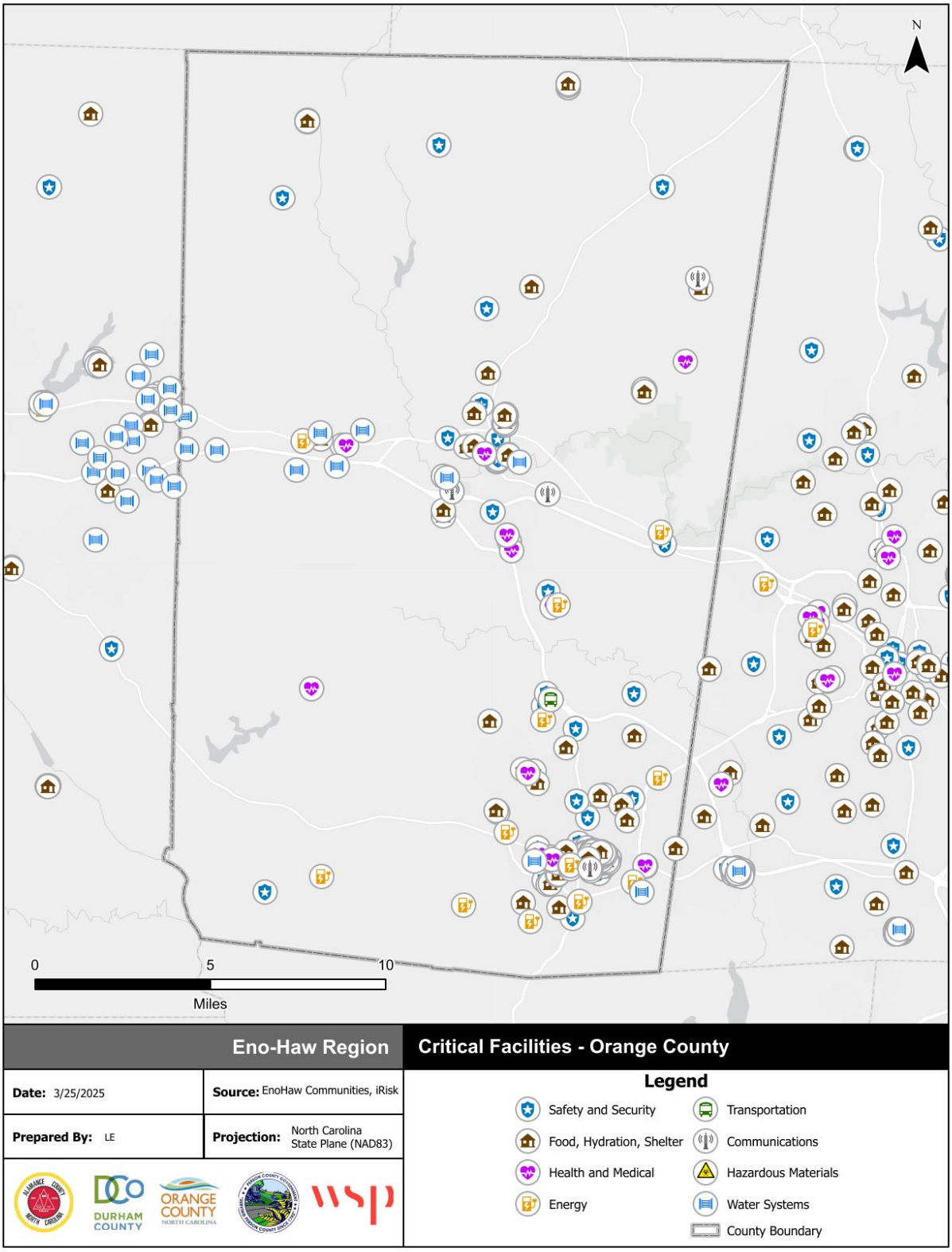
Source: Orange County, HMPC

Table C.4 – Critical Facilities by Type, Town of Hillsborough

Facility Type	Count of Facility Type	Structure Value
Communications	1	$688,400
Energy	0	$-
Food, Hydration, Shelter	6	$18,860,800
Hazardous Materials	0	$-
Health and Medical	4	$111,116,050
Safety and Security	9	$31,057,350
Transportation	0	$-
Water Systems	1	$892,700
Total	**21**	**$162,615,300**

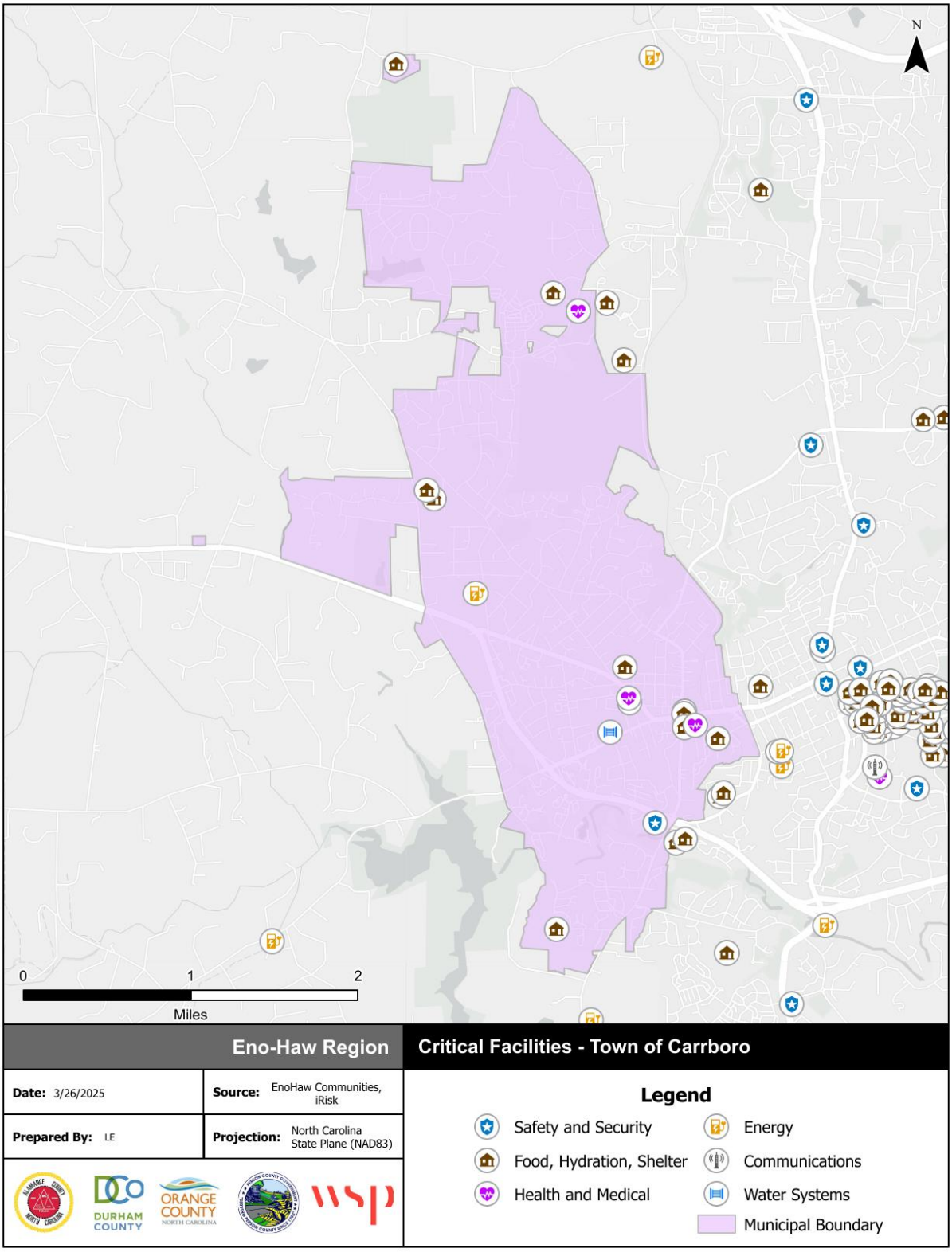
Source: Orange County, HMPC

Figure C.1 – Critical Facilities, Unincorporated Orange County



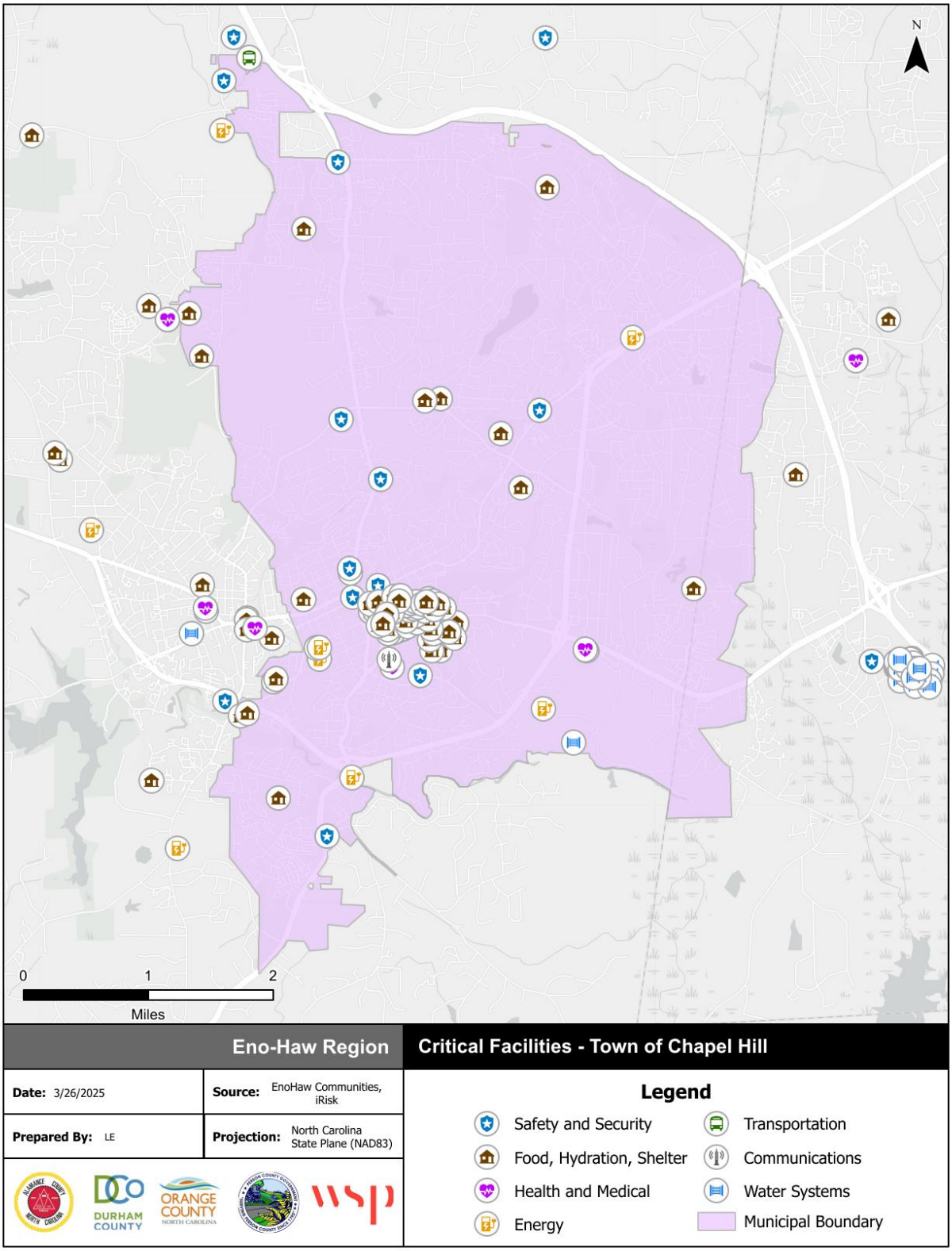
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure C.2 – Critical Facilities, Town of Carrboro



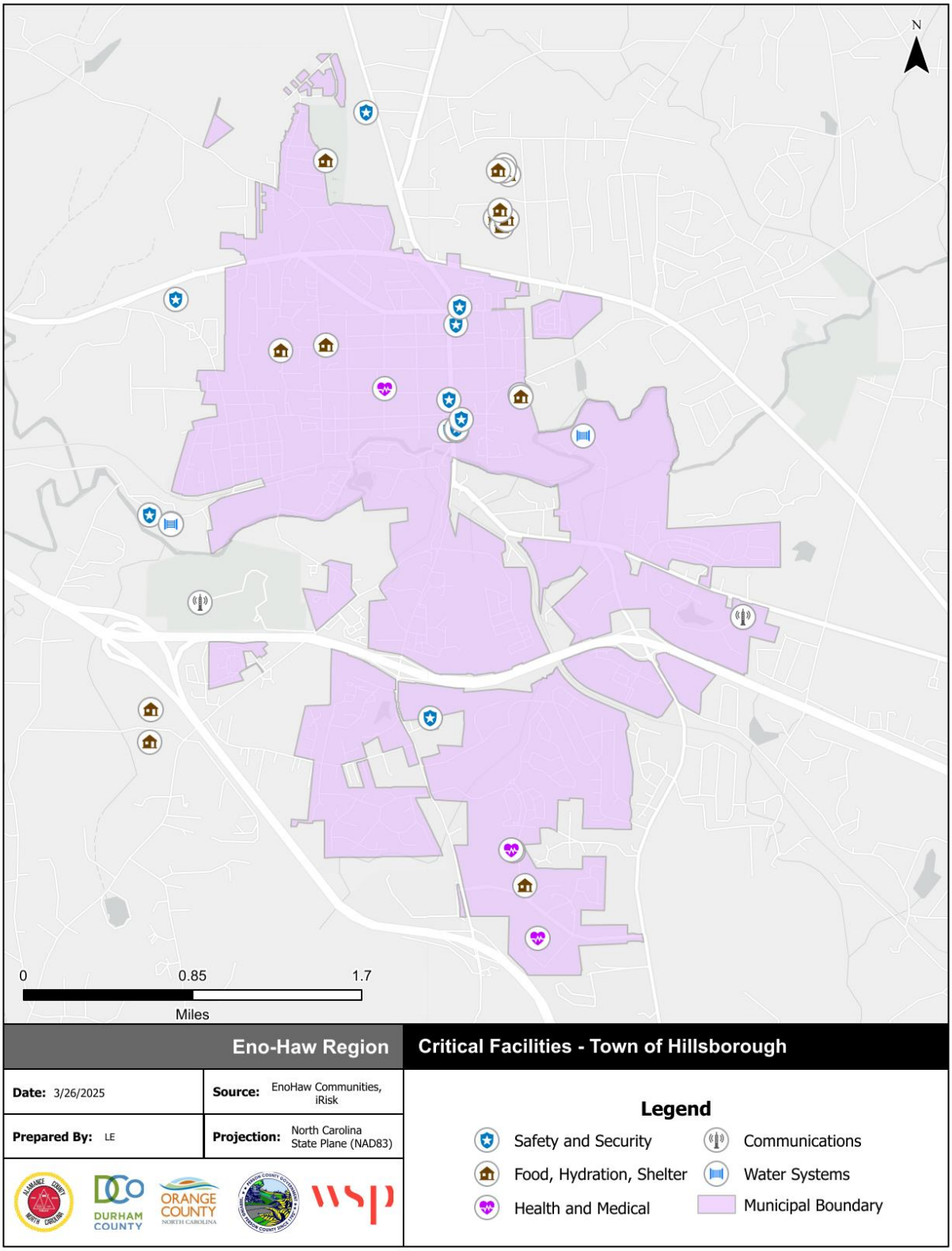
Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure C.3 – Critical Facilities, Town of Chapel Hill



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure C.4 – Critical Facilities, Town of Hillsborough



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Table C.5 – Orange County Critical Facilities Inventory

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Town of Carrboro							
Food, Hydration, Shelter	School	201 ROCK HAVEN ROAD, CARRBORO, NC, 27510	$18,441,300.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	301 W Main St, Carrboro, NC 27510	-	NA	X, Unshaded	Y	0
Health and Medical	EMS	301 W Main St, Carrboro, NC 27510	-	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	400 SHELTON STREET, CARRBORO, NC, 27510	$3,427,500.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	900 Old Fayetteville Rd, Chapel Hill, NC 27516	$16,801,800.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	215 Eubanks Rd, Chapel Hill, NC 27516	$262,000.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	215 Eubanks Rd, Chapel Hill, NC 27516	$12,880,900.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	515 E Winmore Ave, Chapel Hill, NC 27516	$1,427,000.00	NA	X, Unshaded		3.5
Safety and Security	Fire Station	1411 Homestead Rd, Chapel Hill, NC 27516	$61,150.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	890 Old Fayetteville Rd, Chapel Hill, NC 27516	$13,724,300.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	400 Jones Ferry Rd, Carrboro, NC 27510	$11,198,000.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	100 N Greensboro St, Carrboro, NC 27510	$1,327,900.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Municipal	100 N Greensboro St, Carrboro, NC 27510	$1,327,900.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Municipal	203 S Greensboro St, Carrboro, NC 27510	$4,700,100.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	202 Roberson St, Carrboro, NC 27510	$352,200.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	102 Hargraves St, Carrboro, NC 27510	$195,000.00	NA	X, Unshaded		1
Safety and Security	Municipal	100 Public Works Dr, Carrboro, NC 27510	$557,000.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	1411 Homestead Rd, Carrboro, NC 27510	$61,150.00	NA	X, Unshaded	Y	0
Energy	Substation	215 James St, Carrboro, NC 27510	-	NA	X, Unshaded		0
Town of Chapel Hill							
Food, Hydration, Shelter	University	131 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	100 BENNETT ROAD, CHAPEL HILL, NC, 27517	$299,300.00	NA	X, Unshaded	Y	0
Energy	Power Plant	569 WEST CAMERON AVENUE, CHAPEL HILL, NC, 27516	$1,364,766.67	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	235 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	104 COUNTRY CLUB ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded		1
Safety and Security	Police Station	828 MARTIN LUTHER KING JR BOULEVARD, CHAPEL HILL, NC, 27514	$209,000.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	225 CULBRETH ROAD, CHAPEL HILL, NC, 27516	$4,932,800.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	201 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	141 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	201 LENOIR DRIVE, UNIT B, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	400 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	211 SOUTH COLUMBIA STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	105 SMITH LEVEL ROAD, CHAPEL HILL, NC, 27516	$1,584,400.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	101 SMITH LEVEL ROAD, CHAPEL HILL, NC, 27516	$2,874,800.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	754 SOUTH MERRITT MILL ROAD, CHAPEL HILL, NC, 27516	$921,650.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	750 SOUTH MERRITT MILL ROAD, CHAPEL HILL, NC, 27516	$921,650.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	109 STADIUM DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Energy	Substation	521 WEST CAMERON AVENUE, CHAPEL HILL, NC, 27516	$1,364,766.67	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	106 STADIUM DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1003 SOUTH HAMILTON ROAD, CHAPEL HILL, NC, 27517	$14,801,700.00	NA	X, Unshaded	Y	0
Energy	Substation	521 WEST CAMERON AVENUE, CHAPEL HILL, NC, 27516	$1,364,766.67	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	101 STADIUM DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	314 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	160 RIDGE ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	125 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	115 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	135 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	121 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	210 RIDGE ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	203 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	310 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	211 LENOIR DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	209 SOUTH ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	130 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	120 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	216 LENOIR DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	222 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	214 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	131 SOUTH COLUMBIA STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	281 RALEIGH STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	220 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	116 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	204 LENOIR DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	160 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	101 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	208 RALEIGH STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	203 LENOIR DRIVE, UNIT A, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	207 RALEIGH STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	175 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded		0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	102 EMERSON DRIVE, UNIT 999, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	200 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded		0
Food, Hydration, Shelter	University	193 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	202 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	113 EAST CAMERON AVENUE, UNIT B, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	103 EMERSON DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	135 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	230 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	240 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	204 RALEIGH STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	101 EMERSON DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	203 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	200 RALEIGH STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	120 COUNTRY CLUB ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	121 EAST CAMERON AVENUE, UNIT C, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	181 EAST CAMERON AVENUE, UNIT A, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	145 EAST CAMERON AVENUE, UNIT A, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	108 COUNTRY CLUB ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	207 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	University	231 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	601 MEADOWMONT LANE, CHAPEL HILL, NC, 27517	$12,098,500.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	403 MARTIN LUTHER KING JR BOULEVARD, CHAPEL HILL, NC, 27516	$2,243,100.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1615 EAST FRANKLIN STREET, CHAPEL HILL, NC, 27514	$172,000.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	9217 Seawell School Rd, Chapel Hill, NC 27516	$29,191,300.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	500 N Estes Dr, Chapel Hill, NC 27514	$7,138,750.00	NA	X, Unshaded		1
Food, Hydration, Shelter	School	9115 SEAWELL SCHOOL ROAD, CHAPEL HILL, NC, 27516	$29,191,300.00	NA	X, Unshaded		2
Food, Hydration, Shelter	School	500 Weaver Dairy Rd, Chapel Hill, NC 27514	$29,493,900.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	201 SOUTH COLUMBIA STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Health and Medical	Hospital	101 Manning Dr, Chapel Hill, NC 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	203 RALEIGH STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Utility	365 PAUL GREEN THEATRE DRIVE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	180 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	110 COUNTRY CLUB ROAD, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded		0
Food, Hydration, Shelter	University	223 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded		2
Food, Hydration, Shelter	University	140 EAST CAMERON AVENUE, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	201 RALEIGH STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	University	205 SOUTH COLUMBIA STREET, CHAPEL HILL, NC, 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	606 NORTH ESTES DRIVE, CHAPEL HILL, NC, 27514	$7,138,750.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	101 WEAVER DAIRY ROAD EXTENSION, CHAPEL HILL, NC, 27516	$607,200.00	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Safety and Security	Police Station	7300 Millhouse Road, Chapel Hill, NC 27516	$6,680,000.00	NA	X, Unshaded		3
Safety and Security	Municipal	6850 Millhouse Road, Chapel Hill, NC 27516	$7,205,800.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	405 Martin Luther King Jr Blvd, Chapel Hill, NC 27514	$2,243,100.00	NA	X, Unshaded	Y	0
Transportation	Transportation	6900 Millhouse Road, Chapel Hill, NC 27516	$1,880,000.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	120 West Franklin Street, Chapel Hill, NC 27516	$1,417,100.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	1003 South Hamilton Rd, Chapel Hill, NC 27517	$1,524,900.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	179 E Franklin St, Chapel Hill, NC 27514	$751,700.00	NA	X, Unshaded	Y	0
Safety and Security	Emergency Operations Center	1120 Estes Dr, Chapel Hill, NC 27516	$26,249,200.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	170 Old Mason Farm Rd, Chapel Hill, NC 27517	$5,708,900.00	3.12	X, Shaded	Y	0
Energy	Substation	855 Smith Level Rd, Chapel Hill, NC 27516	-	NA	X, Unshaded		0
Energy	Substation	1615 Eubanks Rd, Chapel Hill, NC 27516	-	NA	X, Unshaded		3
Energy	Substation	70 Old Mason Farm Rd, Chapel Hill, NC 27517	$21,855,784.51	NA	X, Unshaded	Y	0
Energy	Substation	2021 S Columbia St, Chapel Hill, NC 27516	-	NA	X, Unshaded		0
Communications	Communications	160 Medical Rd, Chapel Hill, NC 25714	$21,855,784.51	NA	X, Unshaded	Y	0
Safety and Security	Police Station	285 Manning Dr, Chapel Hill, NC 27514	$21,855,784.51	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Municipal	100 Library Drive Chapel Hill, NC 27514	$6,545,100.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Municipal	120 S. Estes Drive Chapel Hill, NC 27514	$1,924,300.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Municipal	216 N. Roberson St. Chapel Hill, NC 27516	$754,300.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Municipal	300 Aquatic Drive Chapel Hill, NC 27516	$4,391,500.00	NA	X, Unshaded	Y	0
Energy	Substation	1733-1731 Dobbins Dr, Chapel Hill, NC 27514		NA	X, Unshaded	Y	0
Town of Hillsborough							
Safety and Security	Fire Station	206 SOUTH CHURTON STREET, HILLSBOROUGH, NC, 27278	$593,200.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	106 EAST MARGARET LANE, UNIT 9334, HILLSBOROUGH, NC, 27278	$3,875,850.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	127 NORTH CHURTON STREET, HILLSBOROUGH, NC, 27278	$413,600.00	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Food, Hydration, Shelter	School	154 HAYES STREET, HILLSBOROUGH, NC, 27278	$4,041,700.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	240 ST MARYS ROAD, HILLSBOROUGH, NC, 27278	$2,424,050.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	402 NORTH NASH STREET, HILLSBOROUGH, NC, 27278	$2,904,400.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	240 ST MARYS ROAD, HILLSBOROUGH, NC, 27278	$2,424,050.00	NA	X, Unshaded	Y	0
Health and Medical	Hospital	430 Waterstone Drive	$105,602,400.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	352 College Park Road, Hillsborough, NC 27278	$1,098,750.00	NA	X, Unshaded		1.5
Water Systems	Treatment Plant	355 Elizabeth Brady Road	$892,700.00	NA	X, Unshaded	Y	2
Food, Hydration, Shelter	Community College	525 College Park Road	$6,746,200.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	101 E Orange St	$551,200.00	NA	X, Unshaded		2
Safety and Security	Municipal	105 E. Corbin St.	$828,600.00	NA	X, Unshaded	Y	0
Safety and Security	Police station	106 E Margaret Ln, Hillsborough, NC 27278	$3,875,850.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	350 College Park Rd, Hillsborough, NC 27278	$1,098,750.00	NA	X, Unshaded		1.5
Health and Medical	EMS	5501 St Marys Rd, Hillsborough, NC 27278	$660,200.00	NA	X, Unshaded		3
Safety and Security	Municipal	125 Court St, Hillsborough, NC 27278	$6,792,700.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	1200 US-70, Hillsborough, NC 27278	$13,027,600.00	NA	X, Unshaded		3
Health and Medical	Municipal	300 W Tryon St, Hillsborough, NC 27278	$3,754,700.00	NA	X, Unshaded	Y	0
Communications	Communications	510 Meadowlands Dr, Hillsborough, NC 27278	$688,400.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Municipal	501 Rainey Ave. Hillsborough, NC 27278	$320,400.00	NA	X, Unshaded	Y	0
Unincorporated Orange County							
Food, Hydration, Shelter	Hog Farm	2425 BREEZE RD	$81,066.67	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	2425 BREEZE RD	$81,066.67	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	2425 BREEZE RD	$81,066.67	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	2425 BREEZE RD	$81,066.67	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	2425 BREEZE RD	$81,066.67	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	2425 BREEZE RD	$81,066.67	NA	X, Unshaded		0
Safety and Security	Fire Station	3900 US 70 WEST, EFLAND, NC, 27243	$509,600.00	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Health and Medical	EMS	4700 NC 86 SOUTH, CHAPEL HILL, NC, 27514	$1,231,300.00	NA	X, Unshaded		1.5
Safety and Security	Fire Station	7020 GUESS ROAD, ROUGEMONT, NC, 27572	$387,300.00	NA	X, Unshaded		0
Safety and Security	Fire Station	720 HAWKINS, CEDAR GROVE, NC, 27231	$133,300.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	4401 Fuller Rd, Efland, NC 27243	$2,400,900.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Hog Farm	222-230 Berry Mill Rd, Hillsborough, North Carolina, 27278	$44,660.00	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	3500 EDMUND LATTA ROAD, HILLSBOROUGH, NC, 27278	$21,200.00	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	3500 EDMUND LATTA ROAD, HILLSBOROUGH, NC, 27278	$21,200.00	NA	X, Unshaded		3
Safety and Security	Fire Station	835 PHELPS ROAD, HILLSBOROUGH, NC, 27278	$188,800.00	NA	X, Unshaded		2
Food, Hydration, Shelter	School	431 STROUDS CREEK ROAD, HILLSBOROUGH, NC, 27278	$9,024,500.00	NA	X, Unshaded		0
Health and Medical	EMS	6800 ORANGE GROVE ROAD, HILLSBOROUGH, NC, 27278	$419,100.00	NA	X, Unshaded		2
Food, Hydration, Shelter	Hog Farm	701 OLLIES LANE, HILLSBOROUGH, NC, 27278	$280,600.00	NA	X, Unshaded		0
Safety and Security	Fire Station	5722 OLD GREENSBORO ROAD, CHAPEL HILL, NC, 27516	$118,700.00	NA	X, Unshaded		1.5
Safety and Security	Fire Station	4014 WHITFIELD ROAD, CHAPEL HILL, NC, 27514	$507,500.00	NA	X, Unshaded		2
Food, Hydration, Shelter	School	1100 NEW GRADY BROWN SCHOOL ROAD, HILLSBOROUGH, NC, 27278	$7,341,200.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Hog Farm	3019 MCDADE STORE ROAD, CEDAR GROVE, NC, 27231	$107,866.67	NA	X, Unshaded		0
Safety and Security	Fire Station	5912 PENTECOST ROAD, CEDAR GROVE, NC, 27231	$139,400.00	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	3019 MCDADE STORE ROAD, CEDAR GROVE, NC, 27231	$107,866.67	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	3019 MCDADE STORE ROAD, CEDAR GROVE, NC, 27231	$107,866.67	NA	X, Unshaded		0
Safety and Security	Emergency Operations Center	1914 NEW HOPE CHURCH ROAD, CHAPEL HILL, NC, 27514	$488,600.00	NA	X, Unshaded		2
Food, Hydration, Shelter	School	1125 NEW GRADY BROWN SCHOOL ROAD, HILLSBOROUGH, NC, 27278	$45,370,700.00	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Energy	Substation	4800 UT US 70 EAST, DURHAM, NC, 27705	-	NA	X, Unshaded		0
Safety and Security	Fire Station	5019 US 70 EAST, DURHAM, NC, 27705	$402,100.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Hog Farm	214-220 Berry Mill Rd, Hillsborough, North Carolina, 27278	$44,660.00	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	500-698 Berry Mill Rd, Hillsborough, North Carolina, 27278	$44,660.00	NA	X, Unshaded		0
Food, Hydration, Shelter	Hog Farm	222-230 Berry Mill Rd, Hillsborough, North Carolina, 27278	$44,660.00	NA	X, Unshaded		2.5
Food, Hydration, Shelter	Hog Farm	500-698 Berry Mill Rd, Hillsborough, North Carolina, 27278	$44,660.00	NA	X, Unshaded		0
Food, Hydration, Shelter	School	308 Orange High School Road	$2,339,075.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	308 Orange High School Road	$2,339,075.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	308 Orange High School Road	$2,339,075.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	308 Orange High School Road	$2,339,075.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	500 Orange High School Road	$2,139,800.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	500 Orange High School Road	$2,139,800.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	500 Orange High School Road	$2,139,800.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	500 Orange High School Road	$2,139,800.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	500 Orange High School Road	$2,139,800.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	711 Dimmocks Mill Road	$262,000.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	719 Dimmocks MIll Rd.	$262,000.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	890 NC 86 N	$444,000.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	3800 US-70, Efland, NC 27243	-	NA	X, Unshaded	Y	0
Energy	Substation	1908 Jones Ferry Rd, Chapel Hill, NC 27516	-	NA	X, Unshaded		2
Energy	Substation	2109 New Hope Church Rd, Chapel Hill, NC 27514	$124,100.00	NA	X, Unshaded		1.5
Safety and Security	Municipal	2110 Clarence Walters Rd, Hillsborough, NC 27278	$4,916,600.00	NA	X, Unshaded	Y	0
Energy	Substation	1910 White Cross Rd, Chapel Hill, NC 27516	-	NA	X, Unshaded		1.5
Communications	Communications	1000 Virginia Cates Rd, Hillsborough, NC 27278	$23,800.00	NA	X, Unshaded		0
Energy	Substation	4809 State Rd 1567, Durham, NC 27705	-	NA	X, Unshaded	Y	0

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Safety and Security	Emergency Operations Center	510 Meadowlands Drive, Hillsborough, NC 27278	$688,400.00	NA	X, Unshaded	Y	0
Energy	Substation	Enterprise Ln, Mebane, NC 27302	-	NA	X, Unshaded	Y	0
Energy	Substation	399 Redman Crossing Rd, Mebane, NC 27302	-	NA	X, Unshaded	Y	0
Communications	Communications	4504 New Sharon Church Rd, Hillsborough, NC 27278	-	1.38	X, Shaded		0

C.2 RISK ASSESSMENT

This section contains a summary of the County's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Dam Failure, Flood, and Wildfire.

C.2.1 DAM FAILURE

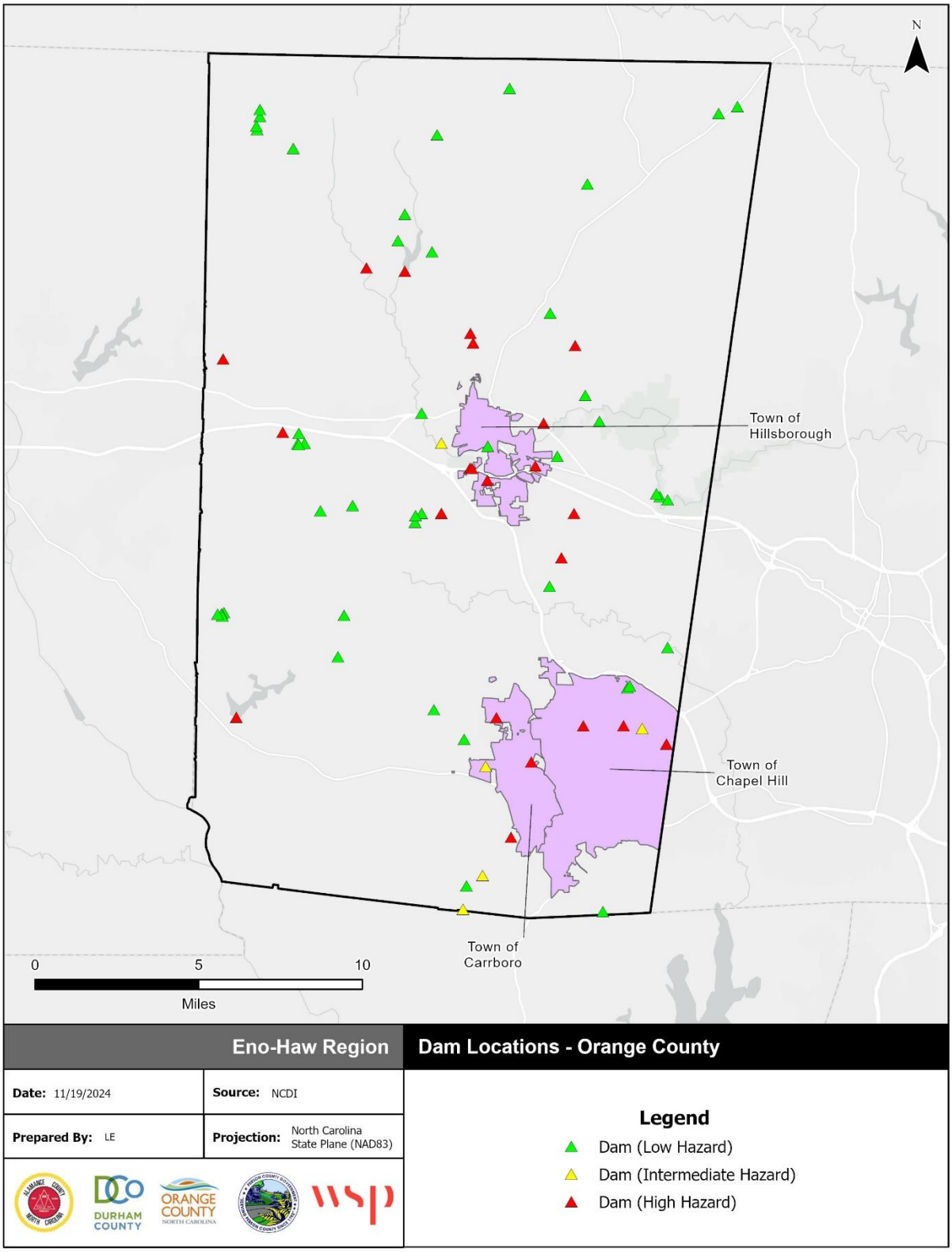
Table C.6 lists all high hazard dams located in unincorporated Orange County that have been identified by the North Carolina Dam Inventory with a condition assessment of "fair" or "poor." Figure C.5 through Figure C.8 show the location of all dams by jurisdiction in Orange County.

Table C.6 – High Hazard Dams in Unincorporated Orange County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Lake Michael Dam	NC00771	Fair	1100	Haw River
Blackburn Lake Dam	NC00776	Fair	55	Hillsborough
Eastwood Lake Dam	NC00781	Fair	330	N/A
University Lake Dam	NC00782	Fair	4836	Carrboro
Lake Ellen Dam	NC01537	Fair	81	N/A
Spring Valley Dam	NC04994	Poor	22	N/A
Flint Ridge Dam	NC03663	Fair	22	N/A
Hines Pond Dam	NC03666	Fair	-	N/A
Meadowlands Dam	NC03669	Fair	45	N/A
Strayhorn Farm Dam	NC03670	Fair	80	Eno
Strayhorn Dam #2	NC04999	Fair	98	N/A
Colony Lake Dam	NC03671	Fair	48	N/A
Wilkins Dam	NC06504	Fair	-	N/A
Haithcock Heirs Dam	NC06505	Poor	-	N/A

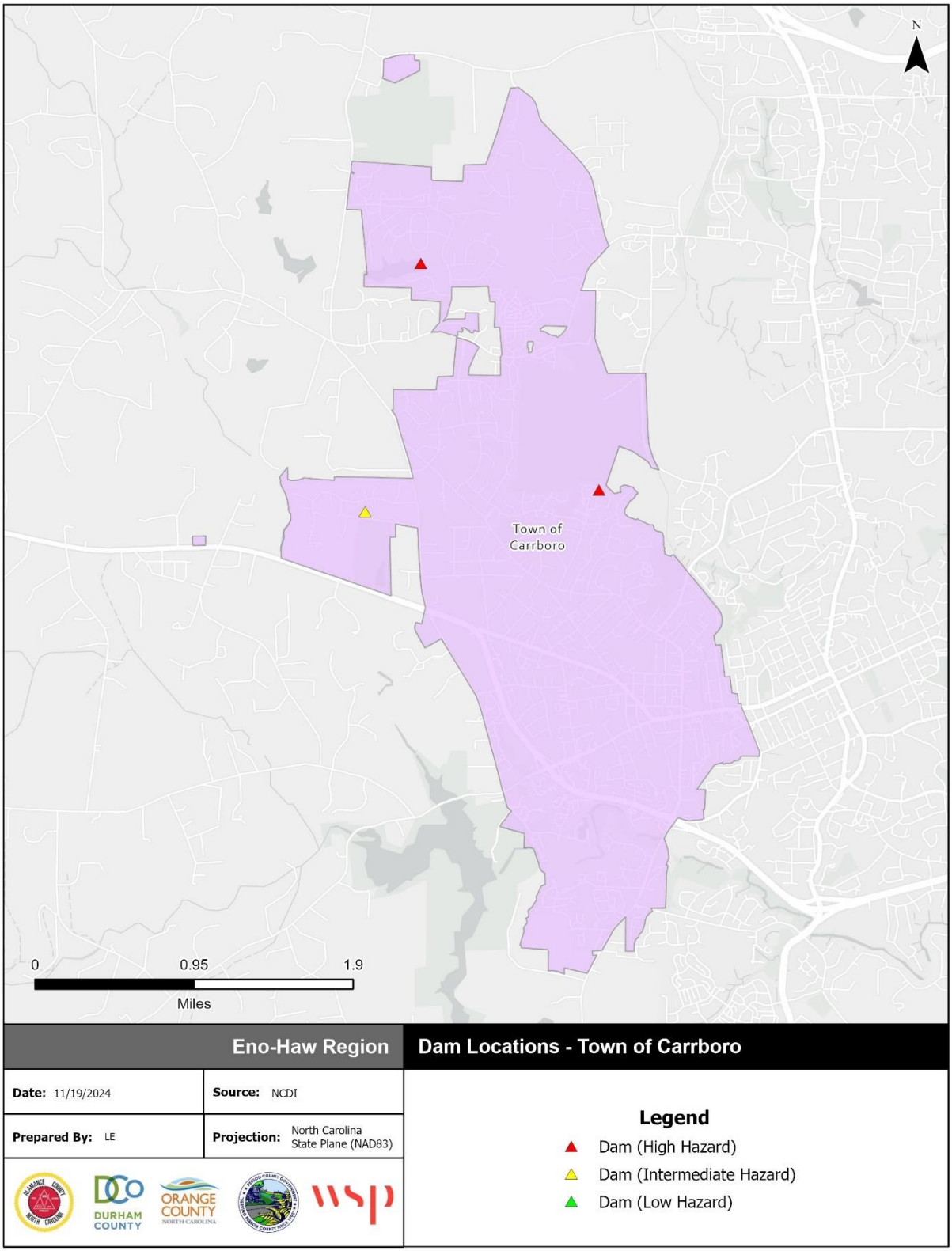
Source: NC Dam Inventory, November 2024

Figure C.5 – Dam Inventory, Unincorporated Orange County



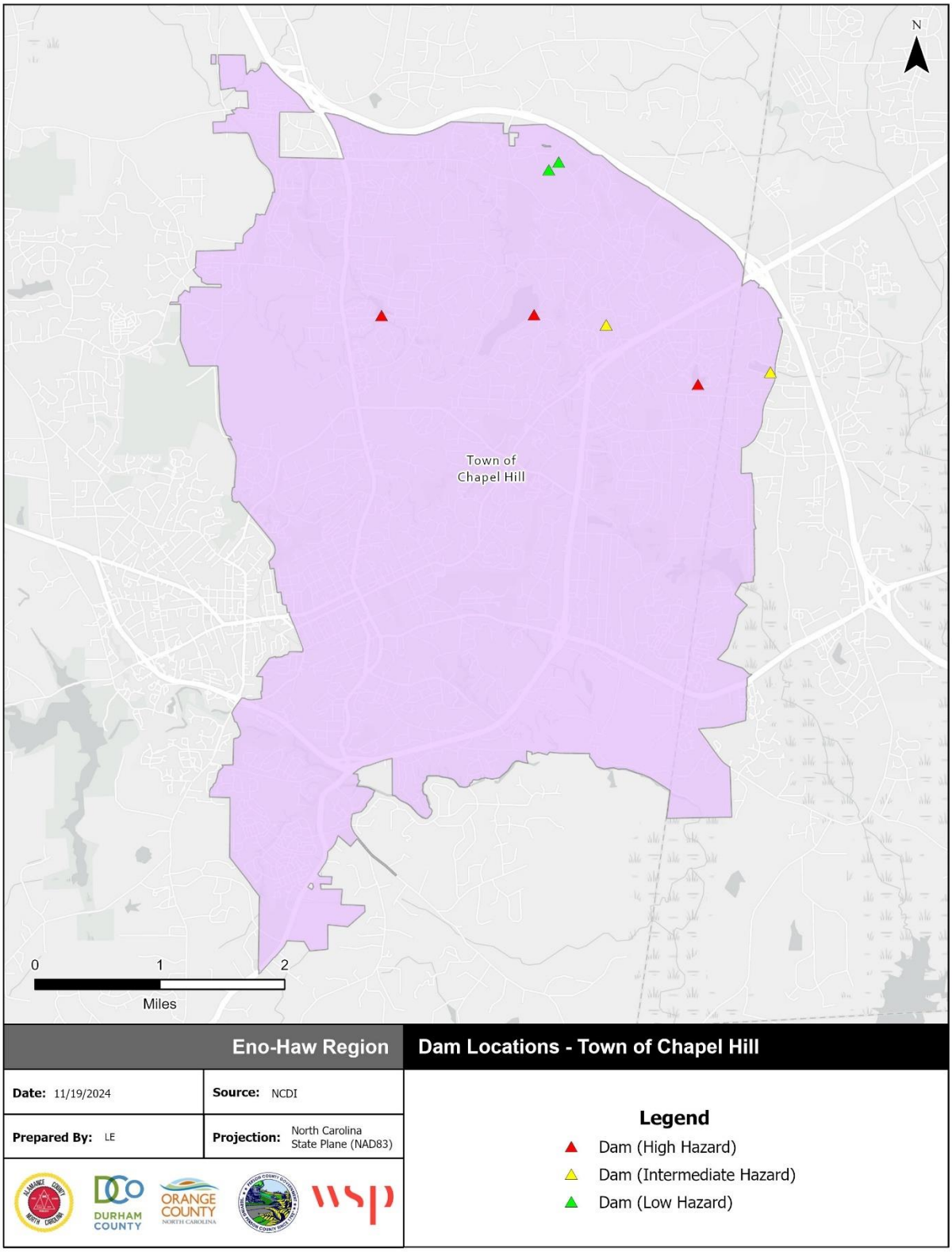
Source: NC Dam Inventory, November 2024

Figure C.6 – Dam Inventory, Town of Carrboro



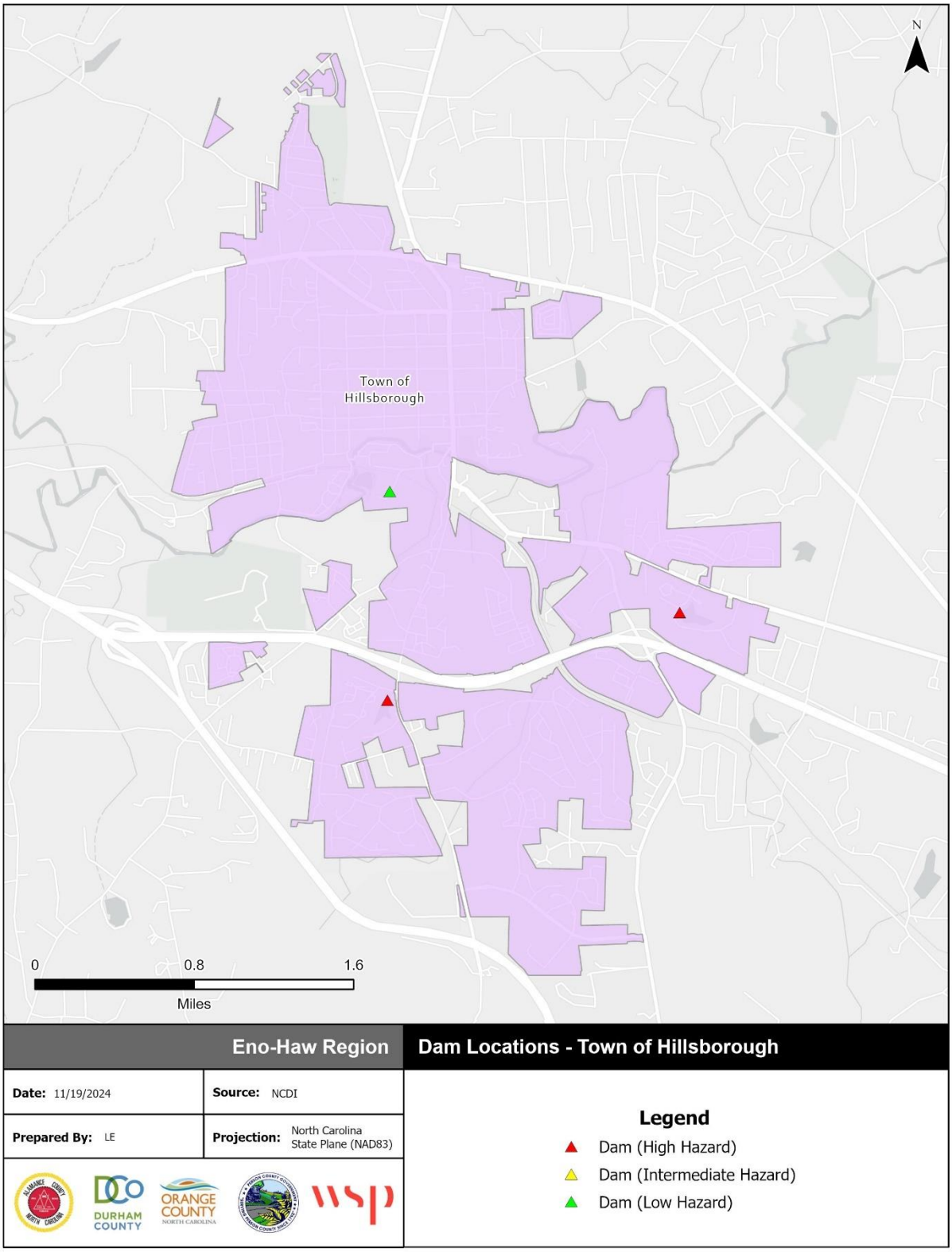
Source: NC Dam Inventory, November 2024

Figure C.7 – Dam Inventory, Town of Chapel Hill



Source: NC Dam Inventory, November 2024

Figure C.8 – Dam Inventory, Town of Hillsborough



Source: NC Dam Inventory, November 2024

C.2.2 FLOODING

Table C.7 details the acreage of Orange County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, at 1 percent, the Town of Chapel Hill has the largest portion of its land area within the mapped 1%-annual-chance floodplain. Overall, 0.3 percent of the total land in the county is within the mapped 1%-annual-chance floodplain.

Table C.7 – Flood Zone Acreage by Jurisdiction, Orange County

Flood Zone	Acreage	Percent of Total (%)
Unincorporated Orange County		
Zone AE	9,822.7	4.2
Zone X (500-year)	681.8	0.3
Zone X Unshaded	223,248.1	95.5
Total	**233,752.6**	--
Town of Carrboro		
Zone AE	263.5	6.3
Zone X (500-year)	23.3	0.6
Zone X Unshaded	3,881.2	93.1
Total	**4,167.9**	--
Town of Chapel Hill		
Zone AE	1,298.5	9.3
Zone X (500-year)	139.6	1.0
Zone X Unshaded	12,510.5	89.7
Total	**13,948.6**	--
Town of Hillsborough		
Zone AE	240.4	6.8
Zone X (500-year)	27.1	0.8
Zone X Unshaded	3,279.5	92.5
Total	**3,547.0**	--
County Total	**255,416.2**	--

Source: FEMA Effective DFIRM

Figure C.9 through Figure C.12 reflect the effective mapped flood hazard zones for all jurisdictions in Orange County with land in or near the SFHA, and Figure C.13 through Figure C.16 display the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table C.8 provides building counts and values for critical facilities by flood zone in Orange County and participating jurisdictions.

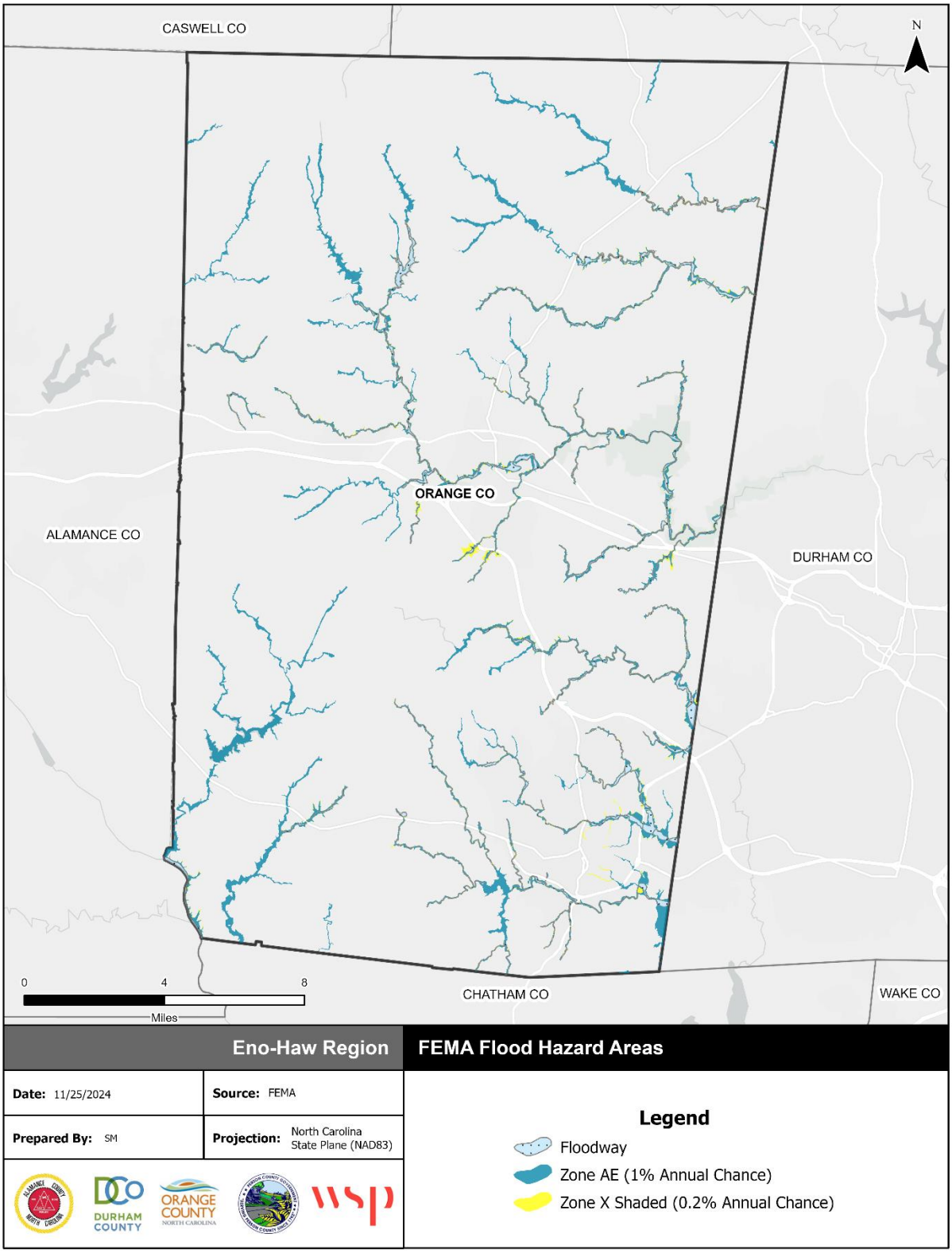
Table C.8 – Critical Facilities Exposed to Flooding, Orange County

Flood Zone	Critical Facility Count	Structure Value
Unincorporated Orange County		
Zone AE	0	$-
Zone X (500-year)	1	$-
Zone X Unshaded	55	$96,795,500

Flood Zone	Critical Facility Count	Structure Value
Total	**56**	**$96,795,500**
Town of Carrboro		
Zone AE	0	$-
Zone X (500-year)	0	$-
Zone X Unshaded	19	$86,745,200
Total	**19**	**$86,745,200**
Town of Chapel Hill		
Zone AE	0	$-
Zone X (500-year)	1	$5,708,900
Zone X Unshaded	107	$1,761,242,100
Total	**108**	**$1,766,951,000**
Town of Hillsborough		
Zone AE	0	$-
Zone X (500-year)	0	$-
Zone X Unshaded	21	$162,615,300
Total	**21**	**$162,615,300**
Orange County Total		
Zone AE	0	$-
Zone X (500-year)	2	$5,708,900.00
Zone X Unshaded	202	$2,107,398,100.00
County Total	**204**	**$2,113,107,000**

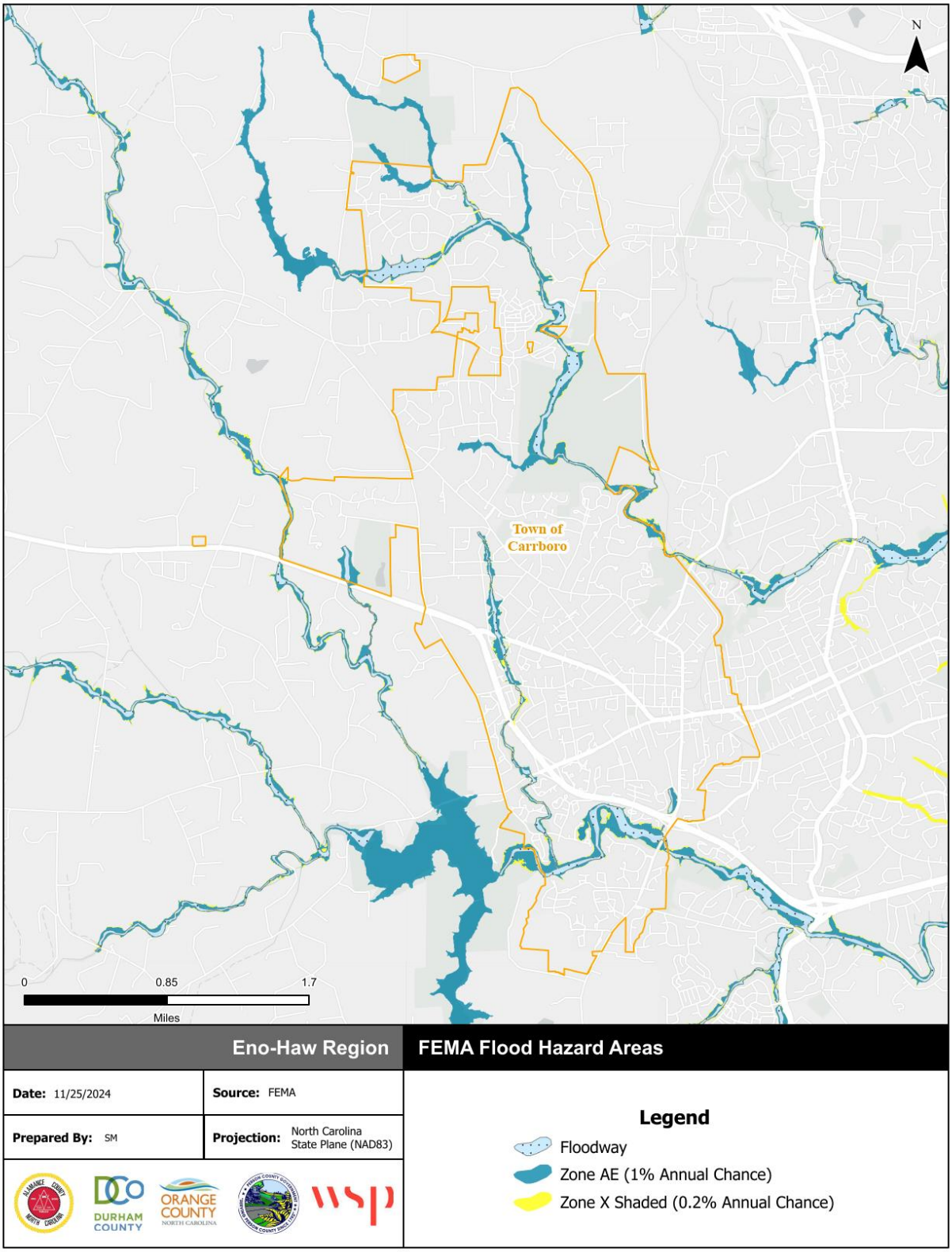
Source: FEMA Effective DFIRM, HMPC

Figure C.9 – FEMA Flood Hazard Areas, Orange County



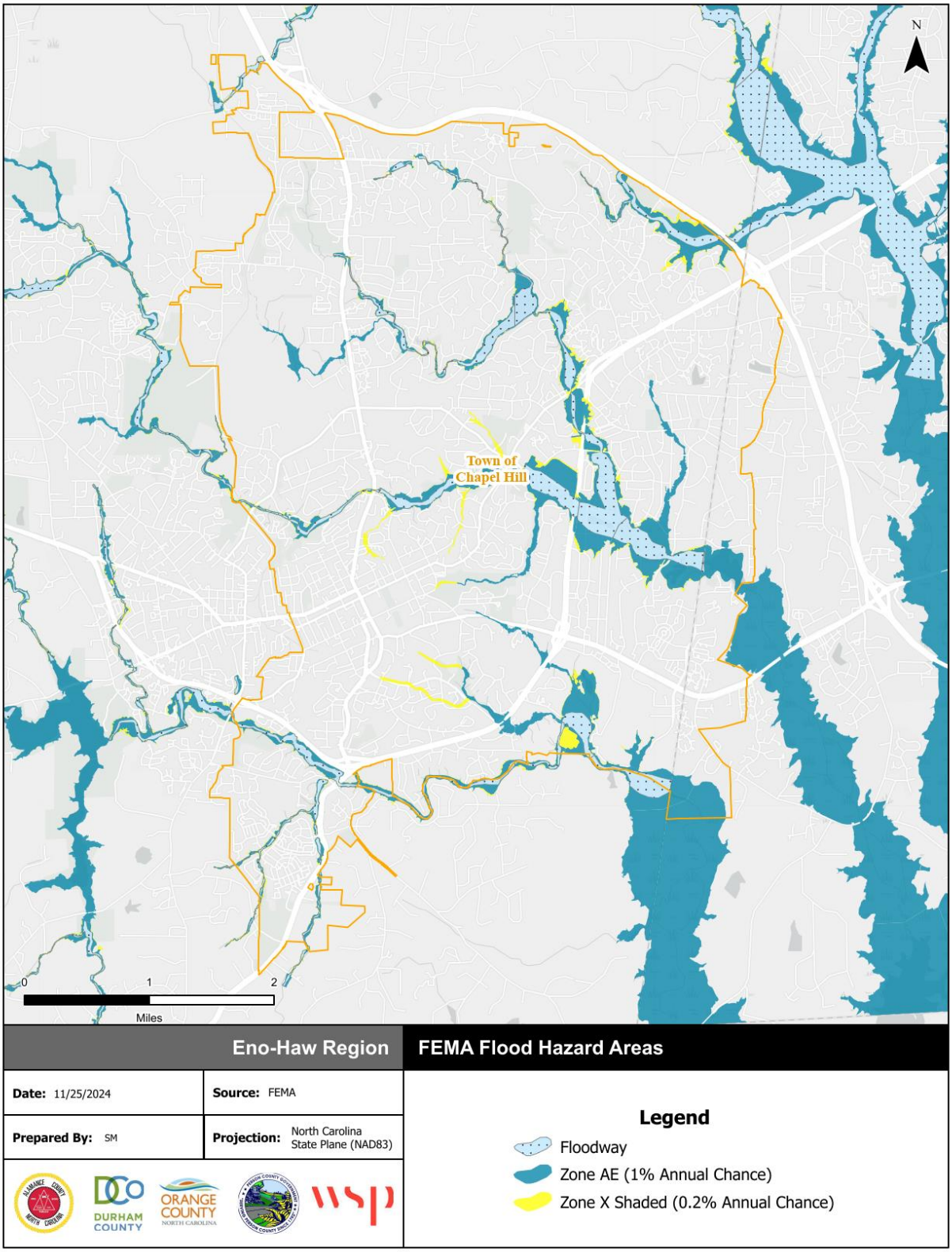
Source: FEMA Effective DFIRM

Figure C.10 – FEMA Flood Hazard Areas, Town of Carrboro



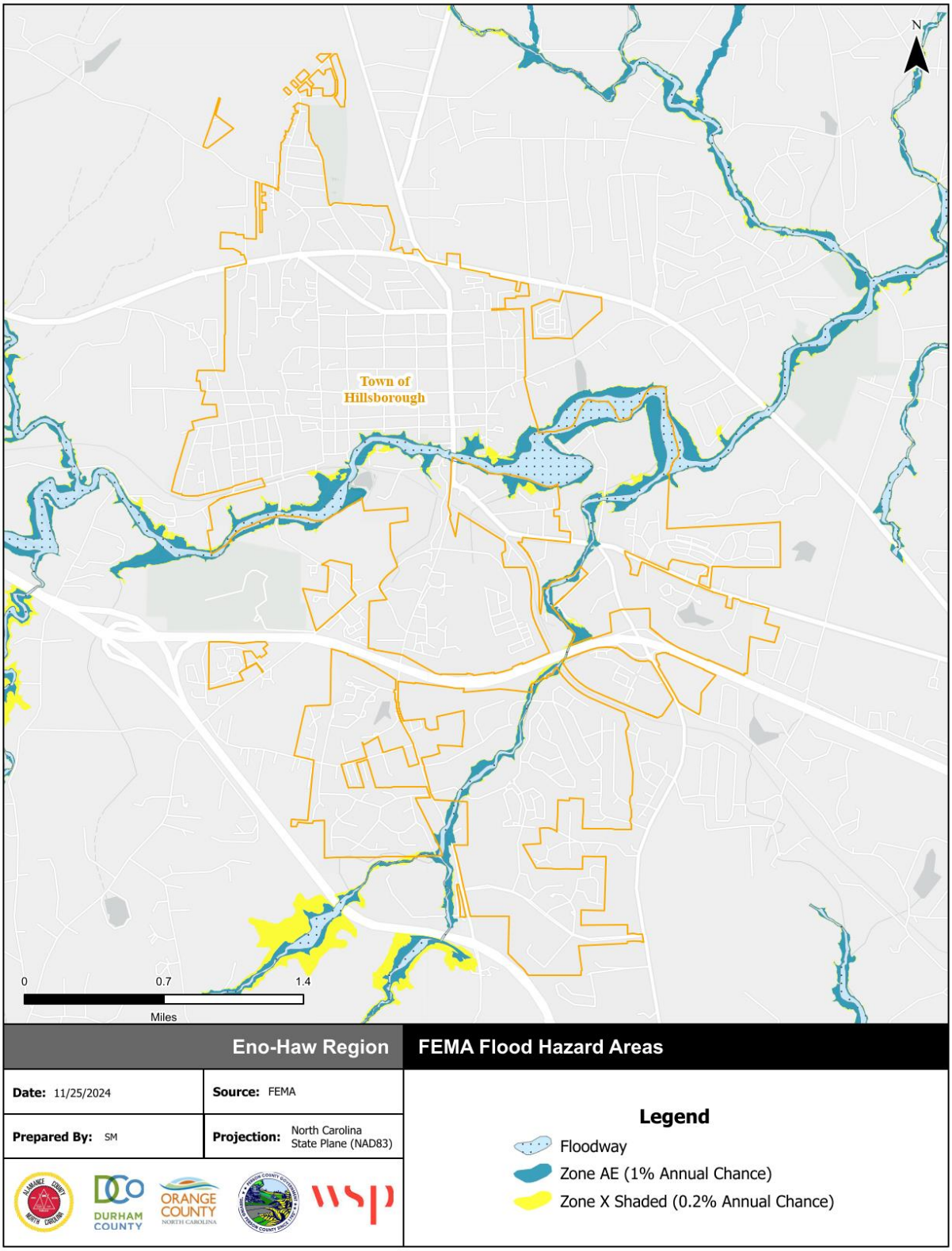
Source: FEMA Effective DFIRM

Figure C.11 – FEMA Flood Hazard Areas, Town of Chapel Hill



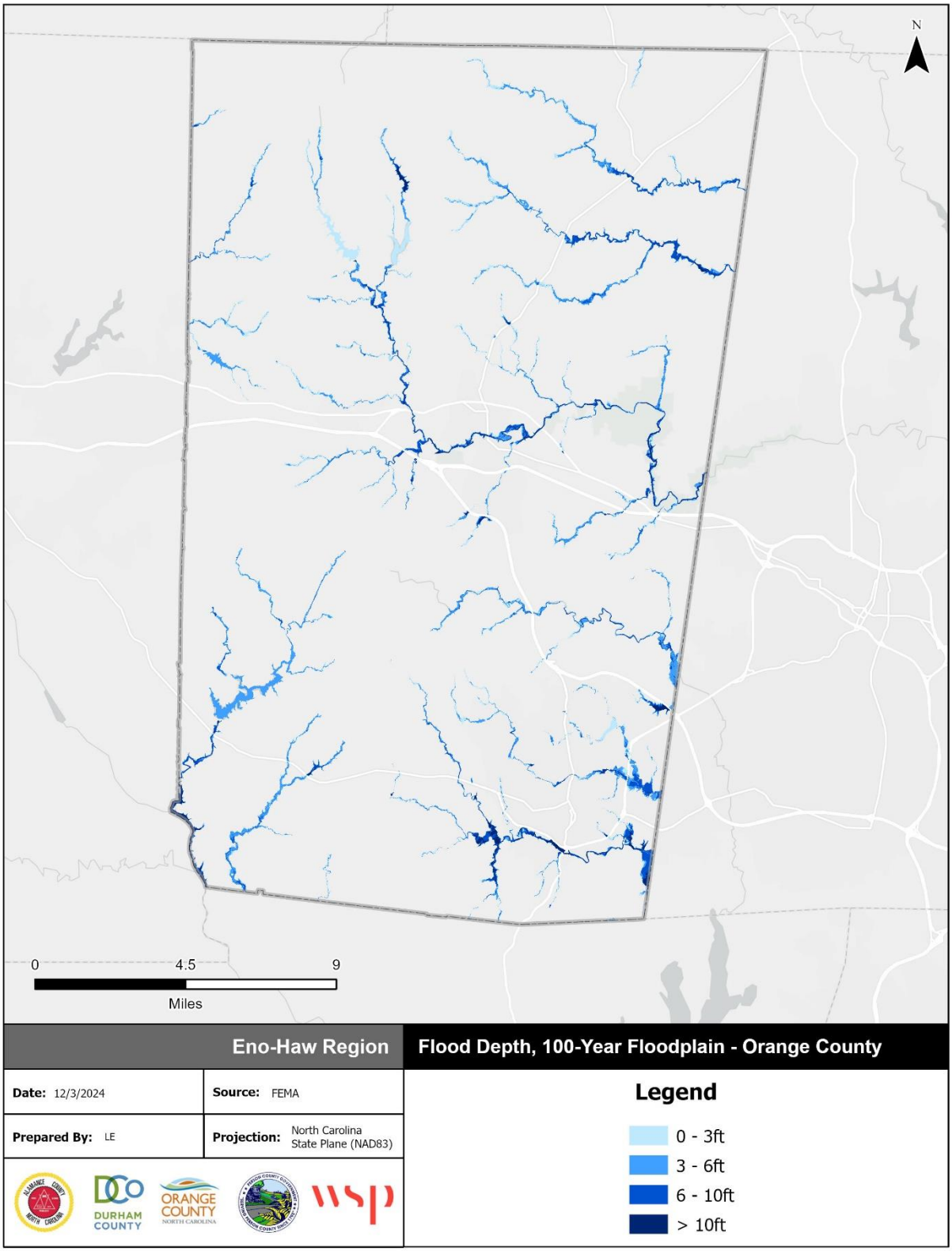
Source: FEMA Effective DFIRM

Figure C.12 – FEMA Flood Hazard Areas, Town of Hillsborough



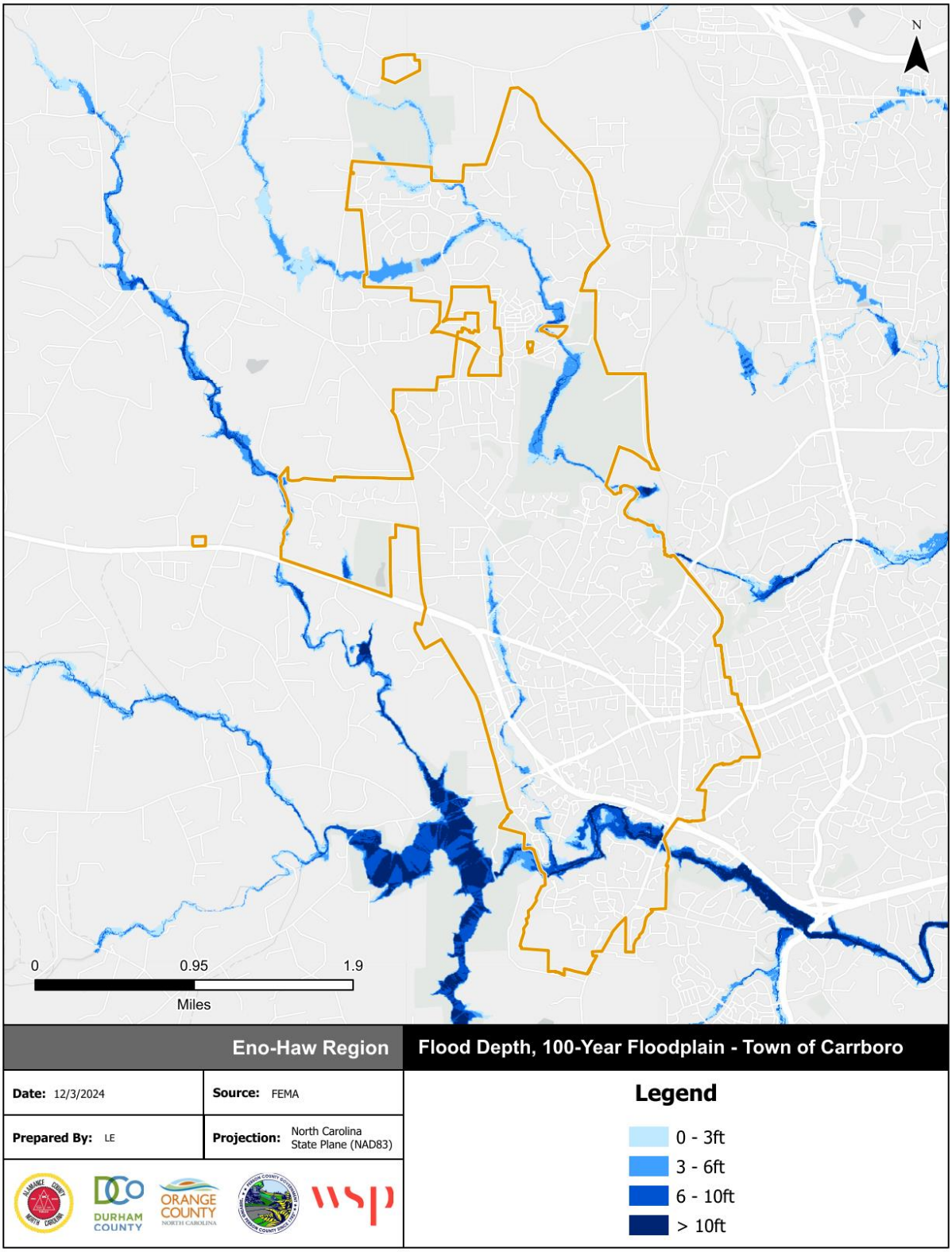
Source: FEMA Effective DFIRM

Figure C.13 – Flood Depth, 1%-Annual-Chance Floodplain, Orange County



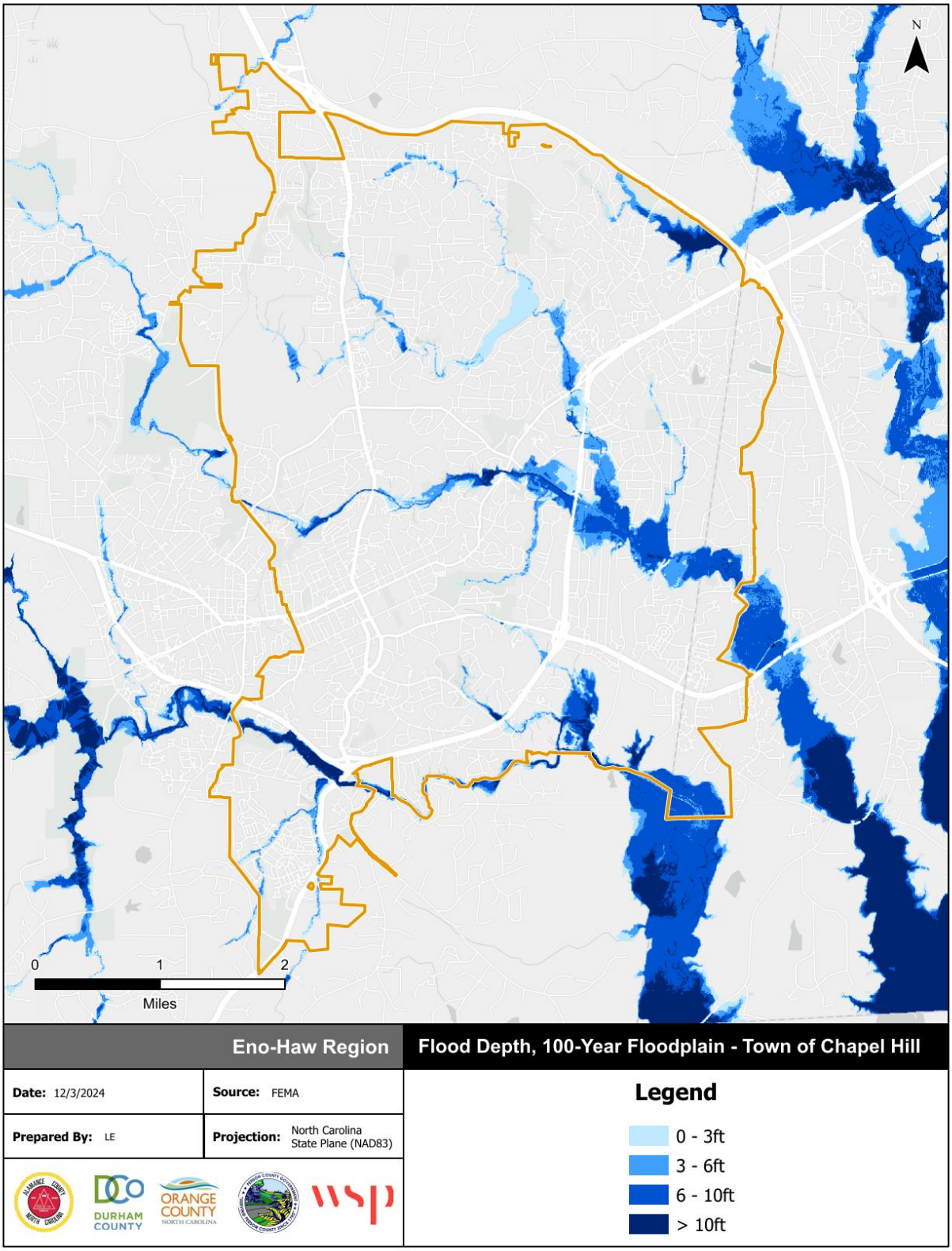
Source: FEMA Effective DFIRM

Figure C.14 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Carrboro



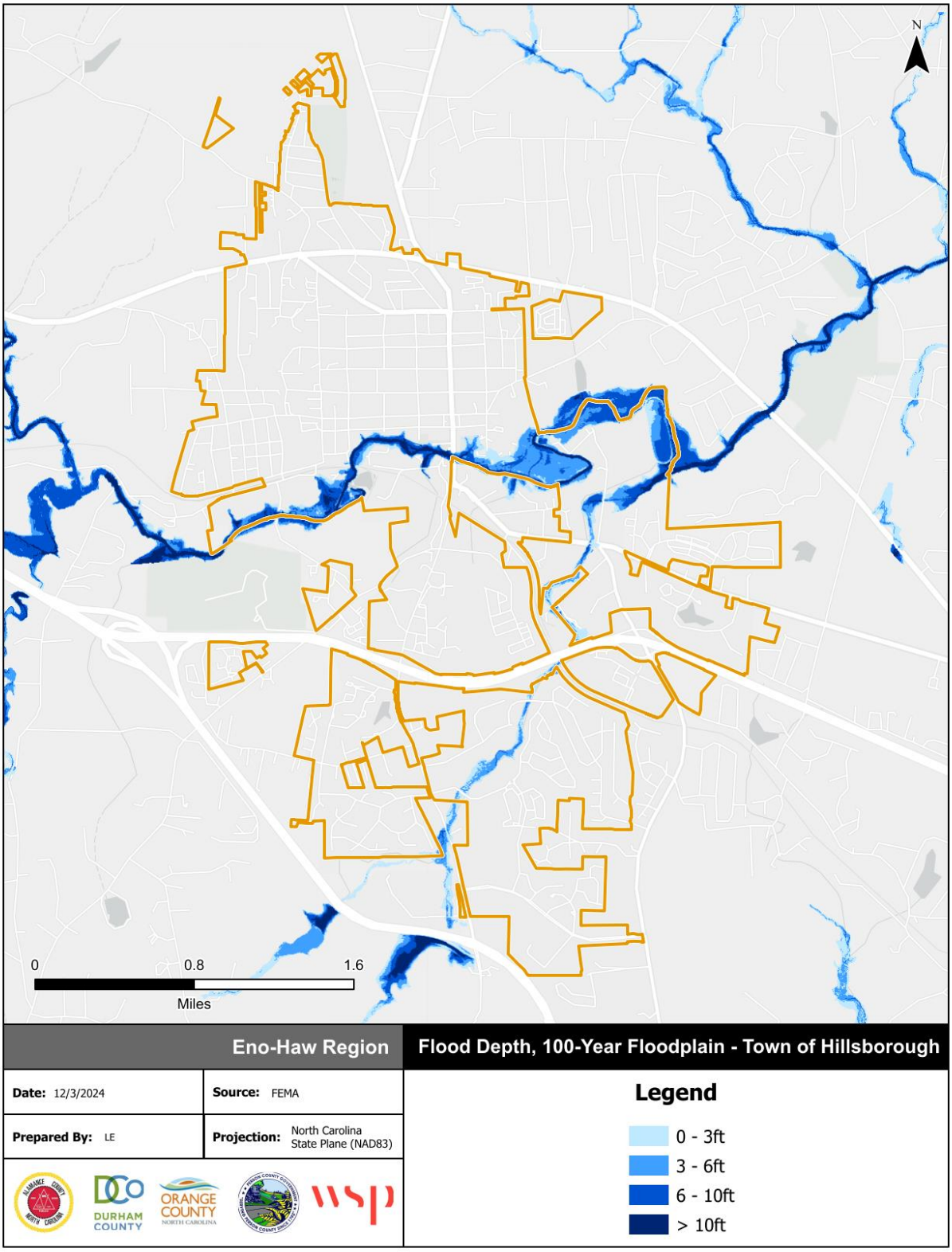
Source: FEMA Effective DFIRM

Figure C.15 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Chapel Hill



Source: FEMA Effective DFIRM

Figure C.16 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Hillsborough



Source: FEMA Effective DFIRM

C.2.2.1 *FLOOD INSURANCE DATA*

The following tables reflect NFIP policy and claims data for the County and incorporated jurisdictions categorized by structure type, flood zone, Pre-FIRM and Post-FIRM. Orange County also participates in the CRS program and is currently rated as a Class 6 community.

Table C.9 – NFIP Program Entry Dates

Community	Regular Program Entry	Emergency Program Entry
Orange County	3/16/1981	7/15/1975
Town of Carrboro	6/25/1976	7/7/1975
Town of Chapel Hill	4/17/1978	2/9/1973
Town of Hillsborough	5/15/1980	4/6/1977

Source: FEMA Community Information System

Table C.10 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Orange County					
Single Family	77	$51,801	$24,355,000	19	$225,163.96
2-4 Family	1	$1,851	$254,000	1	$31,837.94
Non-Residential	1	$4,617	$500,000	0	$0.00
Total	**79**	**$58,269**	**$25,109,000**	**20**	**$257,001.90**
Town of Carrboro					
Single Family	66	$49,551	$20,843,000	17	$171,494.16
All Other Residential	1	$360	$62,000	0	$0.00
Non-Residential	0	$0	$0	1	$0.00
Total	**67**	**$49,911**	**$20,905,000**	**18**	**$171,494.16**
Town of Chapel Hill					
Single Family	172	$156,824	$50,259,000	131	$1,452,507.83
2-4 Family	49	$17,909	$8,936,000	15	$279,372.47
All Other Residential	239	$152,783	$36,963,000	105	$7,732,173.68
Non-Residential	32	$97,491	$11,215,000	97	$5,266,751.98
Total	**492**	**$425,007**	**$107,373,000**	**348**	**$14,730,805.96**
Town of Hillsborough					
Single Family	15	$9,239	$4,618,000	6	$5,813.33
2-4 Family	0	$0	$0	1	$3,218.69
Non-Residential	1	$4,219	$733,000	0	$0.00
Total	**16**	**$13,458**	**$5,351,000**	**7**	**$9,032.02**

Source: FEMA Community Information System, accessed April 2025

Table C.11 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Orange County					
A01-30 & AE Zones	8	$8,327	$2,480,000	3	$32,565.51
A Zones	0	$0	$0	3	$66,352.11
B, C & X Zone					
Standard	71	$49,942	$22,629,000	6	$30,296.04
Preferred	0	$0	$0	8	$127,788.24
Total	**79**	**$58,269**	**$25,109,000**	**20**	**$257,001.90**
Town of Carrboro					
A01-30 & AE Zones	17	$14,827	$5,021,000	10	$109,576.28
A Zones	0	$0	$0	3	$8,183.31
B, C & X Zone					
Standard	50	$35,084	$15,884,000	3	$38,353.32
Preferred	0	$0	$0	2	$15,381.25
Total	**67**	**$49,911**	**$20,905,000**	**18**	**$171,494.16**
Town of Chapel Hill					
A01-30 & AE Zones	342	$314,249	$64,888,000	250	$13,415,786.19
A Zones	11	$1,611	$1,168,000	5	$189,883.78
B, C & X Zone					
Standard	139	$109,147	$41,317,000	40	$484,997.67
Preferred	0	$0	$0	51	$639,873.60
Total	**492**	**$425,007**	**$107,373,000**	**346**	**$14,730,541.24**
Town of Hillsborough					
A01-30 & AE Zones	1	$683	$250,000	2	$5,813.33
B, C & X Zone					
Standard	15	$12,775	$5,101,000	0	$0.00
Preferred	0	$0	$0	5	$3,218.69
Total	**16**	**$13,458**	**$5,351,000**	**7**	**$9,032.02**

Source: FEMA Community Information System, accessed April 2025

Table C.12 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Orange County					
A01-30 & AE Zones	3	$4,574	$874,000	2	$19,583.26
A Zones	0	$0	$0	3	$66,352.11
B, C & X Zone	21	$13,574	$6,562,000	9	$123,074.64
Standard	21	$13,574	$6,562,000	4	$16,078.56
Preferred	0	$0	$0	5	$106,996.08
Total	**24**	**$18,148**	**$7,436,000**	**14**	**$209,010.01**

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Carrboro					
A01-30 & AE Zones	5	$4,980	$1,260,000	5	$77,659.06
A Zones	0	$0	$0	1	$2,000.00
B, C & X Zone	10	$6,189	$2,682,000	5	$53,734.57
Standard	10	$6,189	$2,682,000	3	$38,353.32
Preferred	0	$0	$0	2	$15,381.25
Total	**15**	**$11,169**	**$3,942,000**	**11**	**$133,393.63**
Town of Chapel Hill					
A01-30 & AE Zones	272	$252,646	$48,169,000	223	$12,640,862.04
A Zones	10	$1,436	$1,113,000	5	$189,883.78
B, C & X Zone	69	$57,315	$19,709,000	75	$860,031.29
Standard	69	$57,315	$19,709,000	35	$360,657.22
Preferred	0	$0	$0	40	$499,374.07
Total	**351**	**$311,397**	**$68,991,000**	**303**	**$13,690,777.11**
Town of Hillsborough					
A01-30 & AE Zones	0	$0	$0	2	$5,813.33
B, C & X Zone	4	$6,305	$1,763,000	3	$3,218.69
Standard	4	$6,305	$1,763,000	0	$0.00
Preferred	0	$0	$0	3	$3,218.69
Total	4	$6,305	$1,763,000	5	$9,032.02

Source: FEMA Community Information System, accessed April 2025

Table C.13 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Orange County					
A01-30 & AE Zones	5	$3,753	$1,606,000	1	$12,982.25
B, C & X Zone	50	$36,368	$16,067,000	5	$35,009.64
Standard	50	$36,368	$16,067,000	2	$14,217.48
Preferred	0	$0	$0	3	$20,792.16
Total	**55**	**$40,121**	**$17,673,000**	**6**	**$47,991.89**
Town of Carrboro					
A01-30 & AE Zones	12	$9,847	$3,761,000	5	$31,917.22
A Zones	0	$0	$0	2	$6,183.31
B, C & X Zone	40	$28,895	$13,202,000	0	$0.00
Standard	40	$28,895	$13,202,000	0	$0.00
Total	**52**	**$38,742**	**$16,963,000**	**7**	**$38,100.53**
Town of Chapel Hill					
A01-30 & AE Zones	70	$61,603	$16,719,000	27	$774,924.15
A Zones	1	$175	$55,000	0	$0.00
B, C & X Zone	70	$51,832	$21,608,000	16	$264,839.98
Standard	70	$51,832	$21,608,000	5	$124,340.45
Preferred	0	$0	$0	11	$140,499.53
Total	**141**	**$113,610**	**$38,382,000**	**43**	**$1,039,764.13**

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Hillsborough					
A01-30 & AE Zones	1	$683	$250,000	0	$0.00
B, C & X Zone	11	$6,470	$3,338,000	2	$0.00
Standard	11	$6,470	$3,338,000	0	$0.00
Preferred	0	$0	$0	2	$0.00
Total	**12**	**$7,153**	**$3,588,000**	**2**	**$0.00**

Source: FEMA Community Information System, accessed April 2025

C.2.3 WILDFIRE

Table C.14 summarizes the acreage in Orange County that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 27 percent of Orange County is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table C.14 – Functional Wildland Urban Interface Acreage, Orange County

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	69,797	27%
	Indirect Exposure	12,073	5%
	Critical Fireshed	99,108	39%
	Sources of Ember Load to Buildings	73,277	29%
	Little to No Exposure	0	0%
	Water	2,366	1%
	Total	**256,622**	**100%**

Source: Southern Wildfire Risk Assessment

Figure C.17 through Figure C.20 depict the Functional WUI with the location of critical facilities for unincorporated Orange County and all participating jurisdictions. Figure C.21 through Figure C.24 depict the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure C.25 through Figure C.28 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Functional WUI areas with direct exposure to wildfire are distributed throughout the county with larger clusters occurring in the southeast portion of the County near the Town of Chapel Hill. Burn probability is low throughout the majority of the county with only a few small clusters of moderate burn probability in northern and southwestern Orange County. Potential fire intensity is low to moderate across much of Orange County with a few clusters of moderate to high fire intensity in the central region of unincorporated Orange County.

Table C.15 and Table C.18 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table C.15 – Critical Facilities Exposed to Wildfire, Unincorporated Orange County

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	1	$-
Food, Hydration, Shelter	18	$10,380,800
Hazardous Materials	0	$-
Health and Medical	3	$2,310,600
Safety and Security	8	$14,991,200
Transportation	0	$-
Water Systems	3	$-
Total	**33**	**$27,682,600**

Source: Southern Wildfire Risk Assessment

Table C.16 – Critical Facilities Exposed to Wildfire, Town of Carrboro

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	3	$14,502,900
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	0	$-
Transportation	0	$-
Water Systems	0	$-
Total	**3**	**$14,502,900**

Source: Southern Wildfire Risk Assessment

Table C.17 – Critical Facilities Exposed to Wildfire, Town of Chapel Hill

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	4	$80,041,619
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	1	$6,680,000
Transportation	0	$-
Water Systems	0	$-
Total	**5**	**$86,721,619**

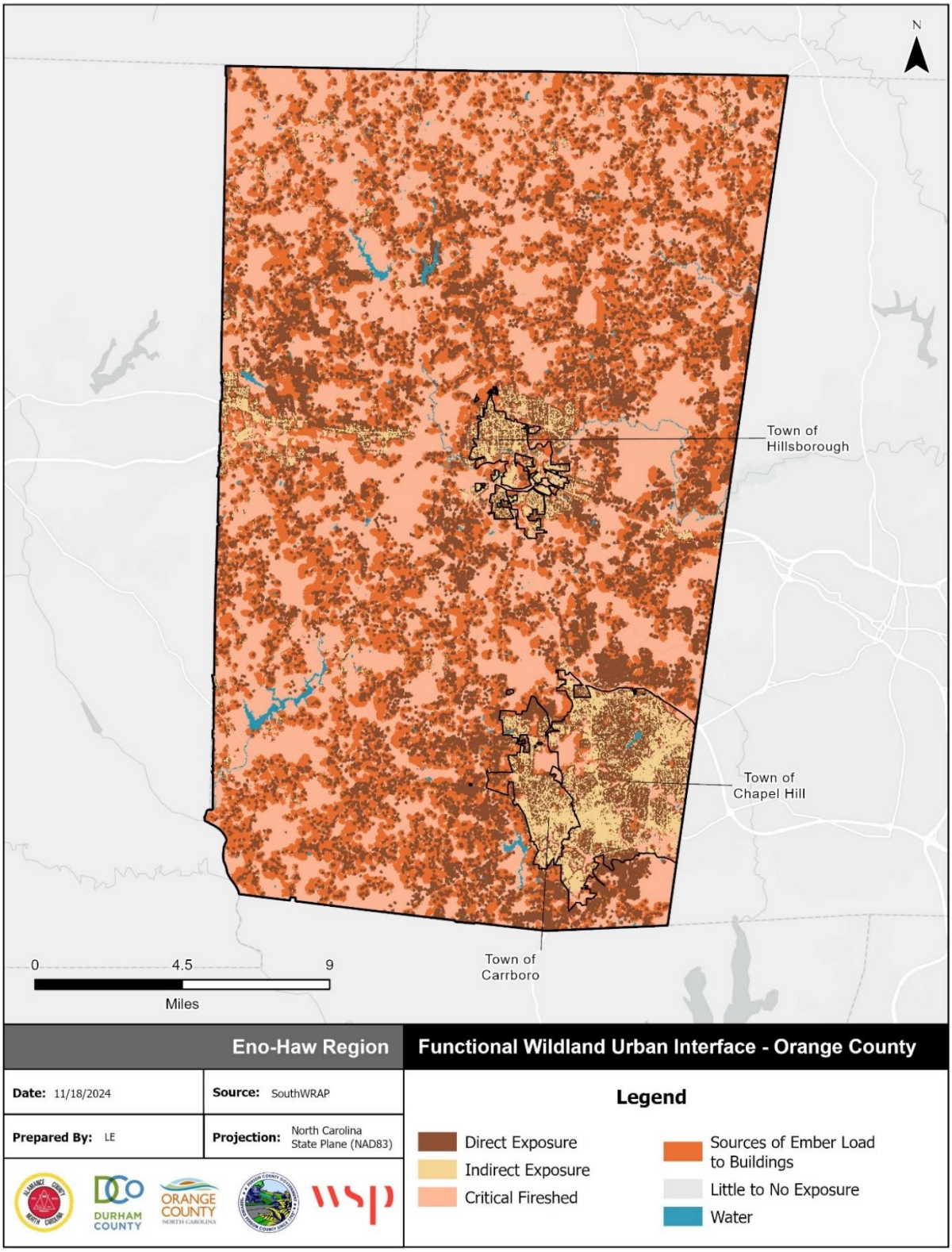
Source: Southern Wildfire Risk Assessment

Table C.18 – Critical Facilities Exposed to Wildfire, Town of Hillsborough

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	1	$551,200
Transportation	0	$-
Water Systems	1	$892,700
Total	**2**	**$1,443,900**

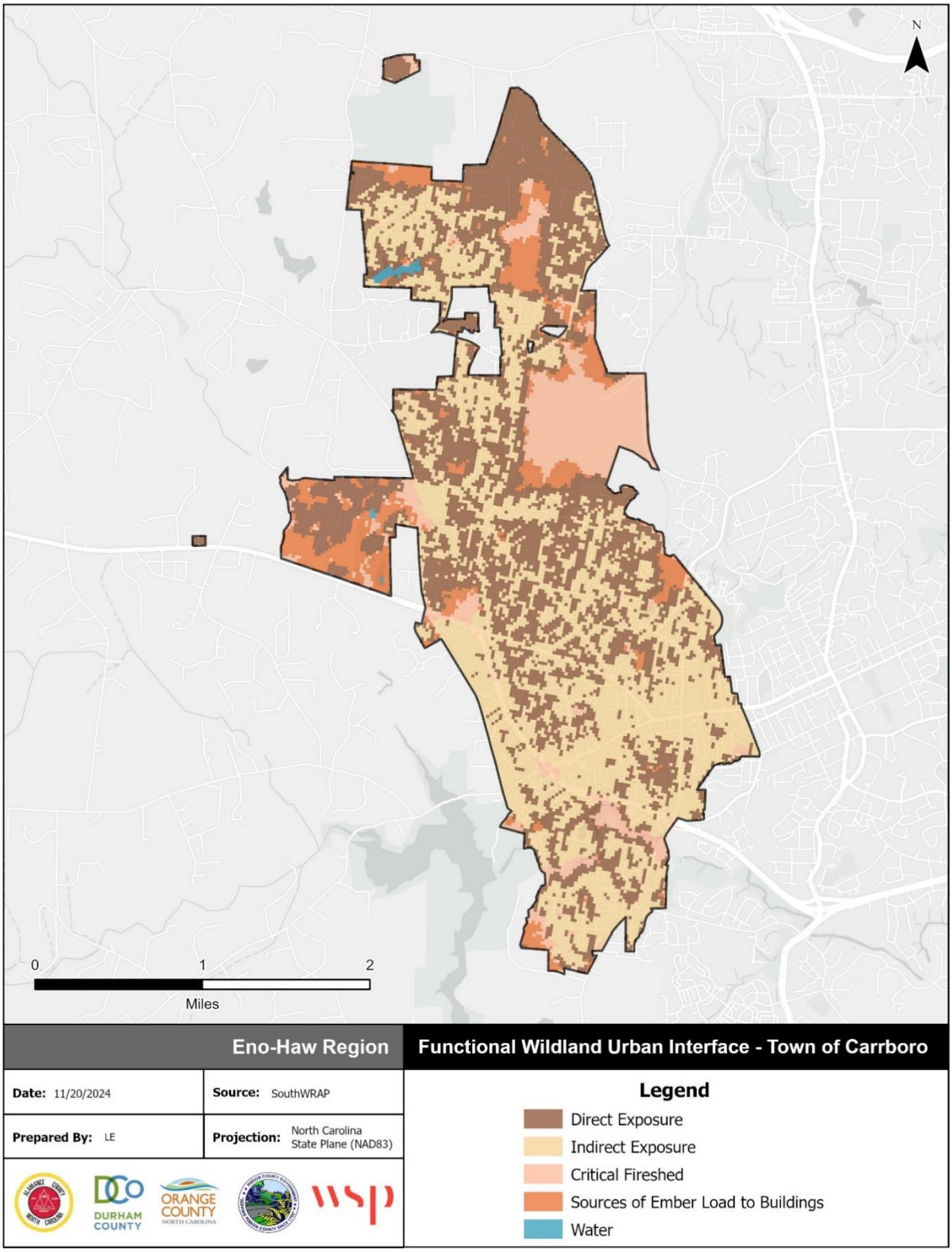
Source: Southern Wildfire Risk Assessment

Figure C.17 – Functional Wildland Urban Interface, Unincorporated Orange County



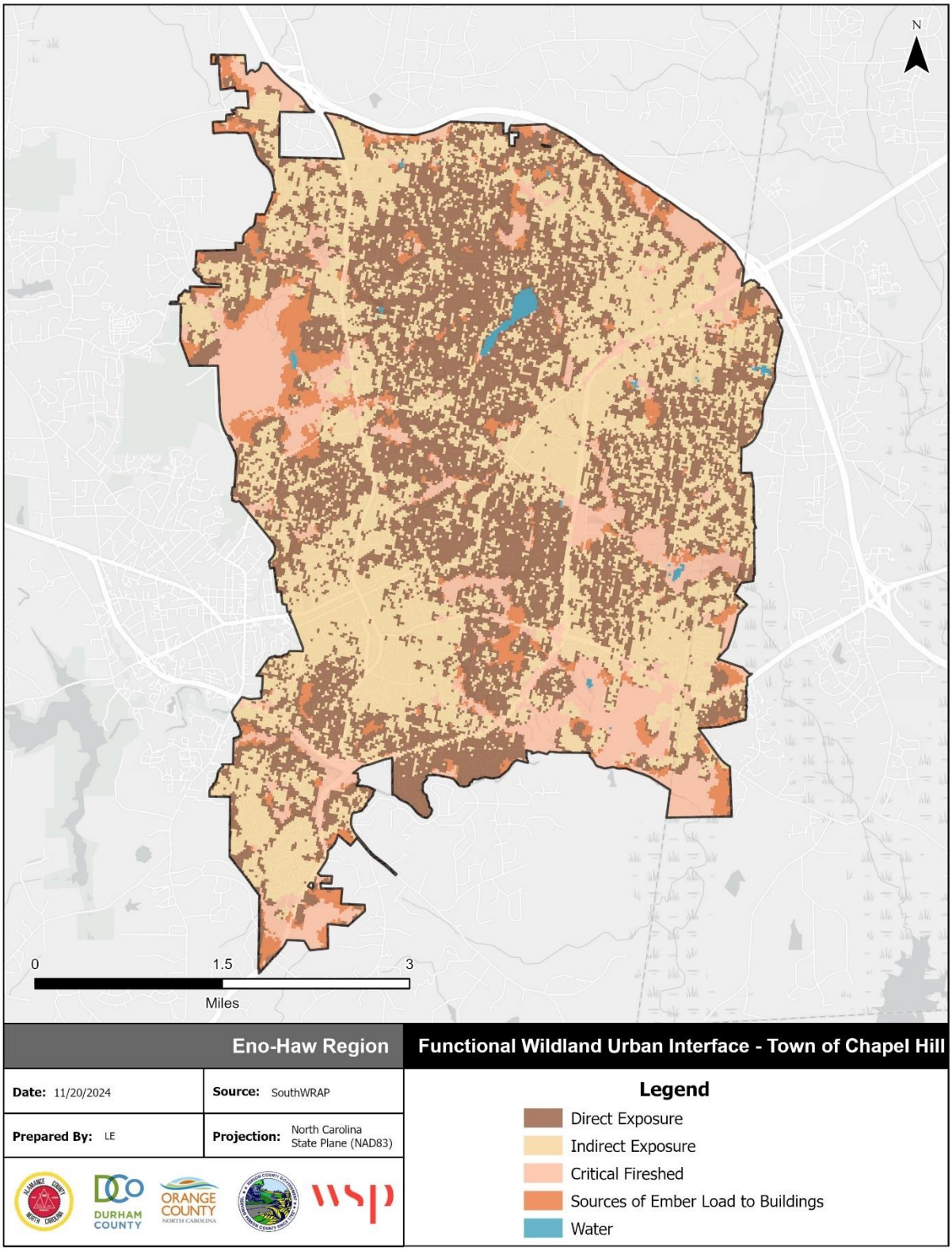
Source: Southern Wildfire Risk Assessment

Figure C.18 – Functional Wildland Urban Interface, Town of Carrboro



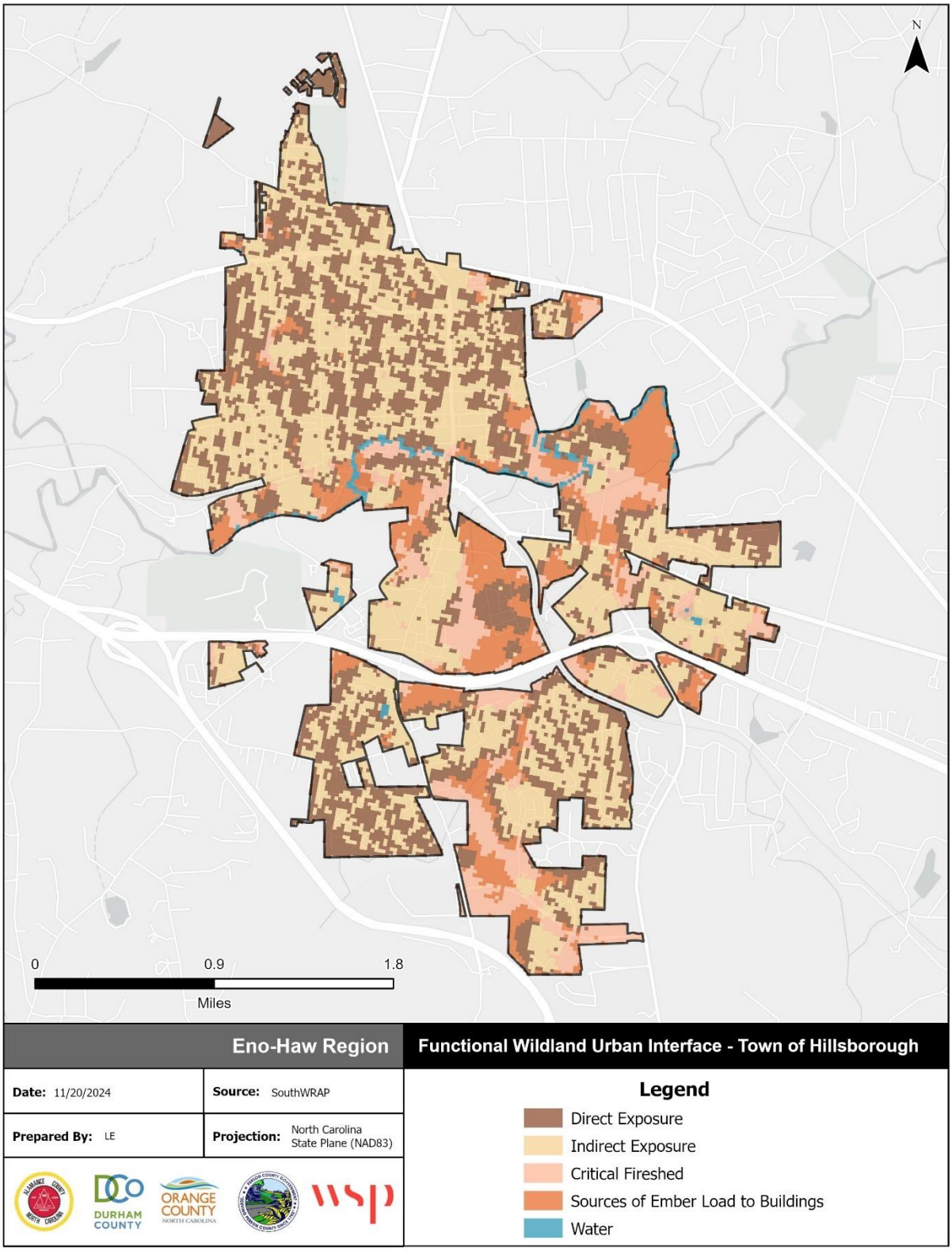
Source: Southern Wildfire Risk Assessment

Figure C.19 – Functional Wildland Urban Interface, Town of Chapel Hill



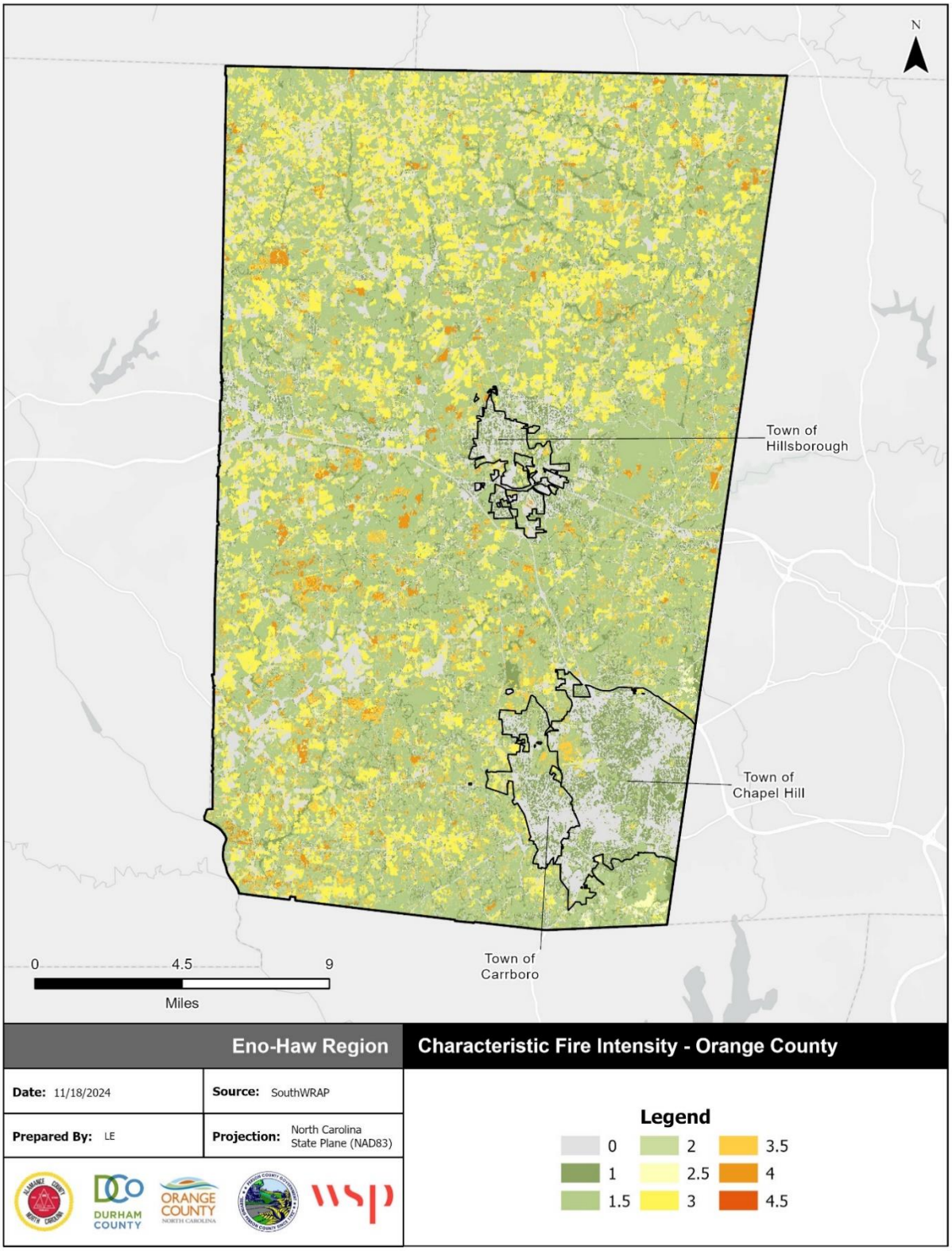
Source: Southern Wildfire Risk Assessment

Figure C.20 – Functional Wildland Urban Interface, Town of Hillsborough



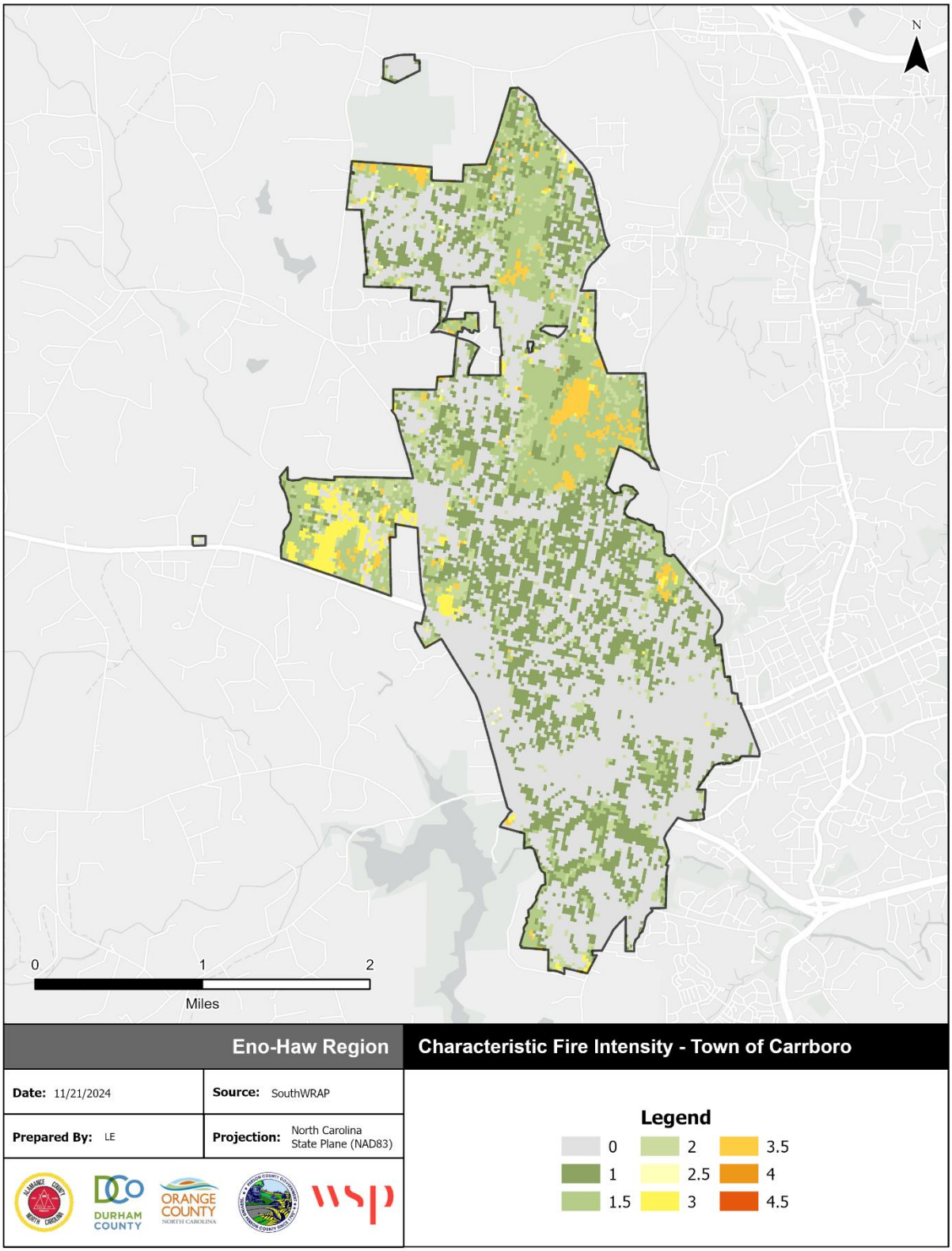
Source: Southern Wildfire Risk Assessment

Figure C.21 – Characteristic Fire Intensity, Unincorporated Orange County



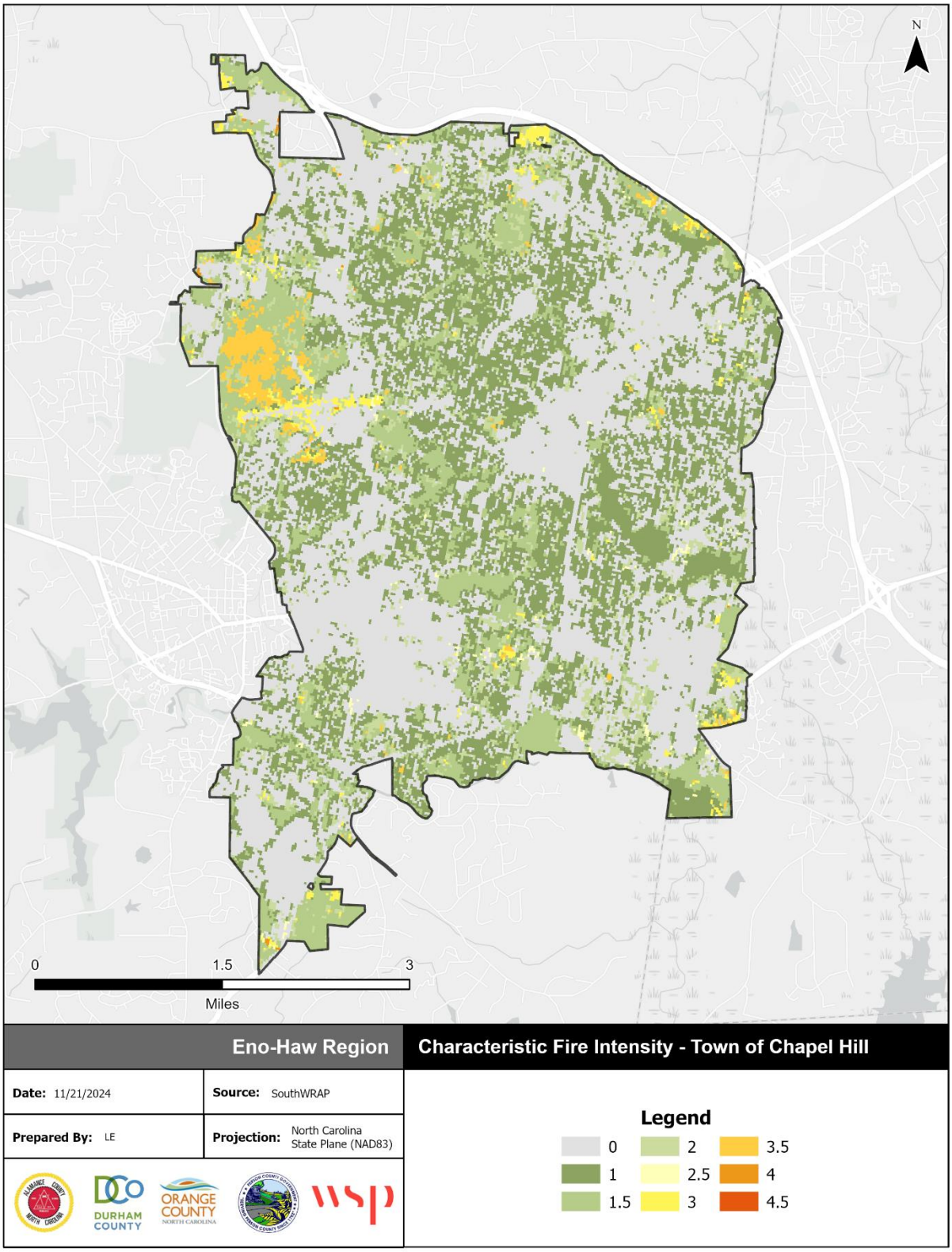
Source: Southern Wildfire Risk Assessment

Figure C.22 – Characteristic Fire Intensity, Town of Carrboro



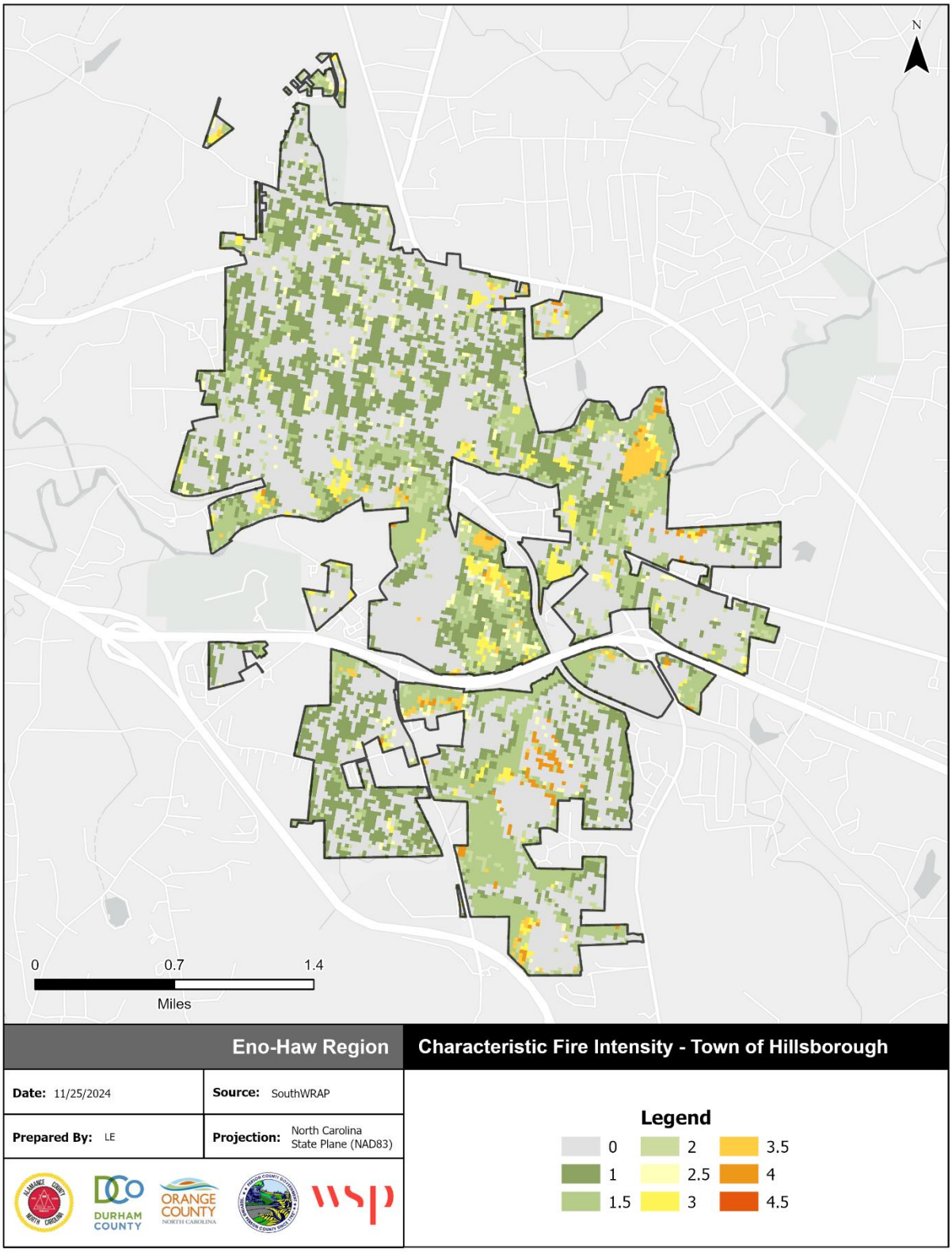
Source: Southern Wildfire Risk Assessment

Figure C.23 – Characteristic Fire Intensity, Town of Chapel Hill



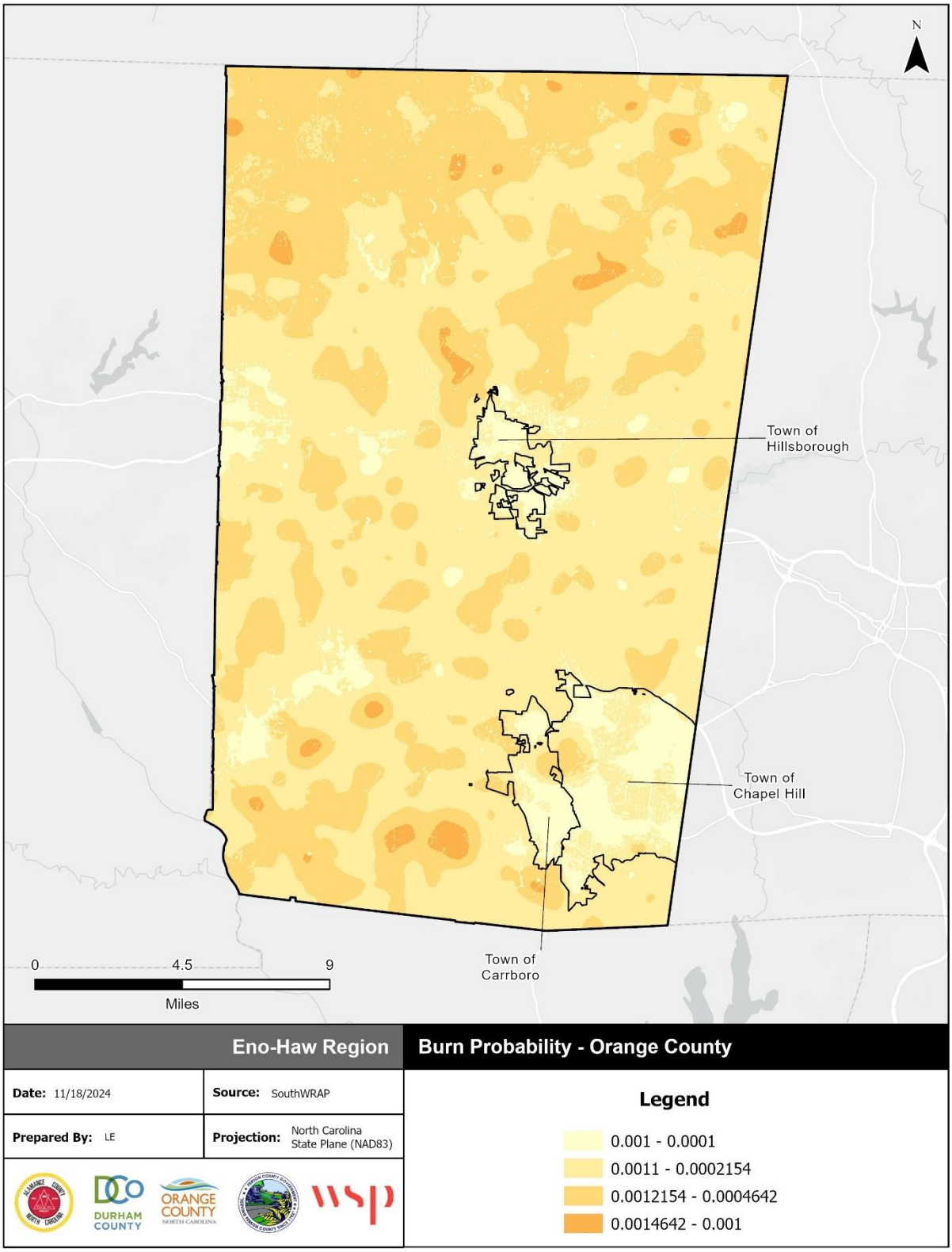
Source: Southern Wildfire Risk Assessment

Figure C.24 – Characteristic Fire Intensity, Town of Hillsborough



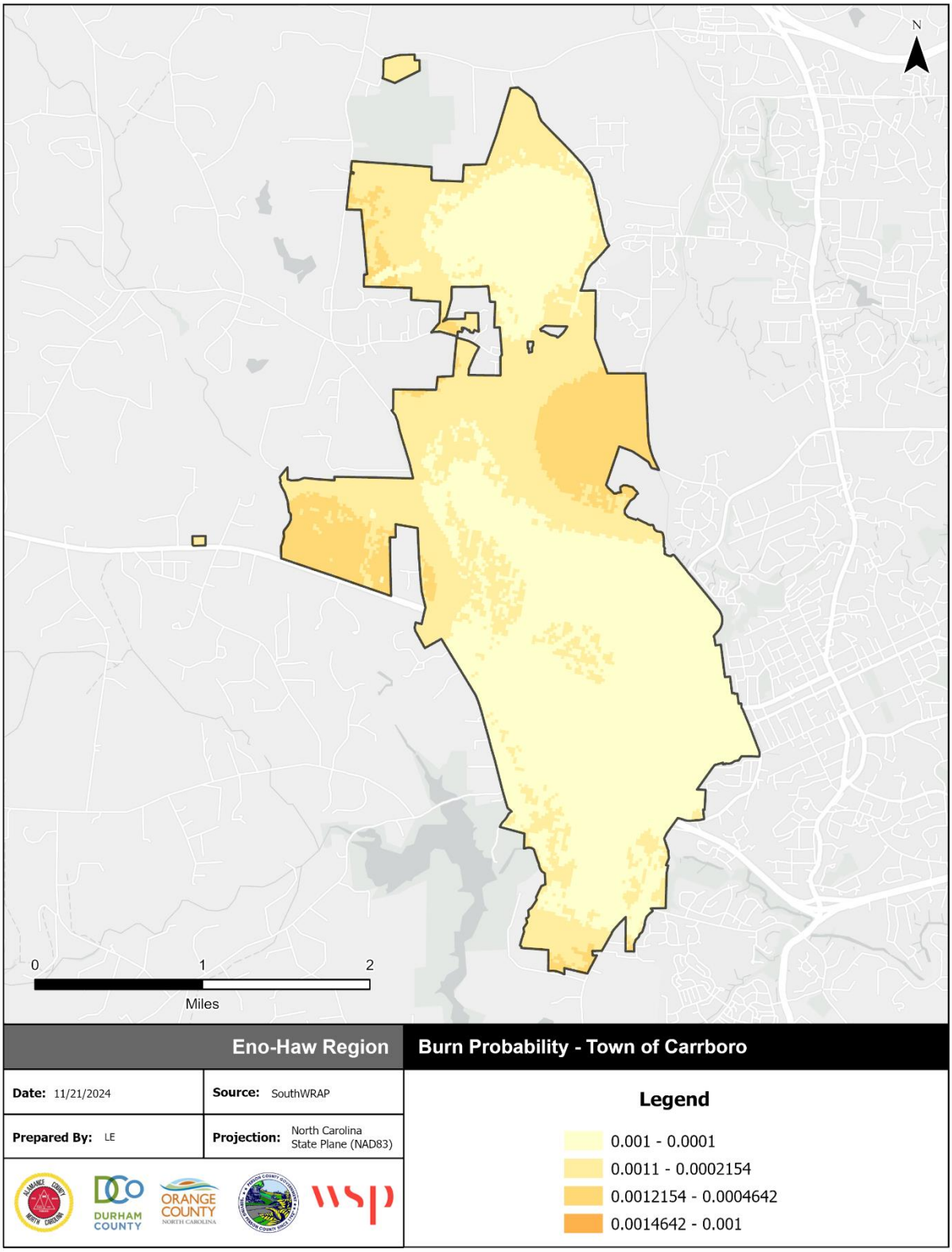
Source: Southern Wildfire Risk Assessment

Figure C.25 – Burn Probability, Unincorporated Orange County



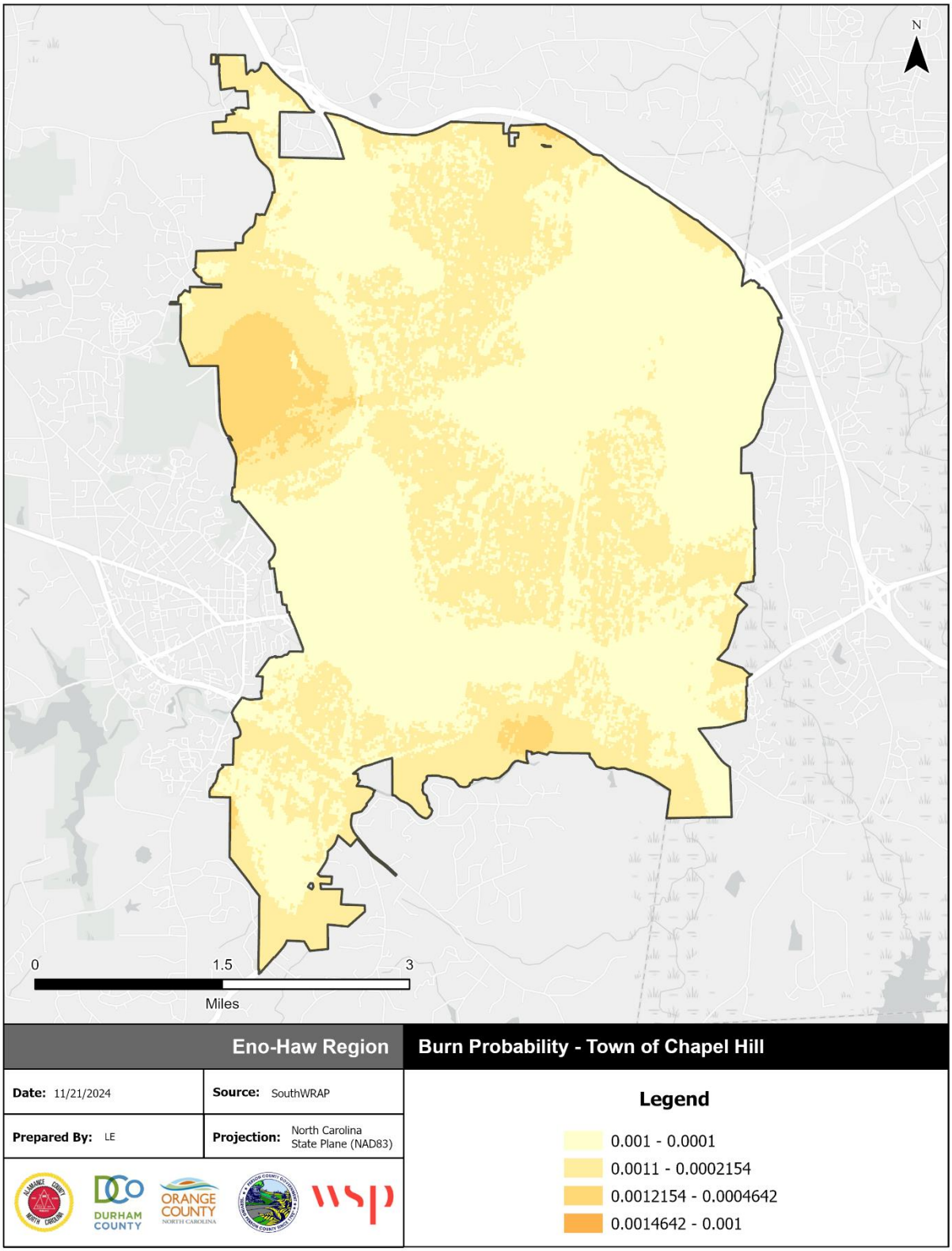
Source: Southern Wildfire Risk Assessment

Figure C.26 – Burn Probability, Town of Carrboro



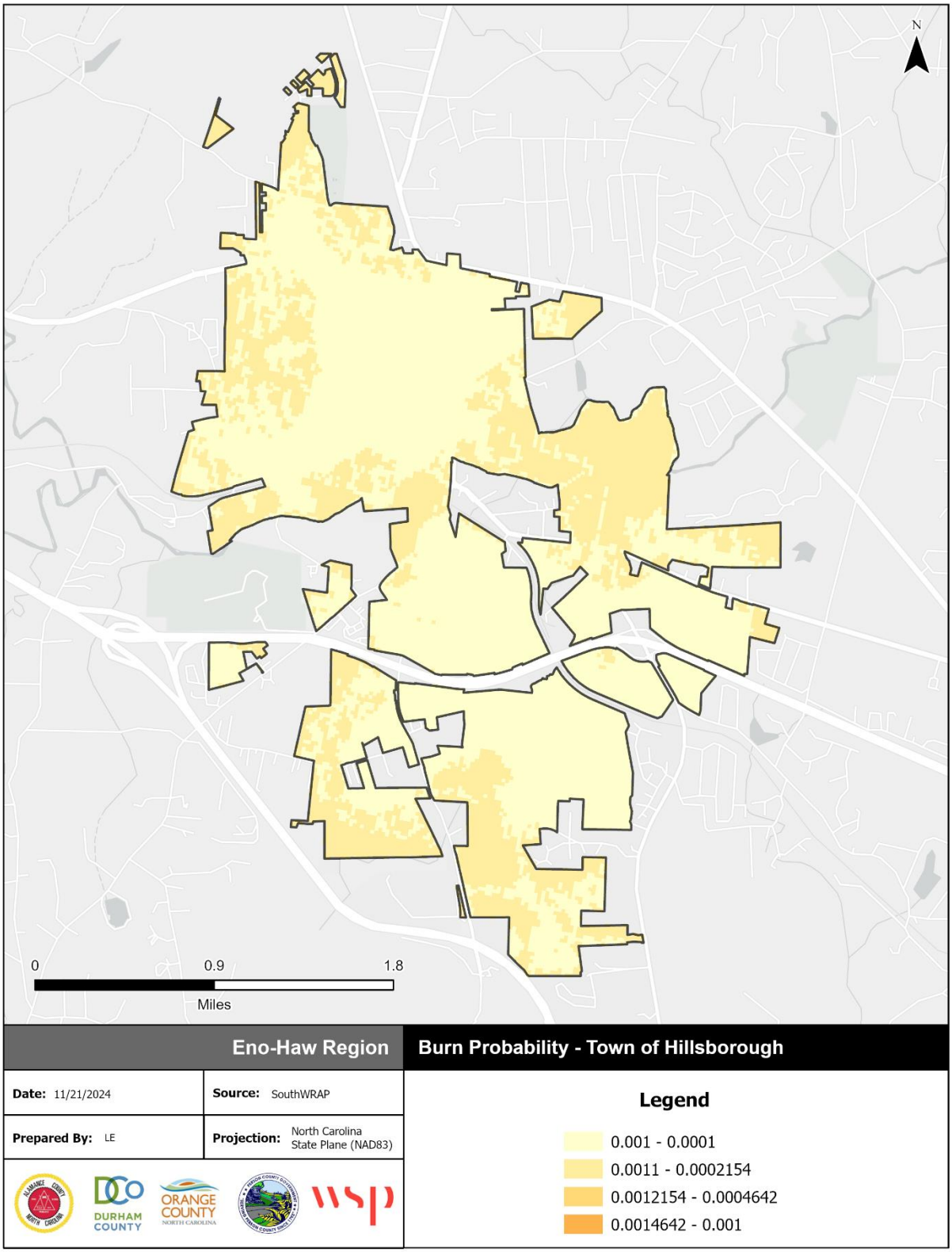
Source: Southern Wildfire Risk Assessment

Figure C.27 – Burn Probability, Town of Chapel Hill



Source: Southern Wildfire Risk Assessment

Figure C.28 – Burn Probability, Town of Hillsborough



Source: Southern Wildfire Risk Assessment

C.3 MITIGATION STRATEGY

Table C.19 – Mitigation Action Plan, Orange County

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Incorporate relevant HMP priorities into drafted 2050 Land Use Plan for adoption; in the meantime, continue implementation of the Orange County 2030 Comprehensive Plan.	All Hazards	1.1	Medium	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	This action has been revised to incorporate priorities into the drafted 2050 Land Use Plan. Implementation of the 2030 Comprehensive Plan is ongoing.
P-2	Continue participation in the Community Rating System (CRS) and annual recertification in order to increase public safety, reduce property damage, avoid economic loss, and allow for a decrease in flood insurance premiums for Orange County residents.	Flooding, Hurricane & Tropical Storm	1.1	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	The CRS re-certification period runs from August 1st to August 1st for each fiscal year. Staff works with CRS every July to submit our annual CRS recertification application. Orange County's 2024 CRS rating was a score of Class 6, which qualifies our constituents for a 20% discount in FEMA flood insurance premiums. Staff hopes to maintain our relatively high CRS score for FY25, with potential eventual score increase (perhaps to Class 5), once staff is able to procure Certified Floodplain Manager (CFM) status.
P-3	Continue to enforce floodplain regulations through the county's Special Flood Hazard Area (SFHA) Overlay District contained within the Orange County Unified Development Ordinance and continue training efforts for the Certified Floodplain Manager (CFM).	Flooding, Hurricane & Tropical Storm	1.2	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	Orange County underwent a successful Floodplain Management program (NFIP) audit by the NC Department of Public Safety (NCDPS) in June 2023. Current feedback from NCDPS is that the program is in full compliance; with only a few minor deficiencies noted, of which staff is aware of and actively working to address into FY25. Staff hopes to procure Certified Floodplain Manager (CFM) status in FY25.
P-4	Continue to collaborate and support municipal mitigation strategies	All Hazards	3.2	Medium	Orange County Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County remains committed to supporting municipal mitigation strategies. Orange County Emergency Management is assisting UNC Chapel Hill with a generator project funded through the Hazard Mitigation Grant Program (HMGP) from Hurricane Florence. Additionally, Orange County Emergency Management is supporting the Town of Carrboro in applying for HMGP funding for a property acquisition related to flood damage from Hurricane Helene.
P-5	Climate Action Plan	All Hazards	2.1	High	Orange County Sustainability	General Fund (existing staff salaries), CIP, Federal and State grants	2023-2032	New	The Orange County Climate Action Plan was adopted in November 2023 and is currently in implementation. The plan addresses climate mitigation strategies as well as resilience and adaptation.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-6	Continue to develop, review, update, and implement recommendations in local and regional plans to improve the reliability, redundancy, and resiliency of water resources (water, wastewater, reclaimed water).	All Hazards	3.1	Medium	OWASA, Orange County Planning and Inspections Department	CIP and Operating Budgets	Ongoing	Carried Forward	Moving into FY25, Orange County continues to coordinate with City of Mebane and Town of Hillsborough and commit active County CIP funds for relevant public water/sewer system extensions, where applicable. Currently, the County has no active public water/sewer extension projects in the queue with remaining public utilities (i.e., City of Durham, OAWS, OWASA) that are geographically capable of serving County constituents. OWASA remains committed to ensuring the reliability, redundancy, and resiliency of the water resources that sustain the water supply for our customers and community
P-7	Home weatherization for low-to-Medium income residents.	Excessive Heat, Severe Winter Weather	4.2	Medium	Orange County Housing Department, Orange County Home Preservation Coalition	General Fund (existing staff salaries), grants	2025-2030	New	
P-8	Tree giveaway program.	Excessive Heat	4.2, 2.1	Medium	Orange County Sustainability	General Fund (existing staff salaries), grants	2025-2030	New	
P-9	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Continue enforcement of the North Carolina State Building Code.	All Hazards	1.2	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	Currently operating under the 2018 edition of the NC State Building Codes and 2017 edition of the National Electrical Code. The updated codes were adopted in 2025 with implementation occurring in 2026 or later.
PP-2	Continue participation in the National Flood Insurance Program (NFIP) to reduce the impact of a future flood event, mitigate effects of flooding, and allow citizens to be eligible for affordable flood insurance.	Flooding, Hurricane & Tropical Storm	1.2	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	Orange County underwent a successful Floodplain Management program (NFIP) audit by the NC Department of Public Safety (NCDPS) in June 2023. Current feedback from NCDPS is that the program is in full compliance; with only a few minor deficiencies noted, of which staff is aware of and actively working to address into FY25. Staff hopes to procure Certified Floodplain Manager (CFM) status in FY25. Orange County's 2024 CRS rating was a score of Class 6, which qualifies our constituents for a 20% discount in FEMA flood insurance premiums. Staff hopes to maintain our relatively high CRS score for FY25, with potential eventual score increase (perhaps to Class 5), once staff is able to procure CFM status.
PP-3	Identify potential flood hazards of critical infrastructure and mitigation measures to address.	Flooding, Hurricane & Tropical Storm	4.2	High	OWASA	CIP and Operating Budgets	2025-2030	Carried Forward	OWASA is developing a Climate Action Plan in 2025 to identify vulnerabilities and outline mitigation measures to address the highest climate risks, including flood hazards of critical infrastructure.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PP-4	Explore expanding situational awareness tools and strategies for increased monitoring of local hazards such as installation of additional stream gauges	All Hazards	2.2	Medium	Emergency Services, OWASA	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County has collaborated with NC Dam Safety to assess local stream and dam gauges. To enhance situational awareness, CONTRAIL access has been granted to all fire chiefs with dam gauges in their jurisdiction.
PP-5	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	Orange County Planning and Inspections Department	Local, State grants, Federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Strive to ensure future development occurs in a manner that protects floodplains, streams, wetlands, and other natural features which work to reduce flood hazard susceptibility and continue to enforce existing regulations pertaining to stormwater management and erosion control standards contained within the Orange County Unified Development Ordinance.	Flooding, Hurricane & Tropical Storm	1.1	High	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	Ongoing	Carried Forward	Moving into FY25, Orange County's ongoing stance (as defined in the UDO) is no new development within the SFHA, barring extraneous/rare circumstances in which a property owner has fully justified that there are no feasible alternatives for by-right development. Substantial improvements to existing structures within the SFHA are permitted; however, any/all construction (new construction and/or or substantial improvements) will continue to require complete floodproofing per FEMA standards. Staff will continue to require No-Rise studies for any fill within the SFHA, and staff will continue to process CLOMR/LOMR applications per regulatory requirements.
Structural Projects									
SP-1	Explore the possibility of retrofitting critical facilities to harden against high winds and lightning.	All Hazards	4.2	Medium	Emergency Services, Asset Management	Unified hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	Orange County will continue to identify opportunities to protect critical facilities from wind and lightning.
SP-2	Conduct a cost-benefit review during the planning and design phase of construction of new government owned facilities or critical facilities to determine the feasibility of equipping the facility with back-up generators, lightening protection, high wind protection, and/or 361 compliant tornado shelters.	All Hazards	4.2	Medium	Emergency Services, Asset Management	Unified hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	This is being completed on a case-by-case basis with each new facility and major retrofit.
SP-3	Continue to identify and explore possibility of improving or retrofitting existing critical facilities with on site energy generation.	All Hazards	4.2	Medium	Emergency Services, Asset Management, OWASA	Unified hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	Orange County, in partnership with the Central Pines Regional Council, is applying for a grant to assess generator specifications for existing County facilities and estimate associated costs.
SP-4	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Emergency Services, Planning and Inspections Department	State grants, UHMA grants, other federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Emergency Services									
ES-1	Engage with regional stakeholders in comprehensive emergency response planning including Complex Coordinated Terror Attack response and Mass Casualty Incident response planning.	All Hazards	3.2	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County continues to provide ASIM training to onboarding EMS personnel and others upon request. Emergency Services initially began the application process for an Assistance to Firefighters Grant (AFG) to fund mass casualty incident (MCI) equipment and training but has instead incorporated it into the 2023-2024 budget. Additionally, Orange County Emergency Services is in the initial planning phase of developing a comprehensive MCI plan. Following the 2019 Regional Complex Coordinated Terrorist Attack (CCTA) Plan, Orange County, in partnership with Durham and Wake counties, hosted a series of trainings to strengthen identified capabilities.
ES-2	Continue to provide warming/cooling centers during extreme temperatures.	Excessive Heat, Severe Winter Weather	2.2	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	New	
ES-3	Explore a box fan giveaway program for residents without central air conditioning.	Excessive Heat	2.1, 2.2	Medium	Orange County Social Services/Aging	General Fund (existing staff salaries)	2025-2030	New	
ES-4	Develop a comprehensive Emergency Operations Plan update with integration of all three municipal Emergency Operations Plans.	All Hazards	3.1	High	Emergency Services	State grants, UHMA grants, other federal grants	2025-2027	New	
ES-5	Develop a Countywide Tactical Interoperable Communications Plan, addressing both voice communication and data.	All Hazards	3.1	Medium	Emergency Services	General Funds (existing staff salaries)	2025-2030	New	
ES-6	Improve situational awareness and interagency coordination during hazard events by using mobile geospatial tools that support real-time data sharing, location tracking, and operational overlays that can support both public safety and non-public safety assets.	All Hazards	3.1	Medium	Emergency Services	General Funds (existing staff salaries)	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Public Education & Awareness									
PEA-1	Provide education and outreach to Orange County residents in multiple languages before, during, and after a hazardous weather event and maintain a link to the Eno-Haw Regional Hazard Mitigation Plan on Orange County's Website.	All Hazards	2.1	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County continues to host and sponsor Community Emergency Response Team (CERT) training, offering two CERT basic training courses annually and meeting regularly with the CERT Council. Orange County Emergency Services partners with Orange County Cooperative Extension to host an annual summer camp that enhances youth resilience to hazards. Additionally, Orange County Emergency Management collaborates with NCEM to host the Emergency Management Experience, an all-girls summer camp focused on careers in emergency management and first response. Orange County remains committed to public education on hazard risks and has developed a multilingual repository of preparedness information. In 2024, the County updated the Ready Orange website to support easy translation into multiple languages and to clearly communicate hazard information and preparedness measures. Emergency Management continues to leverage social media and other platforms to educate residents about natural hazards, including the creation of multilingual preparedness graphics for targeted outreach and social media use. Efforts are ongoing to ensure all communications, especially OC Alert notifications, use plain language for accessibility and clarity.
PEA-2	Engage in regional events, activities, and training opportunities related to natural hazards in order to improve communication, enhance, partnerships, and improve planning efforts with other local jurisdictions.	All Hazards	3.2	Medium	Emergency Services	General Fund (existing staff salaries)	2025-2030	Carried Forward	Orange County actively participates in local and regional exercises. In 2023, Orange County Emergency Services partnered with OWASA to conduct a dam failure tabletop exercise. Currently, Emergency Services is engaged in a Threat and Hazard Identification and Risk Assessment (THIRA) to identify capability gaps related to various hazards. Additionally, in 2021, Orange County hosted a full-scale active shooter exercise at UNC Hillsborough
PEA-3	Provide staff support and information on Orange County's website to provide education and assistance to residents experiencing floodplain, stormwater, and erosion control issues.	Flood, Hurricane and Tropical Storm	2.1	Medium	Orange County Planning and Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	Updated information was posted in 2024 at Floodplain Protection | Orange County, NC. Information also available on https://www.orangecountync.gov/3427/Floods
PEA-4	Continue to support strategies identified in Orange County's Climate Action Plan	All Hazards	3.2	Medium	Orange County Sustainability	Multiple	2023-2050	New	Information on the Climate Action Plan and current progress can be found at https://www.orangecountync.gov/3096/Climate-Action-Plan
PEA-5	Provide utility bill assistance to income eligible residents.	Excessive Heat, Winter Weather	3.2	Medium	Orange County Housing	General Fund (existing staff salaries)	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-6	Conduct periodic heat mapping to understand which parts of Orange County are most vulnerable to excessive heat.	Excessive Heat	3.2	Medium	Orange County Sustainability	General Fund (existing staff salaries)	2025-2030	New	
PEA-7	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	2.2	Medium	Orange County Sustainability, Emergency Services	General Fund (existing staff salaries)	2025-2030	New	

Table C.20 – Mitigation Action Plan, Town of Carrboro

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	The Town of Carrboro, as a member of the Orange County hazard Mitigation Planning Team, will coordinate with Orange County to reevaluate and update its hazard mitigation planning component at least once every five years or sooner as deemed appropriate by the Orange County Planning Director	All Hazards	1.2	High	Town of Carrboro	Self-funded	2025-2030	Carried Forward	Actively participating in update process with local government partners in Eno-Haw Region.
P-2	The Town of Carrboro intends to submit a Community Rating System (CRS) application to the ISO for a flood insurance rating that will benefit owners of flood-prone properties	Flooding	1.2	Medium	Town of Carrboro - Planning Department	N/A	2025-2030	Carried Forward	The Town is still interested in submitting a CRS application to ISO. The Town is assessing current programs and will conduct further research to determine if applying for the CRS is in the best interest of the community;
P-3	The Town of Carrboro will continue to monitor ongoing efforts by the State and the US Army Corps of Engineers to complete new floodplain mapping for the planning area. Local staff resources will be needed to implement and encourage the completion of these activities.	Flooding	1.1	High	Town of Carrboro - Planning Department	N/A	2025-2030	Carried Forward	The Town's Stormwater Utility was established in 2017, and the Stormwater Division created in 2018. The Planning Department and GIS administrator ensure local floodplain maps are updated. The Town also utilizes the Flood Risk Information System as needed.
P-4	Establish comprehensive framework for plans, policies, and regulations pertaining to land use, generally, and the relationship to natural hazard mitigation	All Hazards	1.2	Medium	Town of Carrboro - Planning Department	Self-funded	2025-2030	Carried Forward	Incorporated into Carrboro Connects Comprehensive Plan which was adopted on 7 June 2022. Will continue in this area with the implementation of a new Unified Development Ordinance.
P-5	Establish framework for assessing urban wildfire risk, communicating with the public on measures that can reduce risk.	Wildfire	2.1	Medium	Town of Carrboro - Fire Department	Self-funded; outside grants if available	2025-2030	Carried Forward	Will partner with other local fire departments, the Orange County Fire Marshal's Office, and the North Carolina Forestry Service to assess and mitigate wildfire hazards with a concentration on the Wildland Urban Interface (WUI).
P-6	Explore opportunities to pilot cool pavement.	Excessive Heat	1.2	Medium	Town of Carrboro – Sustainability Division	TBD	2025-2030	New	Piloted cool pavement titanium dioxide additive to pavement resurfacing in several neighborhoods in 2024 using NC DOT Powell Bill Funding.
P-7	Home weatherization for low-to-moderate income residents.	Excessive Heat, Severe Winter Weather	4.2	Medium	Town of Carrboro – Housing and Community Services	Self-funded; outside grants if available	2025-2030	New	Work with Orange County Housing and other partner agencies to continue weatherization of homes in the community.
P-8	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	Town of Carrboro – Fire Department	Self-funded; outside grants if available	2025-2030	New	Will partner with other local fire departments, the Orange County Fire Marshal's Office, and the North Carolina Forestry Service to assess and mitigate wildfire hazards with a concentration on the Wildland Urban Interface (WUI).

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Property Protection									
PP-1	Seek funding to retrofit critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, backup generators, solar and battery electric storage systems, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, and anchoring fixed building equipment.	All Hazards	4.2	Medium	Town of Carrboro - Planning Department	Self-funded; outside grants if available	2025-2030	Carried Forward	The Town will continue to assess facilities and seek funding sources related to needs identified.
PP-2	Manage watersheds and stormwater by promoting active maintenance of stormwater infrastructure, reducing impacts of increased impervious surfaces, and minimizing impact to waterways.	Flooding, Hurricane & Tropical Storm, Landslide	1.2	High	Town of Carrboro - Stormwater Division	Self-funded; outside grants if available	2025-2030	Carried Forward	Action Revised. The Town of Carrboro established a Stormwater Utility Fee in 2017 to fund stormwater services/operations and provide residential and commercial assistance for stormwater related issues by expanding technical assistance, outreach, and other program components. The Town has an active MS4 permit and is subject to requirements, including post-construction stormwater control measures. Stormwater control measures are often designed to exceed state minimum requirements.
PP-3	Look for opportunities to mitigate repetitive loss structures, and to increase resilience by ensuring critical infrastructure is not in locations susceptible to flooding.	Flooding	4.2	Medium	Town of Carrboro - Planning Department	Local, State grants, Federal grants	2025-2030	New	This mitigation measure includes pursuing the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damaged properties. Currently in discussions with one property owner and expect the process to begin in earnest in 2025. This mitigation measure also includes the possibility of relocating Carrboro Public Works.
Natural Resource Protection									
NRP-1	Development of greenways and parklands dedicated to public use along streams and utility easements. The Town will seek to secure funding from federal, state, and local sources to implement the Town's greenway system, which will in turn mitigate flood hazards.	Flood	1.1	Medium	Town of Carrboro - Planning Department	Federal and county grants, and Town funded.	2025-2030	Carried Forward	Phase 1B/Homestead-Chapel Hill High School Multi-use Path is completed. The Morgan Creek and Jones Creek greenway projects are expected to begin construction in 2025/2026. The Town will continue to develop greenways along streams to protect natural resources.
NRP-2	Protect and conserve land with environmental and natural hazard mitigation value as open space.	Flooding, Hurricane & Tropical Storm, Landslide	1.1	High	Town of Carrboro - Planning Department	Self-funded; outside grants if available	2025-2030	Carried Forward	Implementation underway for several projects and multiple approaches including land use regulations for developments, policy analysis/framework for comprehensive planning, and grant funding for repetitive loss properties.
NRP-3	Coordinate with OWASA for planning for long-term and emergency water supply measures.	All Hazards	1.1	High	Town of Carrboro – Fire Department	Self-funded	2025-2030	New	
Structural Projects									
SP-1	Require new developments to install electric, cable, and telephone wires underground to increase critical infrastructure resilience.	All Hazards	1.2	Medium	Town of Carrboro - Planning Department	N/A	2025-2030	Carried Forward	The Town of Carrboro will continue to require new developments to install electric, cable, telephone wires underground to the extent allowed by local utilities—Duke Power/Piedmont Electric Coop.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
SP-2	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Carrboro - Stormwater Division	State grants, federal grants	2025-2030	New	The Town has Capital Projects included in the adopted Capital Improvement Plan to implement public projects within the jurisdiction to manage stormwater within the community.
Emergency Services									
ES-1	Provide misting tents and cold-water giveaways at fire stations during extreme heat days.	Excessive Heat	2.2	Medium	Town of Carrboro Fire	General fund	2025-2030	New	Partial implementation in-progress. Will work to formalize actions based on pre-established thresholds.
ES-2	Develop a comprehensive Emergency Operations Plan update with integration of all three municipal Emergency Operations Plans.	All Hazards	3.1	High	Town of Carrboro – Fire Department	State grants, UHMA grants, other federal grants	2025-2027	New	
ES-3	Work with partners across Orange County on the development a Countywide Tactical Interoperable Communications Plan, addressing both voice communication and data.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2025-2030	New	Research phase. Current plan is to implement mesh network or a similar technology for communications redundancy.
ES-4	Improve situational awareness and interagency coordination during hazard events by using mobile geospatial tools that support real-time data sharing, location tracking, and operational overlays that can support both public safety and non-public safety assets.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2025-2030	New	Supporting Orange County Emergency Services efforts to transition to a new CAD system that will provide geospatial capabilities. Working with local response partners to enhance capabilities. Currently planning to implement Team Accountability Kit (TAK) for to increase situational awareness and improve inter-agency operations.
ES-5	Develop a unified damage assessment process.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2025-2030	New	Work with local and regional response partners to enhance capabilities for damage assessment and tracking on a local and regional level.
ES-6	Develop a Continuity of Operations Plan (COOP) for the Town of Carrboro.	All Hazards	3.1	Medium	Town of Carrboro – Fire Department	General Funds (existing staff salaries)	2027-2030	New	Begin the COOP planning process after completion of the comprehensive EOP update.
ES-7	Engage in regional events, activities, and training opportunities related to natural hazards to improve communication, enhance partnerships, and improve planning efforts both within the across jurisdictions.	All Hazards	3.2	Medium	Town of Carrboro – Fire Department	General Fund (existing staff salaries)	2025-2030	New	Engage with local, regional, state, and federal emergency management services to increase capabilities and enhance interoperability.
ES-8	Identify and implement strategies, processes, and procedures to enhance hazardous materials leak and spill response capabilities.	Hazardous Materials	3.1	Medium	Town of Carrboro – Fire Department	General Fund (existing staff salaries)	2025-2030	New	
Public Education & Awareness									
PEA-1	Maintenance and implementation of adopted (2017) Community Climate Action Plan	All Hazards	1.2	High	Town of Carrboro - Sustainability Division	Self-funded; grants, other revenue as available	2025-2030	Carried Forward	Includes implementation of 2014 Strategic Energy Plan. Will serve as coordinating focus of actions underscoring Town's emphasis on building community resilience. Could potentially be included under Structural Projects, Prevention and Property Protection as well.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-2	Create and maintain web-based resources for hazard risk, mitigation, and preparedness information.	All Hazards	1.2	High	Town of Carrboro – Fire Department	Self-funded	2025-2030	Carried Forward	A web page was created during the 2020-2025 implementation phase. Will update the page and add additional resources in the next implementation phase. This action item also includes utilization of social media and other web-based tools for public education.
PEA-3	Conduct periodic heat mapping to understand which parts of Carrboro are most vulnerable to excessive heat.	Excessive Heat	3.2	Medium	Town of Carrboro - Sustainability Division	General Fund (existing staff salaries)	2025-2030	New	Partnering with UNC to conduct heat mapping in 2025.
PEA-4	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	2.2	Medium	Town of Carrboro - Sustainability Division	General Fund (existing staff salaries)	2025-2030	New	Working with Orange County and other local partners to develop and implement a comprehensive Heat Action Plan.
PEA-5	Encourage and educate private property owners regarding Nature-Based Hazard Mitigation nutrient management.	Flooding, Hurricane & Tropical Storm, Landslide	2.1	Medium	Town of Carrboro - Stormwater Division	Self-funded	2025-2030	New	Conducted 90 property assessments and are developing conservation plans for those properties. Goal is to complete approximately 50 assessments and associated conservation plans annually.
PEA-6	Provide increased public outreach before, during, and after a natural hazard or emergency.	All Hazards	2.2	High	Town of Carrboro – Fire Department	General Fund (existing staff salaries)	2025-2030	New	

Table C.21 – Mitigation Action Plan, Town of Chapel Hill

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Consider creative zoning options.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.2	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. ToCH continues to try to engage with developers to pursue creative zoning options including-conditional zoning which allows flexible and open conversations.-The Blue Hill District and the Innovative, Light Industrial Conditional Zoning District are other examples of creative zoning options. The Town Council and Town staff review zoning requirements and making adjustments as needed to achieve hazard mitigation goals. For example, developers now commonly volunteer to design their stormwater management to meet the 100-year storm, up from the 25-year storm.
P-2	Encourage mixed-use development forms.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. ToCH continues to emphasize mixed-use redevelopment in the downtown and in future focus areas, as per the comprehensive plan. In 2021, the Town adopted a new future land use map called "Charting Our Future.". This initiative charts a course for mixed-use and compact development along major transportation corridors.
P-3	Establish a growth management protocol to maintain sufficient infrastructure capacity.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.1	Medium	Town of Chapel Hill	N/A	2025-2030	Carried Forward	In Progress. The Town will continue existing growth management protocols to maintain sufficient infrastructure capacity including the Town's urban services district and the rural buffer, both of which continue to guide development decisions within the municipal boundaries. In 2021, the Town adopted a new future land use map called "Charting Our Future.". This initiative charts a course for mixed-use and compact development along major transportation corridors.
P-4	Improve the Development Review Process	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Planning Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. This continues to be an ongoing effort since 2009. The Town is in the process of a complete rewrite of the development ordinance, which will include a comprehensive review of the Development Review Process.
P-5	Continue to enforce the stormwater management regulations through the Town's Land Use Management Ordinance and the floodplain regulations through the town's Flood Damage Prevention Ordinance. Continue training initiatives to maintain the Certified Floodplain Manager (CFM) registrations.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Stormwater Division	Stormwater Fund (existing staff salaries)	2025-2030	Carried Forward	The Town has made updates to the stormwater management regulations that modernize and streamline our rules, including a design standard that moved from the 25-year storm to the 100-year storm for large new construction. The Town now has a Certified Floodplain Manager and will continue to support training.
P-6	Continue to participate in county-wide collaborative efforts and mitigation strategies	All Hazards	3.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Engage in regular Emergency Management meetings, training, and data sharing to strengthen community resilience and organizational response to hazards.
P-7	Continue enforcement of the North Carolina State Building Code.	All Hazards	1.2	Medium	Town of Chapel Hill - Inspections Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town continues to enforce the building code by maintaining a staff with multiple trade certifications for all forms of development.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-8	Continue participation in the National Flood Insurance Program (NFIP) to allow citizens to be eligible for affordable flood insurance.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Stormwater Division	Stormwater Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town continues to administer its Flood Damage Prevention Ordinance, consistent with federal and state regulations, to maintain compliance with the National Flood Insurance Program.
P-9	Explore expanding situational awareness tools and strategies for increased monitoring of local hazards	All Hazards	2.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. In collaboration with ESRI consultants, we continue to work on building and enhancing dashboard viewers to monitor real-time conditions and aid in the decision-making process.
P-10	Pursue grants and other resources to support tree planting.	Excessive Heat	4.2	Medium	Town of Chapel Hill – Parks & Recreation, Office of Sustainability & Resilience	Grants, donations, general fund	2025-2030	New	
P-11	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Develop a network of greenways with regional connections.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill - Parks and Recreation and Planning Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town continues to implement the Mobility Plan, which will create a future Chapel Hill where you don't need a car to get around. This work also includes planning for Everywhere-to-Everywhere greenways. The Town is also in the process of updating the Parks Master Plan, which will integrate greenway and other off-road connections with the Town's parks system.
PP-2	Preserve open space in residential developments through the application of conservation development principles.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2050	Carried Forward	In Progress. The Town is in the process of rewriting the development ordinance, which will include an evaluation of conservation measures like tree and habitat protection.
PP-3	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	Town of Chapel Hill - Planning Department/ Managers Office	Local, State grants, Federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Manage watersheds, stormwater, and water quality and seek funding to design and construct projects on the subwatershed study reports' priority project lists, which have been identified and approved by the Town Council.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill - Stormwater Division	Stormwater Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. In 2014, the Town Council adopted the Stormwater Master Plan, which included a recommendation for conducting subwatershed studies. These studies evaluate existing conditions and identify problems – failing/undersized infrastructure, drainage and flooding, water quality, and stream conditions – then develop integrated watershed plans for improvements based on a full build-out condition, using zoning and land use plans. The Town has completed several of these studies and will continue to implement the identified improvement strategies in accordance with Council's direction.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
NRP-2	Strive to ensure future development occurs in a manner that protects floodplains, streams, wetlands, and other natural features which work to reduce flood hazard susceptibility and continue to enforce existing regulations.	Flooding, Hurricane & Tropical Storm	1.1	Medium	Town of Chapel Hill - Planning Department/ Managers Office	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town's future land use map includes a resiliency map series that identifies important climate stressors like flooding and extreme heat. Town is now in the process rewriting our development ordinance, which will include an evaluation of resiliency standards and regulations that can help to mitigate hazard impacts on new development and redevelopment.
NRP-3	Coordinate with OWASA on long-term water supply planning and local conservation measures.	Drought, Extreme Heat	1.1	Medium	Town of Chapel Hill Office of Sustainability & Resilience	OWASA	2025-2030	Carried Forward	In progress. The Town continues to work closely with OWASA as it updates its emergency and long-range water supply plan.
NRP-4	Strategically preserving, acquiring, or protecting additional open spaces to provide environmental buffer. Work to implement open space recommendations as outlined in the Recreation Standards and Needs Assessment included as a component of the Comprehensive Parks Plan, adopted 5/29/2013. (https://www.townofchapelhill.org/town-hall/departments-services/parks-recreation/planning-and-development/comprehensive-parks-plan-adopted-may-29-2013).	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill	N/A	2025-2030	Carried Forward	In Progress. ToCH has open space standards in the ordinances for residential property. In addition, there are environmental resections for development town-wide. The Town has adopted the Jordan Watershed Stormwater Management for New Develop ordinance in an effort to further protect land with environmental value. The Town is also in the process of updating the Parks Master Plan, which will evaluate opportunities for protecting open space.
NRP-5	Encourage public and private partnerships to restore and maintain the Town's environmental resources.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	1.1	Medium	Town of Chapel Hill	N/A	2025-2030	Carried Forward	In Progress. These types of partnerships are negotiated on a case-by-case basis. As an example, the town worked with UNC Healthcare at Eastowne to preserve a natural area as part of the development approval.
Structural Projects									
SP-1	Continue to identify and explore possible retrofits to critical facilities and Town-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology. This could include, but is not limited to: wind retrofits, low water consumption fixtures, leak detectors, back up generators, ignition-resistant materials, 320 or 361 compliant safe rooms, lightning protection, hail resistant roofing, anchoring fixed building equipment.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.2	Medium	Town of Chapel Hill - Public Works	General Fund (existing staff salaries) / Unified Hazard Mitigation Assistance (UHMA)	2025-2030	Carried Forward	No progress made due to funding limitations.
SP-2	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed county/town critical facilities.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.2	Medium	Town of Chapel Hill	Local, State grants, other federal grants	2025-2030	Carried Forward	No progress made due to funding limitations.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
SP-3	Coordinate with utility partners and property owners regarding the use of microgrids and other forms of distributed energy to provide backup power to critical facilities.	Hurricane & Tropical Storm, Tornadoes & Thunderstorms	4.2	Medium	Town of Chapel Hill Office of Sustainability & Resilience	General Fund, Utilities, Developers, Federal Grants (DOE)	2020-2025	Carried Forward	In progress. Town is actively planning for solar and battery storage upgrades to critical facilities over the next five years.
SP-4	Coordinate with OWASA to enhance the capacity of regional water system interconnects, as needed.	Drought, Excessive Heat	4.2	Medium	Town of Chapel Hill Office of Sustainability & Resilience	OWASA	2020-2025	Carried Forward	In progress. The Town continues to work closely with OWASA on water system interconnects.
SP-5	Coordinate with OWASA to limit the impacts of water supply leaks through infrastructure planning, maintenance and design.	Critical Infrastructure Failure	4.2	Medium	Town of Chapel Hill Office of Sustainability & Resilience	OWASA	2020-2025	Carried Forward	In progress. The Town continues to work closely with OWASA as it maintains and upgrades critical infrastructure.
SP-6	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Town of Chapel Hill Public Works	State grants, federal grants	2025-2030	New	
Emergency Services									
ES-1	Engage in regional events, activities, and training opportunities related to natural hazards in order to improve communication, enhance, partnerships, and improve planning efforts both within the Town and with other local jurisdictions.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	3.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town of Chapel Hill Office of Emergency Management (EM) routinely engages with emergency management services in surrounding jurisdictions and participates in joint meetings, planning sessions, and briefings with other agencies and jurisdictions. The Town has maintained an agreement for a countywide alert system.
ES-2	Identify and implement strategies to increase swift water rescue capacity.	Flooding, Hurricane & Tropical Storm, Tornadoes & Thunderstorms	3.1	Medium	Town of Chapel Hill - Fire Department	Emergency Management Performance Grant (EMPG)	2025-2030	Carried Forward	In Progress. The Town is part of the NC Task Force 8 Team assigned by the State of North Carolina and has certified several staff within the Fire Department for swift water rescue. The department will continue to advance this work going forward.
ES-3	Engage with regional and county stakeholders in comprehensive emergency response planning including Complex Coordinated Terror Attack response and Mass Casualty Incident response planning.	All Hazards	3.2	Medium	Town of Chapel Hill - Emergency Management Division	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Public safety agencies undergo regular training, and currently, all municipalities in the county are revising a comprehensive Emergency Operations Plan. This revision includes annexes addressing regional responses, mass casualty incidents (MCIs), and responses to terror attacks.
ES-4	Connect unhoused populations to services/resources during extreme temperatures.	Excessive Heat, Severe Winter Weather	2.2	Medium	Town of Chapel Hill Police Department (CARE team, Crisis Unit)	General Fund (existing staff salaries)	2025-2030	New	
Public Education & Awareness									
PEA-1	Encourage low-impact development for addressing stormwater quality and quantity concerns.	Flooding, Hurricane & Tropical Storm	1.2	Medium	Town of Chapel Hill - Planning Department	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Low Impact Design (LID) is encouraged throughout the Town. The central theme of these regulations is to encourage "low-impact design" that disperses pavement into small modules, and replicates the natural hydrological system of the site." LUMO Article 5 Design and Development Standards). The Town will explore ways of modernizing these and similar measures as part of rewriting of our land development regulations.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
PEA-2	Provide education and outreach to Chapel Hill residents in multiple languages in order to increase awareness of natural hazard potential in the town.	All Hazards	2.1	Medium	Town of Chapel Hill - Emergency Management Division and Communications and Public Affairs	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. The Town's community connections team conducts neighborhood-scale engagement throughout the year that includes information about hazards with translation services.
PEA-3	Strive to improve communication and outreach in multiple languages to Town of Chapel Hill residents before, during, and after hazard weather event with the county's website, press releases, social media accounts in order to keep residents informed and improve public safety in and around the Town.	All Hazards	2.1	Medium	Town of Chapel Hill - Emergency Management Division and Communications and Public Affairs	General Fund (existing staff salaries)	2025-2030	Carried Forward	In Progress. Unified hazardous weather messaging continues to be shared across multiple forms of social media and printed flyers as appropriate, and exploring the use of mass notification platforms and automated translation technologies continues.
PEA-4	Conduct periodic heat mapping to understand which parts of Chapel Hill are most vulnerable to excessive heat.	Excessive Heat	3.2	Medium	Town of Chapel Hill Office of Sustainability and Resilience and Technology Solutions	General Fund (existing staff salaries)	2025-2030	New	
PEA-5	Install water level and rain gauge sensors to provide early warning alerts for downstream flooding.	Flooding	2.2	High	Town of Chapel Hill Public Works, Office of Emergency Preparedness and Risk Management, Office of Sustainability and Resilience	General Fund (existing staff salaries), Stormwater Fees	2025-2030	New	
PEA-6	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	2.2	Medium	Town of Chapel Hill Office of Sustainability and Resilience in collaboration with Orange County	General Fund (existing staff salaries)	2025-2030	New	

Table C.22 – Mitigation Action Plan, Town of Hillsborough

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
Prevention									
P-1	Work with State efforts to study hydrology and maps/designate any new flood prone areas	Flooding	1.1	High	Town of Hillsborough Planning Department	N/A	2025-2030	Carry Forward	New flood maps and GIS maps were drawn for much of our jurisdiction as of 2017, but the northwest, south, and southwest areas of town continue to utilize 2007 FIRM panels.
P-2	Ensure public safety is prioritized through investing in building trust and legitimacy with the community	All Hazards	2.1	Medium	Town of Hillsborough Police Department	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-3	Coordinate with community organizations to prepare for and respond to emergencies together.	All Hazards	2.2	Medium	Town of Hillsborough Police Department, Communications	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-4	Ensure employee safety through regular maintenance of facilities and by establishing an open-door policy, conducting hazard assessments, and addressing staff concerns in a timely manner.	All Hazards	3.1	Medium	Safety and Risk Management	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-5	Revise the Urban Service Boundary to reflect a 2040 actual water and sewer capacity and availability with already identified improvement as well as incorporate preferred future land use and growth patterns.	Drought	1.1	High	Town of Hillsborough Water Distribution and Wastewater Collection, Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-6	Update the Water and Sewer Management, Planning and Boundary Agreement and Central Orange Coordinated Area Land Use Plan to reflect revisions represented in the Comprehensive Sustainability plan.	Drought	3.2	High	Town of Hillsborough Water Distribution and Wastewater Collection, Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-7	Rewrite the Unified Development Ordinance to reflect current development trends and patterns to incorporate sustainability, environmental and climate best practices, economic resiliency measures, and equity in development and redevelopment as well as meet water and sewer system-wide needs. Incorporate additional hazard mitigation measures in the new UDO.	All Hazards	1.1, 1.2, 4.1	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023. This action has been updated here to reflect the Town's ongoing UDO rewrite, which is scheduled to conclude in 2027.
P-8	In the UDO rewrite, ensure development review processes are clear, responsive, predictable, and equitable while ensuring flexibility within design. Include requirement to obtain capacity assurance and Water and Sewer Extension Contract prior to rezoning or annexation requests.	Drought	1.1	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-9	Clarify the roles and responsibilities of internal town department reviewers, appointed boards, and the town board in the development review process. Evaluate building staff capacity by transferring floodplain administration to Stormwater and Environmental Services.	All Hazards	4.3	Medium	Town of Hillsborough Planning and Economic Development, Administrative Services, and Town Board	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023. This action has been updated here to reflect internal discussions regarding floodplain administration.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-10	Update Town drought policy and monitor drought conditions to best protect water supplies.	Drought	1.1, 1.2	Medium	Town of Hillsborough Stormwater and Environmental Services, Water Distribution and Wastewater Collection	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-11	Develop and adopt reforestation plans for town-owned and town-maintained properties.	All Hazards	1.1	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-12	Develop and adopt forest management plans and policies for town-owned and maintained properties.	All Hazards	1.1	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-13	Map critical environmental and sensitive areas and significant landforms, such as slopes, ridges, streams, and wetlands, to inform other plans and development decisions.	All Hazards	1.1	Medium	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-14	Develop and adopt a green infrastructure policy for town projects	All Hazards	1.2	High	Town of Hillsborough Public Space and Sustainability, Public Works	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-15	Develop and adopt a tree preservation policy for town-owned and town-maintained properties.	All Hazards	1.1	High	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-16	Advocate for and endorse regulations that advance best management practices for development projects.	Flooding	1.2	Medium	Town of Hillsborough Planning and Economic Development, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-17	Employ land suitability analysis to guide built environment policy and development decisions.	All Hazards	1.1, 1.2	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-18	Develop and adopt regulations that limit development to slopes that are 3 to 1 or gentler.	Landslide	1.1	Medium	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-19	Update recommended and prohibited plants list to incorporate drought-tolerant, deer resistant, and climate hardy species.	Drought, Excessive Heat	2.1	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-20	Assess renewable energy generation potential (i.e., generating capacity) for solar photovoltaics and wind energy projects on town-owned properties and identify priority sites for planning and implementation.	Critical Infrastructure Failure	4.2	High	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-21	Implement a water conservation and efficiency program marketed towards residents and local businesses with the aim of reducing water treatment loads and associated energy use.	Drought	2.1	Medium	Town of Hillsborough Public Space and Sustainability, Utilities	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
P-22	Evaluate best practices for resilient power, such as backup generation sources, fuel, micro-grids, telecommunications, and emergency service providers. Prepare a community-wide GHG emissions inventory to understand how to reduce emissions associated with the broad set of activities occurring within town's jurisdictional boundary (e.g., energy consumption in residential buildings, on-road transportation, waste generation).	Critical Infrastructure Failure	4.2	Medium	Town of Hillsborough Public Space and Sustainability, Public Works, Utilities, Police, Fire	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
P-23	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Investigate opportunities and incorporate to the greatest extent possible sustainability and climate initiatives in facility development including geothermal, solar, weatherization, and green infrastructure.	All Hazards	1.2, 4.2	Medium	Town of Hillsborough Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
PP-2	For on-site renewable energy generation, explore the feasibility of energy storage systems (e.g., solar PV plus battery storage).	Critical Infrastructure Failure	4-2	High	Town of Hillsborough Public Space and Sustainability, Public Works	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
PP-3	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	Flooding	4.2	Medium	Town of Hillsborough Stormwater and Environmental Services, Planning and Economic Development	Local, State grants, Federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Implement green infrastructure projects on town-owned and town-maintained properties.	All Hazards	4.1	Medium	Town of Hillsborough Public Space and Sustainability, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-2	Support floodplain reclamation projects.	Flooding	4.1	Medium	Town of Hillsborough Stormwater and Environmental Services, Planning and Economic Development	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-3	Investigate opportunities to restore the Eno River to its natural channel in Gold Park.	Flooding	4.1	Medium	Town of Hillsborough Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-4	Develop a rainwater harvesting or rain barrel cost-sharing program.	Drought, Flooding	2.1	Medium	Town of Hillsborough Public Space and Sustainability, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
NRP-5	Coordinate with housing partners to incorporate green infrastructure and best management practices into housing developments and property management policies.	Flooding	1.2	Medium	Town of Hillsborough Planning and Economic Development, Stormwater and Environmental Services	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency/Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Implementation Status Comments
NRP-6	Develop and adopt incentives to expand the use of green infrastructure (such as bioswales, rain gardens, and green roofs) for development sites.	Drought, Excessive Heat, Flooding	1.2	High	Town of Hillsborough Planning and Economic Development	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
Structural Projects									
SP-1	Relocate the Public Works operation to a non-floodprone site. This is a sizable project and is expected to be completed in the next 5-7 years.	Flooding	4.2	Medium	Town of Hillsborough Public Works Department	Town Budget	2025-2026	Carry Forward	This was originally budgeted for a contract for the 2016-2017 budget cycle. The Public Works department is slated to move to the Town's NC Hwy 86 N facility, but now with construction expected to begin in summer 2025.
SP-2	Develop and implement a capital improvement projects plan for stormwater infrastructure improvements.	Flooding	1.1, 1.2	High	Town of Hillsborough Stormwater and Environmental Services, Public Space and Sustainability	Town Budget	2025-2027	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
Emergency Services									
ES-1	Provide public Wi-Fi in town parks and at town facilities.	Critical Infrastructure Failure, Cyber Threat	2.2	Medium	Information Technology	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
ES-2	Coordinate with organizations and agencies to expand access to high-speed internet.	Critical Infrastructure Failure, Cyber Threat	2.2	Medium	Information Technology	Town Budget	2025-2030	New	Recommended Action in Hillsborough Comprehensive Sustainability Plan (2030) adopted June 12, 2023.
ES-3	Explore a box fan giveaway program for residents without central air conditioning.	Excessive Heat	2.1, 2.2	Medium	Town of Hillsborough	General Fund (existing staff salaries)	2025-2030	New	
Public Education & Awareness									
PEA-1	Develop and begin implementing a countywide Heat Action Plan.	Excessive Heat	3.2	Medium	Town of Hillsborough Administration in collaboration with Orange County	General Fund (existing staff salaries)	2025-2030	New	

ANNEX D. PERSON COUNTY

D.1 ASSET INVENTORY

Person County and the HMPC provided a local inventory of critical facilities and community lifelines, which are a priority for mitigation planning and emergency management. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Table D.1 and Table D.2 provide a count of critical facilities by FEMA lifeline category by jurisdiction in Person County. Figure C.1 through Figure C.4 show the locations of all critical facilities by jurisdiction in Person County.

Table D.3 provides a detailed inventory of the critical facilities in Person County, indicating each facility's FEMA lifeline category, flood zone, 1% annual chance flood depth, and wildfire. More information on hazard vulnerability is provided in the hazard profiles.

Table D.1 – Critical Facilities by Type, Unincorporated Person County

Facility Type	Count of Facility Type	Structure Value
Communications	0	$-
Energy	5	$635,020
Food, Hydration, Shelter	1	$177,716
Hazardous Materials	0	$-
Health and Medical	1	$894,681
Safety and Security	11	$1,138,607
Transportation	1	$8,426,125
Water Systems	3	$1,493,129
Total	**22**	**$12,765,278**

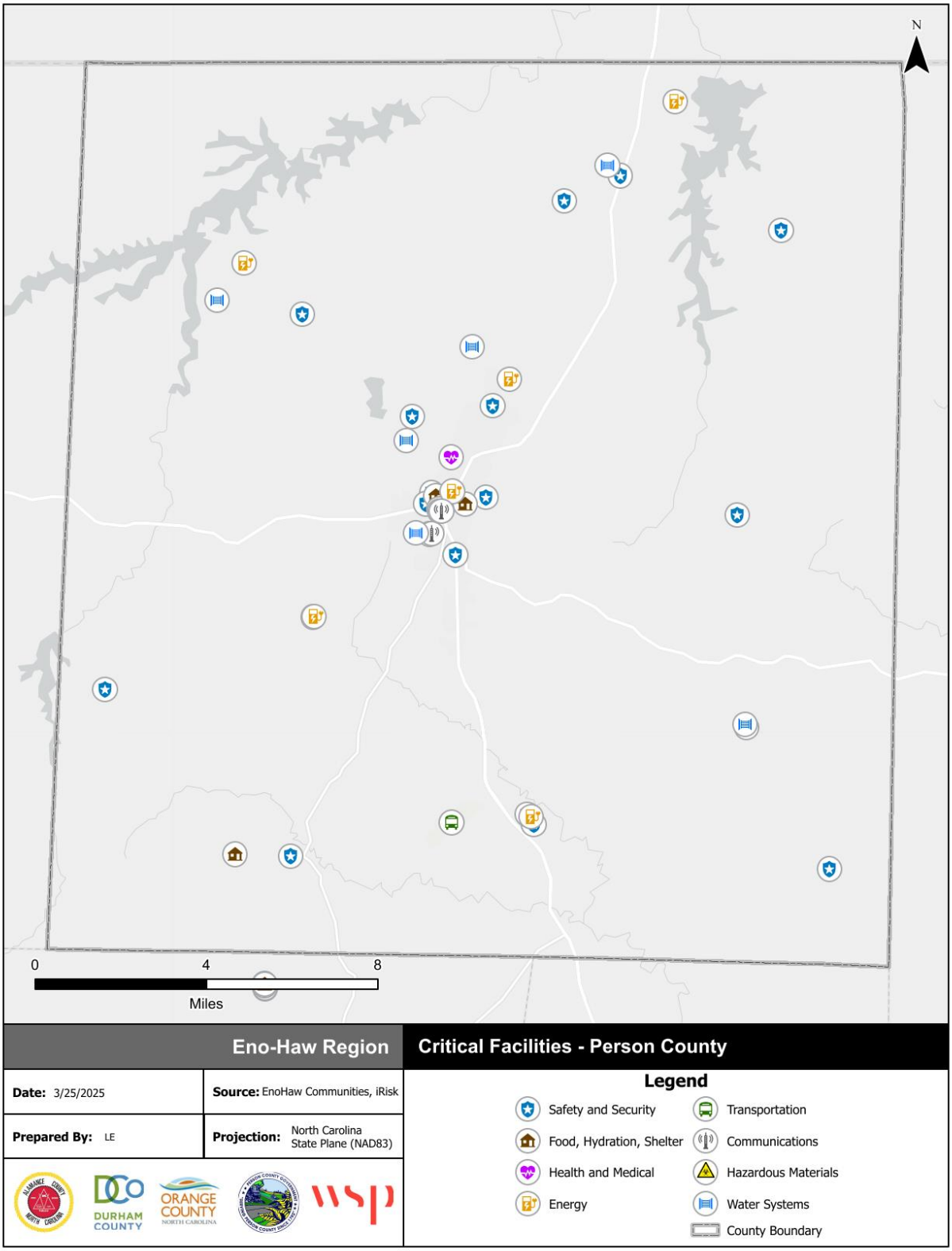
Source: Person County, HMPC

Table D.2 – Critical Facilities by Type, City of Roxboro

Facility Type	Count of Facility Type	Structure Value
Communications	3	$622,930
Energy	1	$607,465
Food, Hydration, Shelter	2	$6,086,670
Hazardous Materials	0	$-
Health and Medical	3	$21,865,626
Safety and Security	12	$11,511,759
Transportation	0	$-
Water Systems	3	$1,895,136
Total	**24**	**$42,589,586**

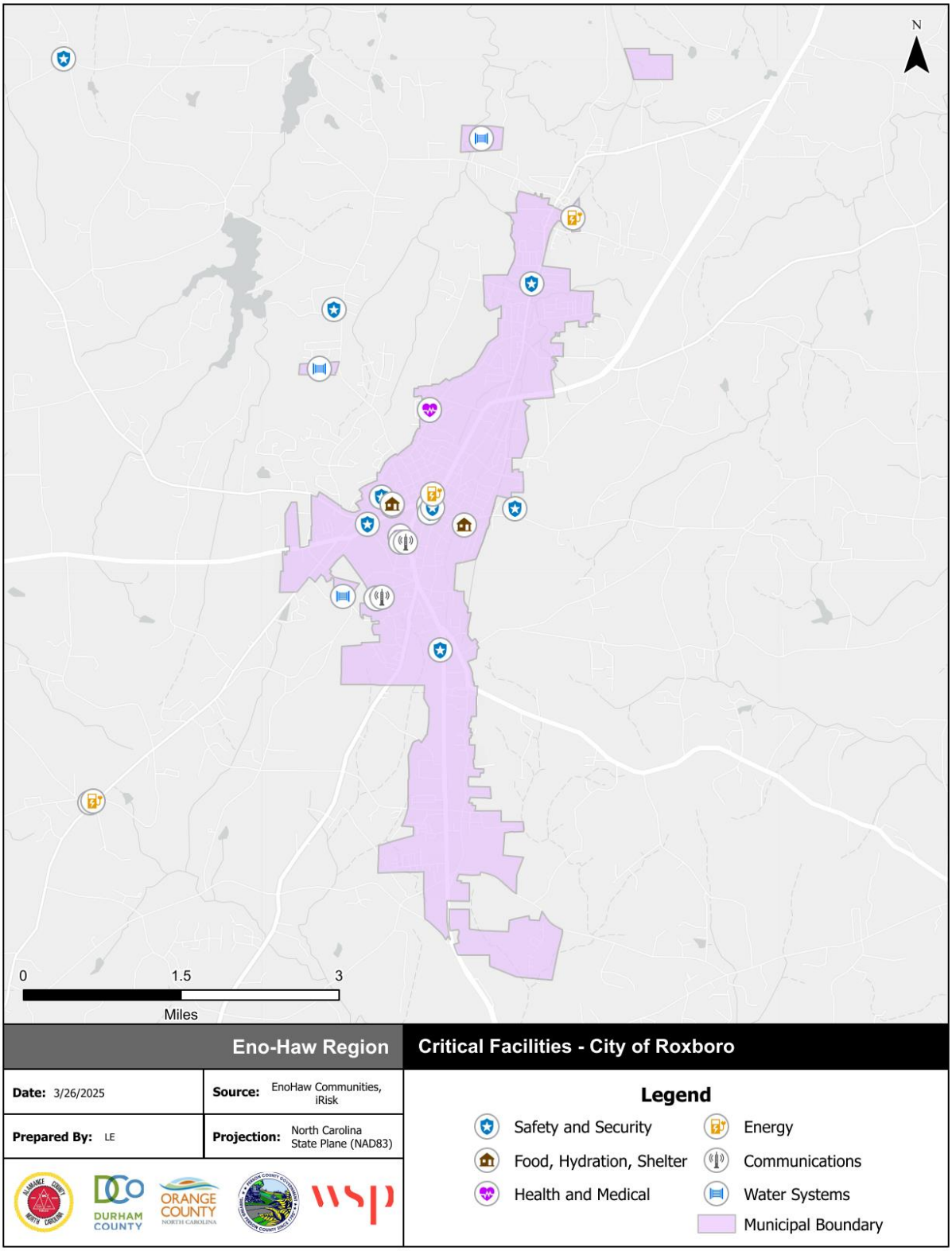
Source: Person County, HMPC

Figure D.1 – Critical Facilities, Unincorporated Person County



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Figure D.2 – Critical Facilities, City of Roxboro



Source: NCEM IRISK Database, HMPC input, GIS Analysis

Table D.3 – Person County Critical Facilities Inventory

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
City of Roxboro							
Food, Hydration, Shelter	School	304 SOUTH MORGAN STREET, ROXBORO, NC, 27573	$1,311,446.00	NA	X, Unshaded	Y	0
Health and Medical	Hospital	615 RIDGE ROAD, ROXBORO, NC, 27573	$14,080,411.00	NA	X, Unshaded	Y	0
Safety and Security	Emergency Operations Center	216 WEST BARDEN STREET, ROXBORO, NC, 27573	$308,934.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	School	115 LAKE DRIVE, ROXBORO, NC, 27573	$4,775,224.00	NA	X, Unshaded	Y	0
Water Systems	Treatment Plant	1599 CHUB LAKE RD	$919,905.00	NA	X, Unshaded		3
Water Systems	Treatment Plant	902 CAVEL CHUB LAKE RD	$975,231.00	NA	X, Unshaded		1.5
Health and Medical	Municipal	303 S MADISON BLVD	$7,476,281.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	105 S LAMAR ST	$443,558.00	NA	X, Unshaded	Y	0
Communications	Municipal	323 HILL ST	-	NA	X, Unshaded		0
Communications	Municipal	204 W BARDEN ST	$267,580.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	2130 CHUB LAKE RD	$594,027.00	NA	X, Unshaded		0
Safety and Security	Municipal	425 LONG AVE	$1,712,784.00	NA	X, Unshaded		3
Safety and Security	Municipal	304 S MORGAN ST	$1,311,446.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	779 MOUNTAIN RD	$1,038,645.00	NA	X, Unshaded	Y	0
Safety and Security	Municipal	120 COURT ST	$3,231,692.00	NA	X, Unshaded	Y	0
Energy	Fuel Station	207 MADISON BLVD	$607,465.00	1.33	AE	Y	0
Safety and Security	Fire Station	1051 DURHAM RD	$109,023.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	105 S LAMAR ST	$443,558.00	NA	X, Unshaded	Y	0
Communications	Communications	700 FRANKLIN ST	$355,350.00	NA	X, Unshaded	Y	0
Health and Medical	EMS	216 W BARDEN ST	$308,934.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	LEASBURG RD	$260,684.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	N MAIN ST	$328,500.00	NA	X, Unshaded	Y	0
Safety and Security	Police Station	109 S LAMAR ST	$1,728,908.00	NA	X, Unshaded	Y	0
Water Systems	Utility	WESLEYAN HEIGHTS RD	-	NA	X, Unshaded		2

FEMA Lifeline	Facility Type	Address	Structure Value	Flood Depth	Flood Zone	High WUI Exposure	Fire Intensity
Unincorporated Person County							
Safety and Security	Police Station	3434 BURLINGTON ROAD, ROXBORO, NC, 27574	$184,616.00	NA	X, Unshaded	Y	0
Food, Hydration, Shelter	Hog Farm	134 TED MOORE DRIVE, HURDLE MILLS, NC, 27541	$177,716.00	NA	X, Unshaded	Y	0
Energy	Fuel Station	3400 BURLINGTON RD	$79,638.00	NA	X, Unshaded	Y	0
Energy	Fuel Station	411 HELENA MORIAH RD	$203,229.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1291 CONCORD CEFFO RD	$173,838.00	NA	X, Unshaded		0
Safety and Security	Fire Station	UNION GROVE CHURCH RD	-	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	1215 SHILOH CHURCH RD	$82,865.00	NA	X, Unshaded		3
Health and Medical	EMS	295 HELENA MORIAH RD	$894,681.00	NA	X, Unshaded	Y	0
Safety and Security	Fire Station	350 ASHLEY AVE	$156,175.00	NA	X, Unshaded	Y	2
Safety and Security	Fire Station	1344 DENNYS STORE RD	$121,103.00	NA	X, Unshaded		3
Safety and Security	Fire Station	1879 MOUNT HARMONY CHURCH RD	$59,007.00	NA	X, Unshaded		0
Safety and Security	Fire Station	5939 HESTERS STORE RD	$78,309.00	NA	X, Unshaded		2
Safety and Security	Fire Station	185 OLIVE BRANCH RD	$142,571.00	NA	X, Unshaded		2
Safety and Security	Fire Station	6005 MOUNT HARMONY CHURCH RD	$70,999.00	NA	X, Unshaded		1
Transportation	Transportation	385 Montgomery Dr, Timberlake, NC 27583	$8,426,125.00	NA	X, Unshaded		0
Water Systems	Utility	MOUNT HARMONY CHURCH RD	$41,515.00	NA	X, Unshaded		3
Water Systems	Utility	SEMORA RD	$1,451,614.00	NA	X, Unshaded		3
Energy	Substation	331 ALLIE CLAY RD	$352,153.00	NA	X, Unshaded	Y	0
Energy	Substation	DUNNAWAY RD	-	NA	X, Unshaded		0
Safety and Security	Fire Station	9379 BOSTON RD	$69,124.00	NA	X, Unshaded		1.5
Water Systems	Utility	188 CLAUDE HALL RD	-	NA	X, Unshaded		1.5
Energy	Substation	MAYO CREEK	-	NA	X, Unshaded	Y	0

D.2 RISK ASSESSMENT

This section contains a summary of the County's asset inventory as well as hazard profile and vulnerability assessment for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Dam Failure, Flood, and Wildfire.

D.2.1 DAM FAILURE

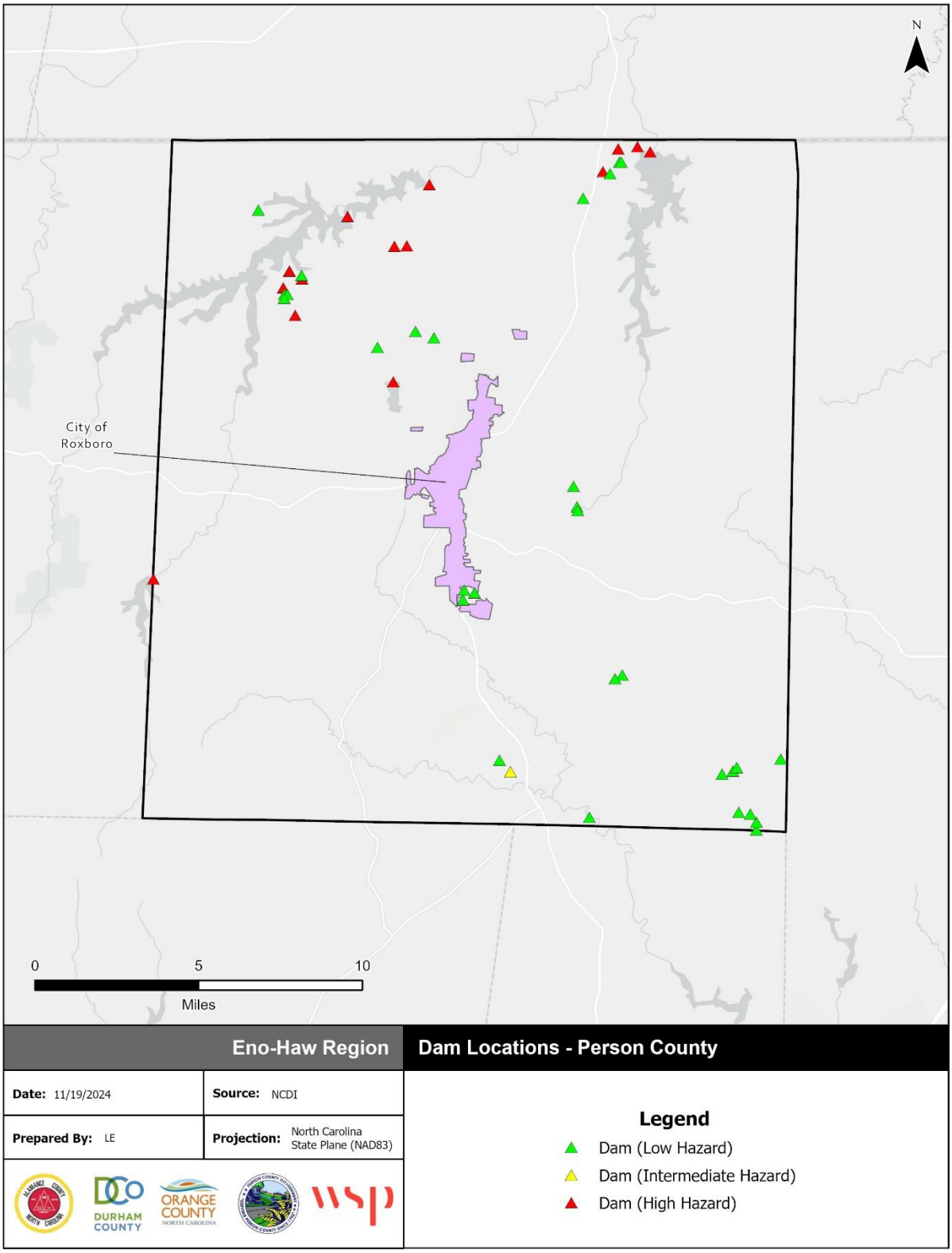
Table D.4 lists all high hazard dams located in unincorporated Person County that have been identified by the North Carolina Dam Inventory with a condition assessment of "fair" or "poor." Note that there are currently no high hazard dams located in Person County with a condition assessment of "poor." Figure D.3 and Figure D.4 show the location of all dams by jurisdiction in Person County.

Table D.4 – High Hazard Dams in Unincorporated Orange County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Lake Hyco Dam	NC00656	Fair	160000	McGehees Mill
Roxboro Municipal Lake Dam	NC00658	Fair	4125	Olive Hill
Roxboro Afterbay Dam	NC00666	Fair	27000	Denniston
South Hyco Lake Dam	NC03689	Fair	9400	N/A
Mayo Active Ash Basin Dam	NC06003	Fair	1921	N/A
Roxboro West Ash Basin Dam	NC06006	Fair	5567	N/A
Roxboro West Ash Basin Rock Filter Dam	NC06007	Fair	5567	N/A
Jimmie Bowes Transmission Line Dam	NC06016	Fair	-	N/A

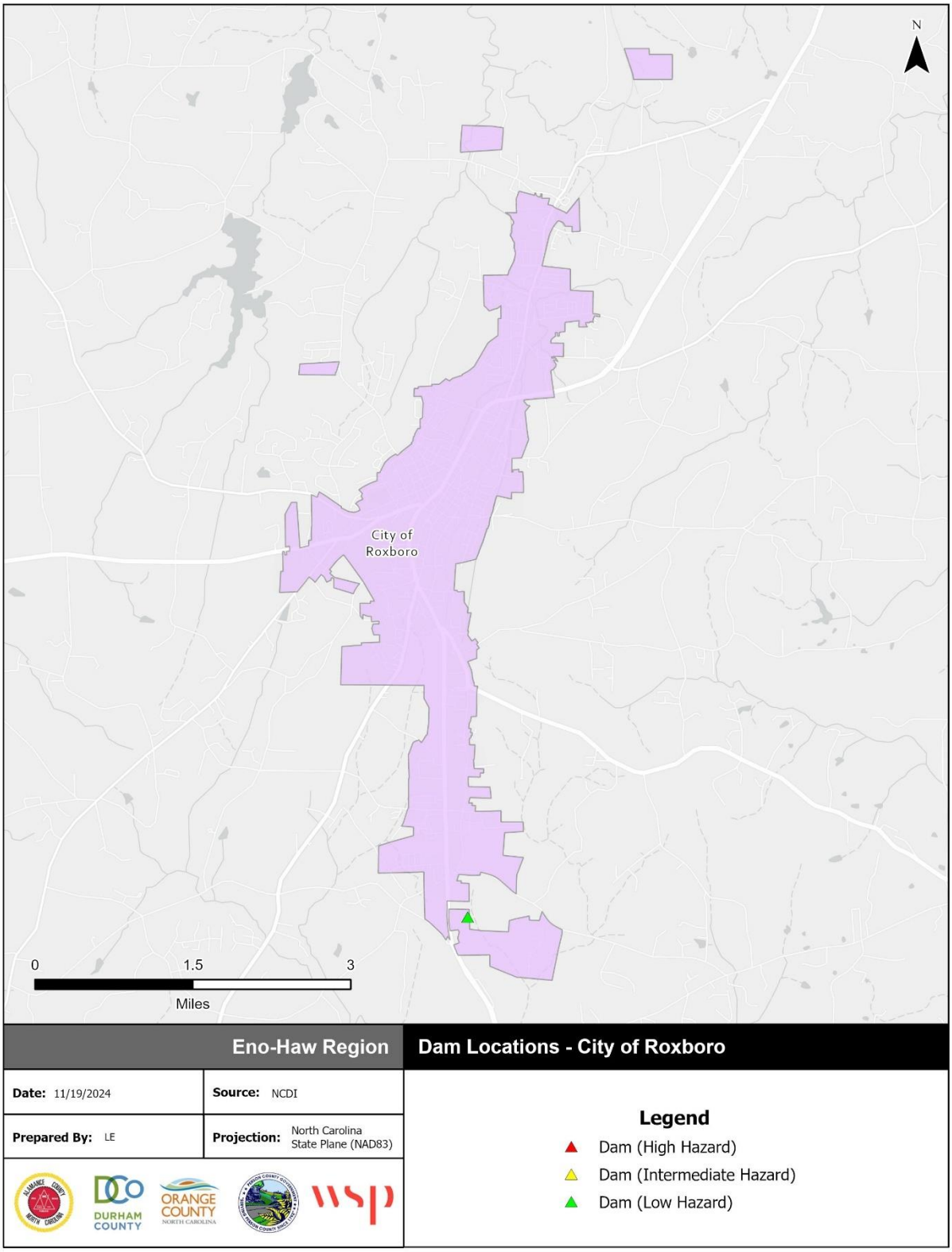
Source: NC Dam Inventory, November 2024

Figure D.3 – Dam Inventory, Unincorporated Person County



Source: NC Dam Inventory, November 2024

Figure D.4 – Dam Inventory, City of Roxboro



Source: NC Dam Inventory, November 2024

D.2.2 FLOODING

Table D.5 details the acreage of Person County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, the City of Roxboro has 0.1 percent of its land area within the mapped 1%-annual-chance floodplain while the total of unincorporated Durham County has 0.6 percent. Overall, 0.1 percent of the total land in the county is within the mapped 1%-annual-chance floodplain.

Table D.5 – Flood Zone Acreage by Jurisdiction, Person County

Flood Zone	Acreage	Percent of Total (%)
Unincorporated Person County		
Zone AE	15,692.2	6.2
Zone X (500-year)	272.1	0.1
Zone X Unshaded	238,101.7	93.7
Total	254,066.0	--
City of Roxboro		
Zone AE	150.4	3.3
Zone X (500-year)	25.0	0.6
Zone X Unshaded	4,338.1	96.1
Total	4,513.5	--
County Total	**258,579.5**	--

Source: FEMA Effective DFIRM

Figure D.5 and Figure D.6 reflects the effective mapped flood hazard zones for Person County, and Figure D.7 and Figure D.8 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

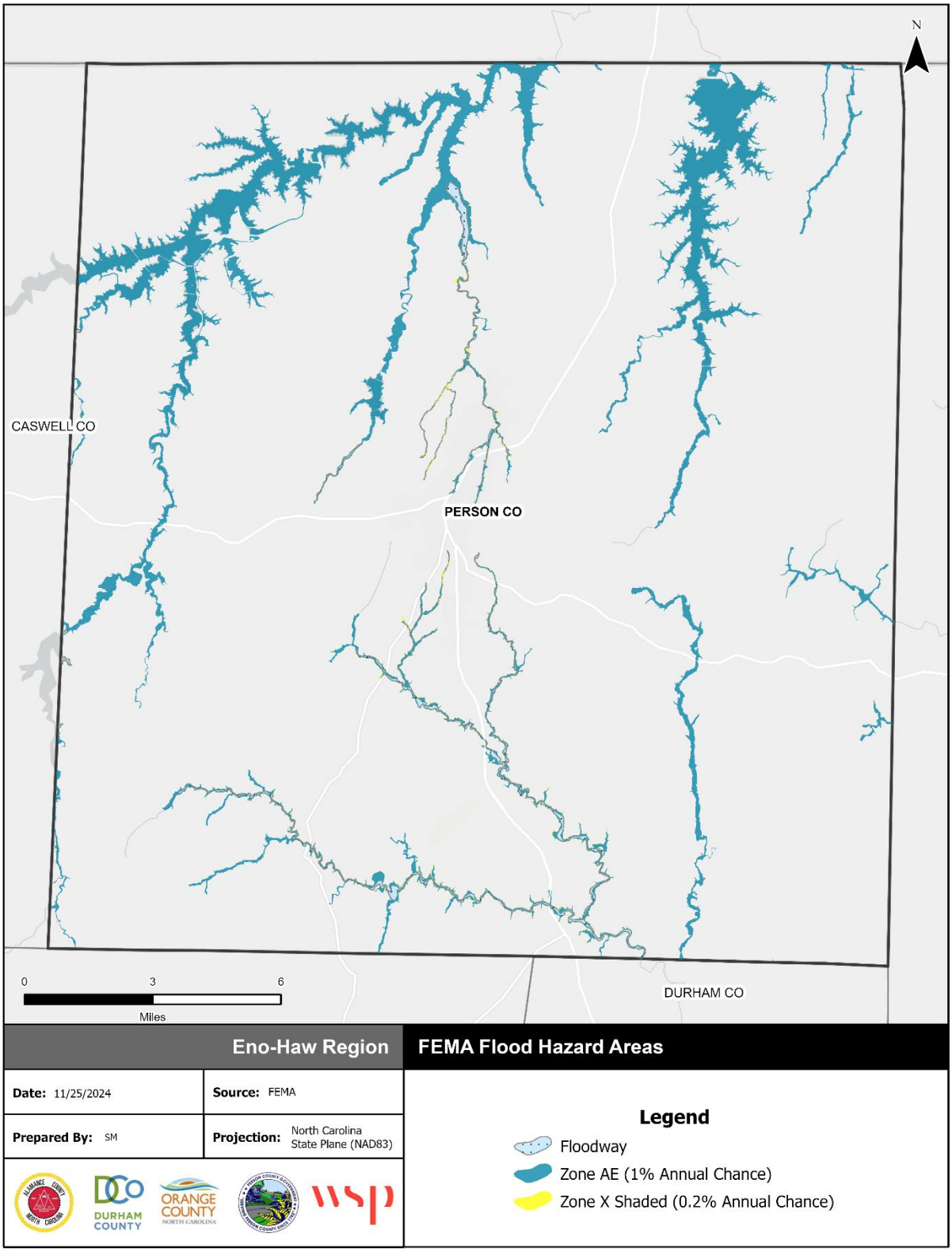
Table D.6 provides building counts and values for critical facilities by flood zone in Person County and participating jurisdictions.

Table D.6 – Critical Facilities Exposed to Flooding, Person County

Flood Zone	Critical Facility Count	Structure Value
Unincorporated Person County		
Zone AE	0	$-
Zone X (500-year)	0	$-
Zone X Unshaded	22	$12,765,278
Total	**22**	**$12,765,278**
City of Roxboro		
Zone AE	1	$607,465
Zone X (500-year)	0	$-
Zone X Unshaded	23	$41,982,121
Total	**24**	**$42,589,586**
Person County Total		
Zone AE	1	$607,465
Zone X (500-year)	0	$-
Zone X Unshaded	45	$54,747,399
County Total	**46**	**$55,354,864**

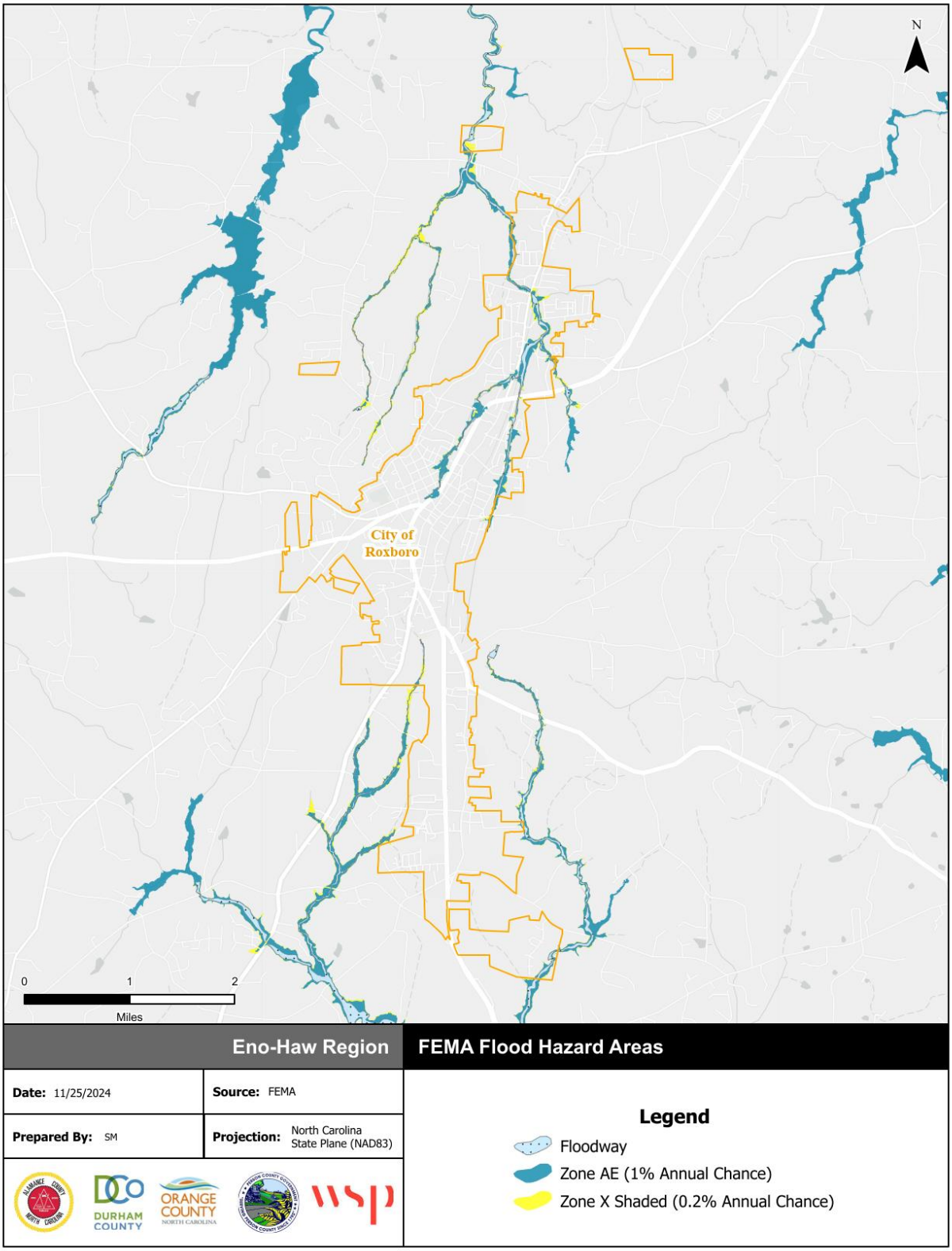
Source: FEMA Effective DFIRM, HMPC

Figure D.5 – FEMA Flood Hazard Areas, Person County



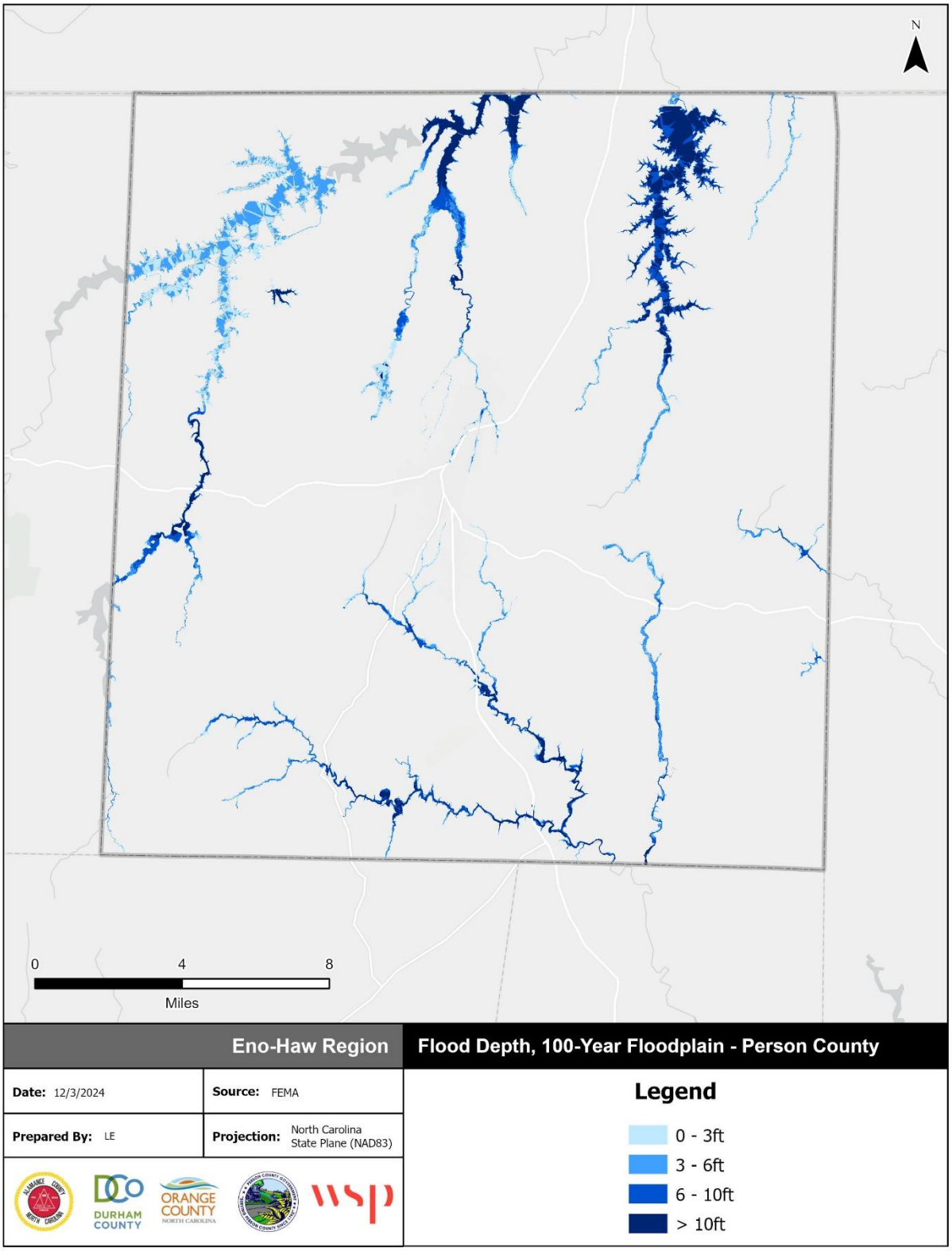
Source: FEMA Effective DFIRM

Figure D.6 – FEMA Flood Hazard Areas, City of Roxboro



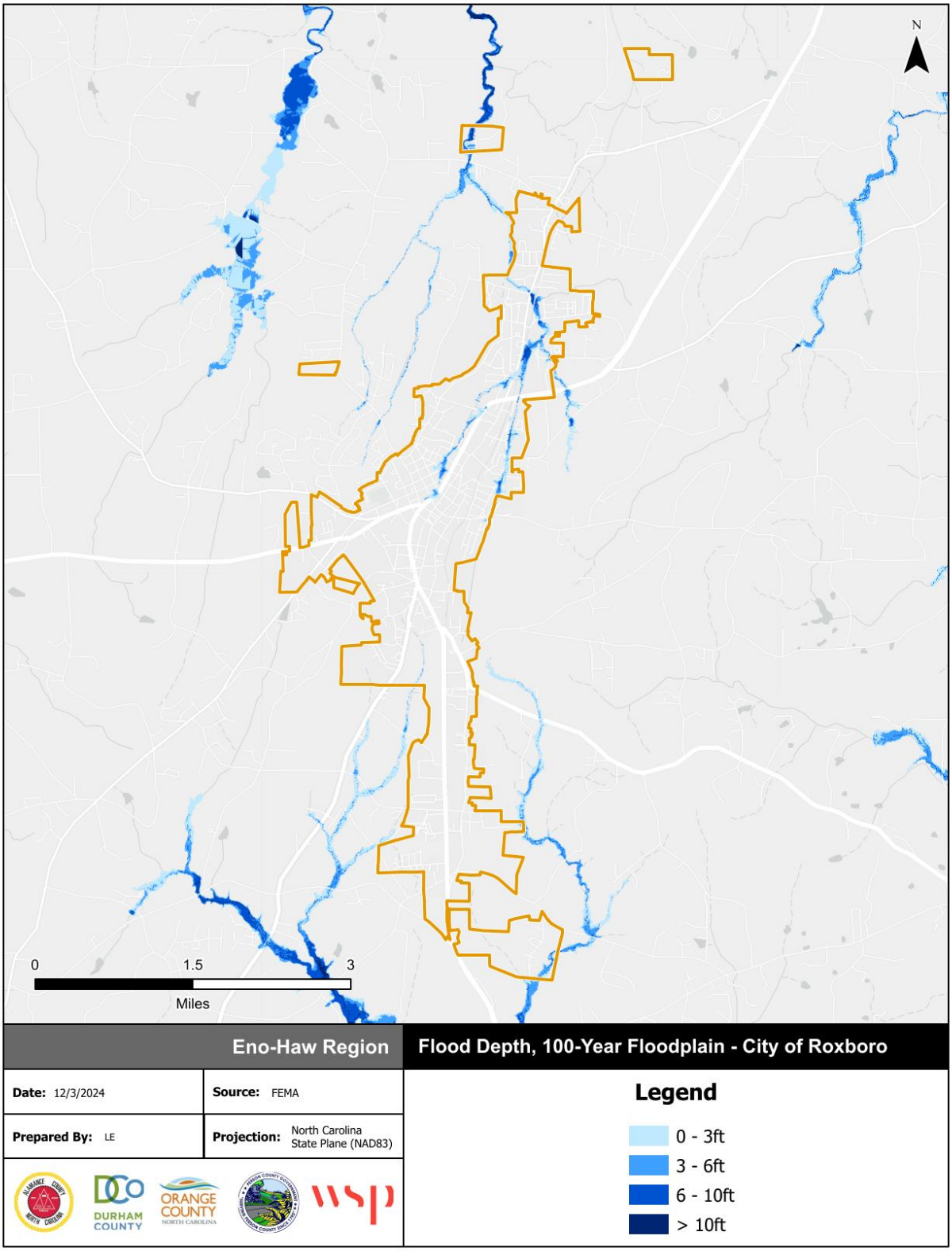
Source: FEMA Effective DFIRM

Figure D.7 – Flood Depth, 1%-Annual-Chance Floodplain, Person County



Source: FEMA Effective DFIRM

Figure D.8 – Flood Depth, 1%-Annual-Chance Floodplain, City of Roxboro



Source: FEMA Effective DFIRM

D.2.2.1 *FLOOD INSURANCE DATA*

The following tables reflect NFIP policy and claims data for the County and incorporated jurisdictions categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table D.7 – NFIP Program Entry Dates

Community	Regular Program Entry	Emergency Program Entry
Person County	9/14/1990	3/12/1990
City of Roxboro	3/25/1991	-

Source: FEMA Community Information System

Table D.8 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Person County					
Single Family	10	$8,404	$2,936,000	4	$8,356.96
Total	**10**	**$8,404**	**$2,936,000**	**4**	**$8,356.96**
City of Roxboro					
Single Family	0	$0	$0	2	$24,521.54
Non-Residential	3	$5,656	$1,502,000	0	$0.00
Total	**3**	**$5,656**	**$1,502,000**	**2**	**$24,521.54**

Source: FEMA Community Information System, accessed April 2025

Table D.9 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Person County					
A01-30 & AE Zones	1	$2,246	$136,000	1	$0.00
B, C & X Zone					
Standard	9	$6,158	$2,800,000	0	$0.00
Preferred	0	$0	$0	3	$8,356.96
Total	**10**	**$8,404**	**$2,936,000**	**4**	**$8,356.96**
City of Roxboro					
A01-30 & AE Zones	3	$5,656	$1,502,000	2	$24,521.54
Total	3	$5,656	$1,502,000	2	$24,521.54

Source: FEMA Community Information System, accessed April 2025

Table D.10 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Person County					
A01-30 & AE Zones	1	$2,246	$136,000	1	$0.00
B, C & X Zone	4	$2,644	$1,400,000	0	$0.00
Standard	4	$2,644	$1,400,000	0	$0.00
Total	**5**	**$4,890**	**$1,536,000**	**1**	**$0.00**

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
City of Roxboro					
A01-30 & AE Zones	2	$4,243	$1,153,000	2	$24,521.54
Total	**2**	**$4,243**	**$1,153,000**	**2**	**$24,521.54**

Source: FEMA Community Information System, accessed April 2025

Table D.11 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Person County					
B, C & X Zone	5	$3,514	$1,400,000	3	$8,356.96
Standard	5	$3,514	$1,400,000	0	$0.00
Preferred	0	$0	$0	3	$8,356.96
Total	**5**	**$3,514**	**$1,400,000**	**3**	**$8,356.96**
City of Roxboro					
A01-30 & AE Zones	1	$1,413	$349,000	0	$0.00
Total	**1**	**$1,413**	**$349,000**	**0**	**$0.00**

Source: FEMA Community Information System, accessed April 2025

D.2.3 WILDFIRE

Table D.12 summarizes the acreage in Person County that falls within the Functional Wildland Urban Interface (WUI), categorized into zones that describe the wildfire risk mitigation activities appropriate for each zone. Areas in the Functional WUI are those areas where development and building structures may intermix with burnable land cover. Approximately, 16 percent of Person County is categorized as having direct exposure to wildfire risk within the Functional WUI.

Table D.12 – Functional Wildland Urban Interface Acreage, Person County

	Functional Wildland Urban Interface (WUI) Category	Acres	Percent
	Direct Exposure	41,493	16%
	Indirect Exposure	8,744	3%
	Critical Fireshed	132,034	51%
	Sources of Ember Load to Buildings	68,385	26%
	Little to No Exposure	0	0%
	Water	8,151	3%
	Total	**258,806**	**100%**

Source: Southern Wildfire Risk Assessment

Figure D.9 and Figure D.10 depict the Functional WUI with the location of critical facilities for unincorporated Durham County and all participating jurisdictions. Figure D.11 and Figure D.12 depict the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure D.13 and Figure D.14 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Functional WUI areas with direct exposure to wildfire are distributed throughout the county with some larger gaps in development in the northern part of the county. Burn probability is low throughout the county with clusters of slightly elevated burn probability in the northwestern corner of the county and east of Roxboro. Potential fire intensity is low to moderate across much of Person County with a few clusters of moderate to high fire intensity in unincorporated areas surrounding the City of Roxboro.

Table D.13 and Table D.14 provides building counts and values for critical facilities by FEMA lifeline that are located in areas categorized with direct exposure to wildfire risk on the Functional WUI scale.

Table D.13 – Critical Facilities Exposed to Wildfire, Unincorporated Person County

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	10	$1,548,018
Transportation	0	$-
Water Systems	1	$41,515
Total	**11**	**$1,589,533**

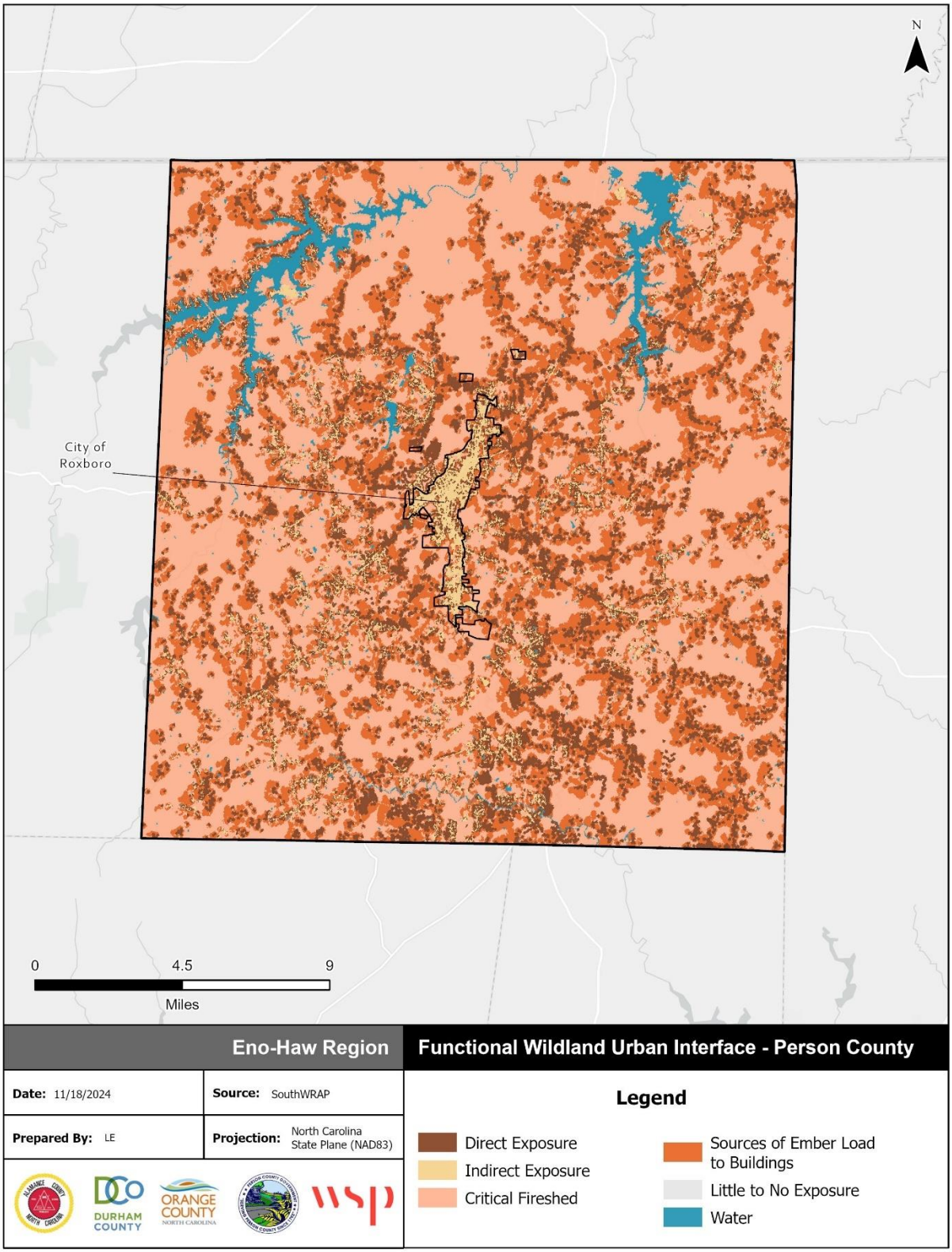
Source: Southern Wildfire Risk Assessment

Table D.14 – Critical Facilities Exposed to Wildfire, City of Roxboro

Type	Critical Facility Count	Structure Value
Communications	0	$-
Energy	0	$-
Food, Hydration, Shelter	0	$-
Hazardous Materials	0	$-
Health and Medical	0	$-
Safety and Security	1	$1,712,784
Transportation	0	$-
Water Systems	1	$975,231
Total	**2**	**$2,688,015**

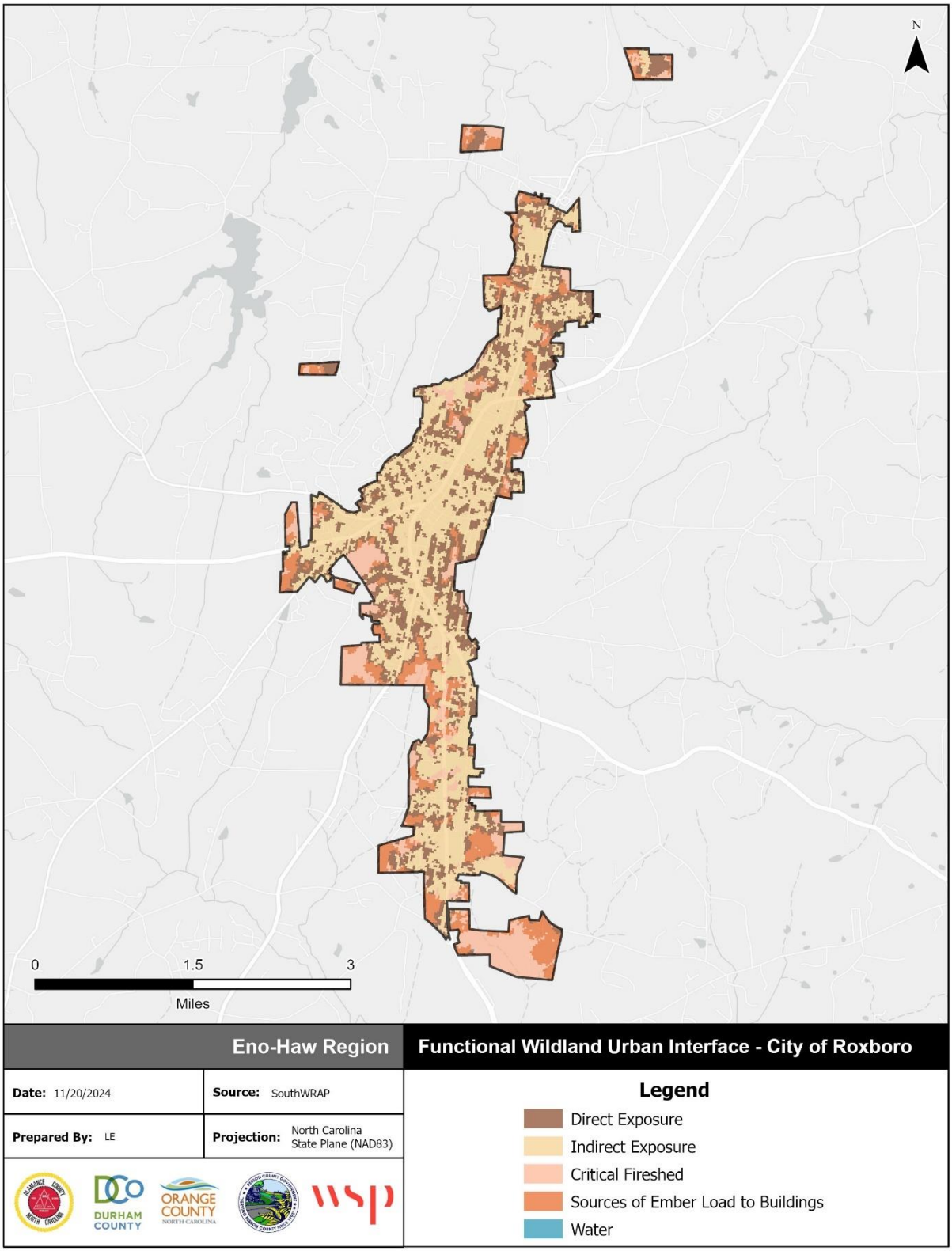
Source: Southern Wildfire Risk Assessment

Figure D.9 – Functional Wildland Urban Interface, Unincorporated Person County



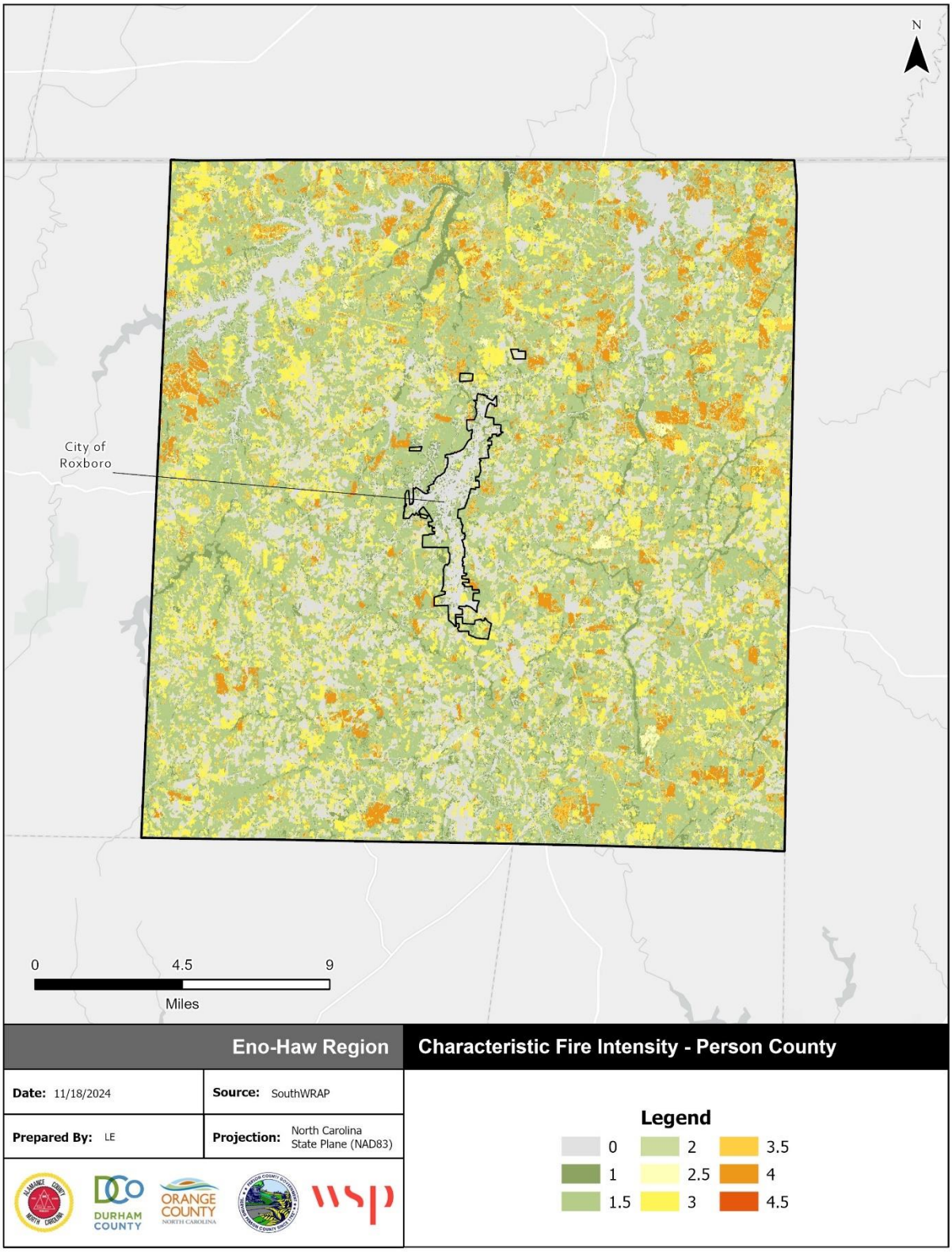
Source: Southern Wildfire Risk Assessment

Figure D.10 – Functional Wildland Urban Interface, City of Roxboro



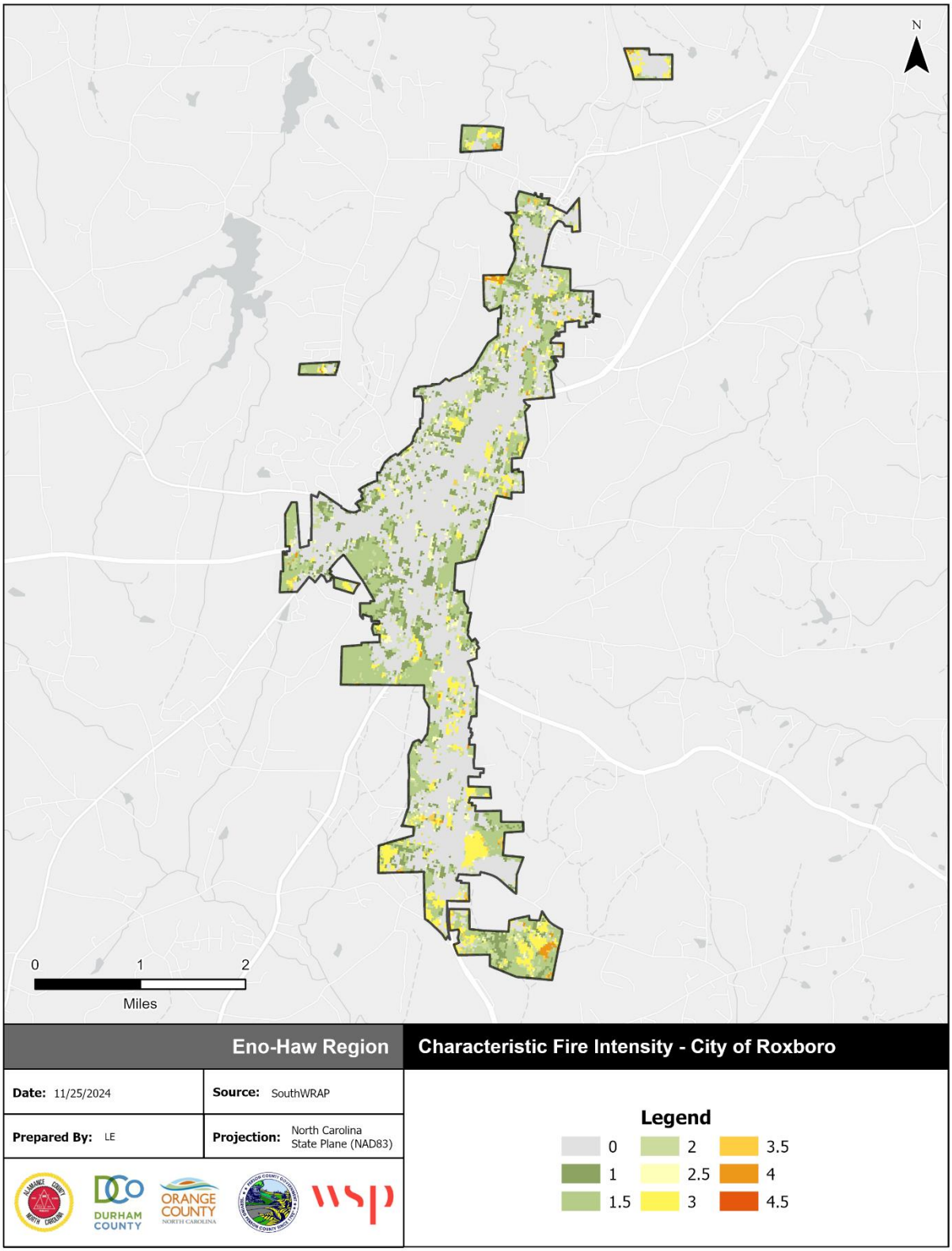
Source: Southern Wildfire Risk Assessment

Figure D.11 – Characteristic Fire Intensity, Unincorporated Person County



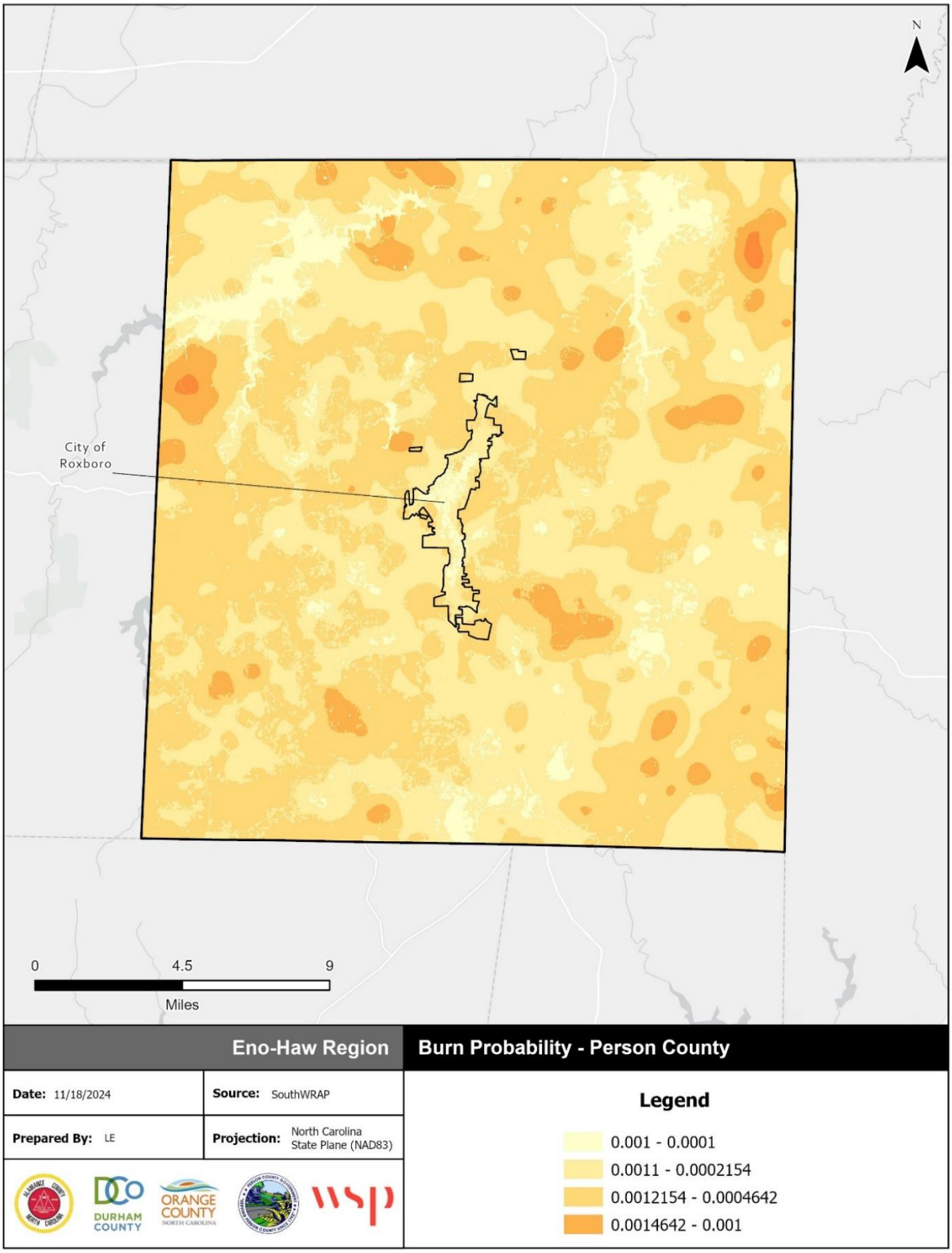
Source: Southern Wildfire Risk Assessment

Figure D.12 – Characteristic Fire Intensity, City of Roxboro



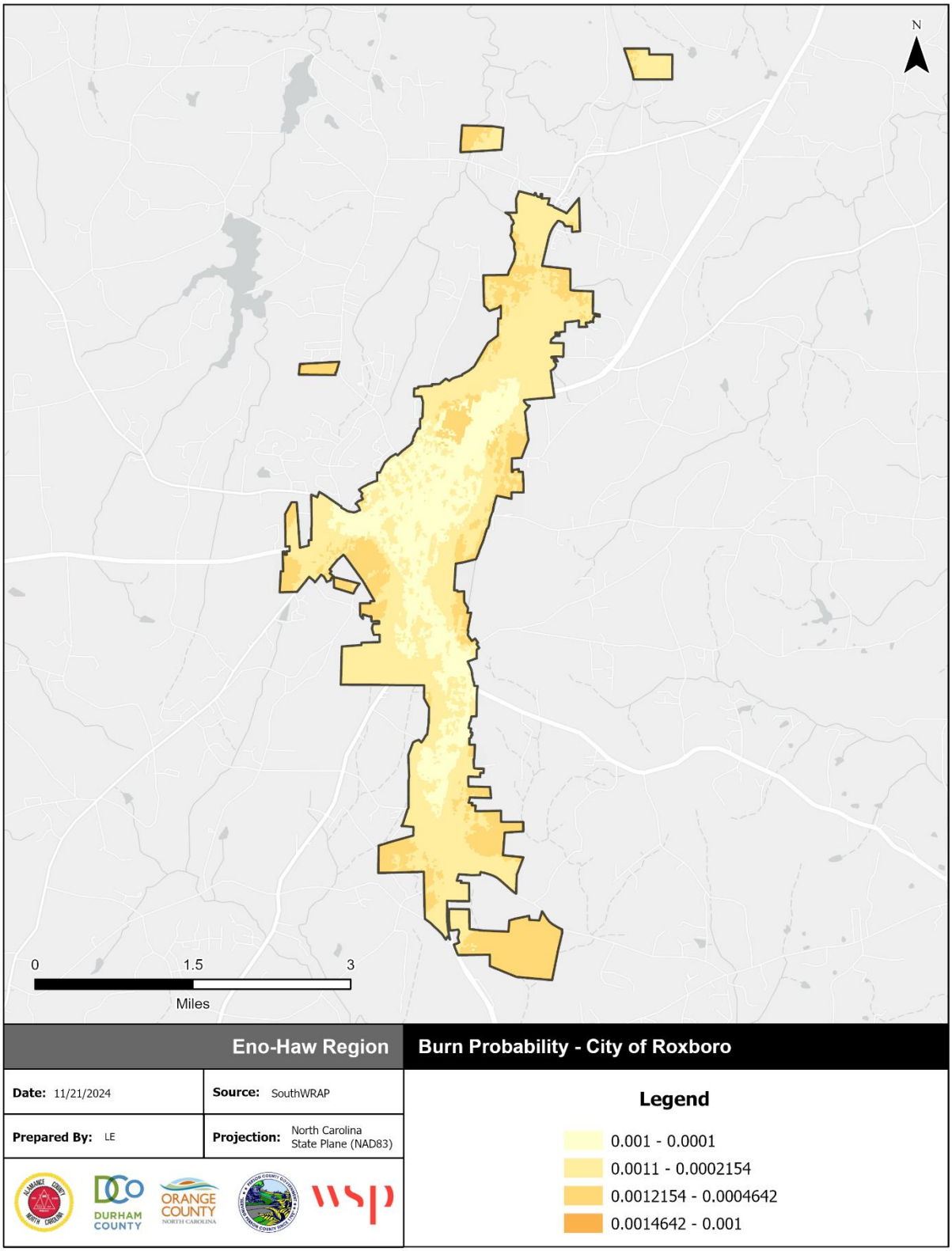
Source: Southern Wildfire Risk Assessment

Figure D.13 – Burn Probability, Unincorporated Person County



Source: Southern Wildfire Risk Assessment

Figure D.14 – Burn Probability, City of Roxboro



Source: Southern Wildfire Risk Assessment

D.3 MITIGATION STRATEGY

Table D.15 – Mitigation Action Plan, Person County

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Status Comments
Prevention									
P-1	Update the Person County Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All Hazards	1.1	Low	PLAN	Local	2030	Carried Forward	No progress to report. Staff remains interested in updating the Subdivision Ordinance in general and plans to address this item.
P-2	Revise and update the regulatory floodplain maps.	Flooding	4.1	Medium	PLAN & GIS	Local	2030	Carried Forward	Floodplain map updates are in progress (per FEMA).
P-3	Identify at risk-populations that may be exceptionally vulnerable in the event of long-term power outages.	Excessive Heat, Tornadoes & Thunderstorms, Severe Winter Weather	2.2	High	PLAN & ES	Local	2030	Carried Forward	No progress to report, but this action remains a priority.
P-4	Organize outreach to vulnerable populations during long-term power outage events	Excessive Heat, Tornadoes & Thunderstorms, Severe Winter Weather	2.1	High	ES	Local	2030	Carried Forward	No progress to report, but this action remains a priority.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	ES, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Pursue the acquisition and/or elevation of flood prone properties.	Flooding	4.2	Low	PLAN, INSP	Local, State grants, Federal grants	2025-2030	New	
PP-2	Create and maintain a list of repetitive flood loss properties.	Flooding	4.2	Medium	PLAN, GIS, & INSP	Local	2030	Carried Forward	No flood FEMA designated repetitive loss properties as of 2025. County will continue to track flood loss properties through GIS and Building Inspections using Crisis Track Software.
PP-3	Retrofit existing public facilities and critical facilities to withstand impacts from all hazards	All Hazards	4.2	High	ES	Federal; State; Local	2025-2030	Carried Forward	Revised to property protection action; previously SP-2. Have previously applied for grant funding for critical facility protection. This action remains a priority.
PP-4	Identify and strengthen public facilities to act as shelters for all hazards	All Hazards	4.2	High	ES	Federal; State; Local	2025-2030	Carried Forward	Revised to property protection action, previously SP-3. Have previously applied for grant funding for critical facility protection. This action remains a priority.
PP-5	Encourage the identification and retrofitting of safe rooms in public buildings, critical facilities, schools, and nursing homes.	Tornadoes & Thunderstorms	4.2	Medium	ES	Local	2025-2030	Carried Forward	Revised to property protection action, previously SP-5. No progress to report. This action remains a priority.
Natural Resource Protection									
NRP-1	Establish Enhanced Voluntary Ag District (EVAD) Ordinance	Flooding	1.1	Medium	SW	Local	2030	Carried Forward	No progress to report, but this action remains a priority.
NRP-2	Develop a conservation easement program	Flooding	1.1	Medium	SW	Federal; Local; State	2030	Carried Forward	No progress to report, but this action remains a priority.
NRP-3	Encourage participation in State & Federal Cost Share programs	Drought, Flooding	1.1	High	SW, NRCS, & NC Forest Service	Federal; Local; State	2025-2030	Carried Forward	No progress to report, but this action remains a priority.
NRP-4	Conduct landowner/farmer workshops on conservation practices	Drought, Flooding	1.1	Medium	SW & AG	State; Local	2025-2030	Carried Forward	No progress to report, but this action remains a priority.

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2025 Status	2025 Status Comments
Structural Projects									
SP-1	Identify at risk facilities and evaluate potential mitigation techniques for all hazards	All Hazards	4.2	High	PLAN, GIS, & ES	Local	2025-2030	Carried Forward	No progress to report, but this action remains a priority.
SP-2	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	PLAN, ES	State grants, federal grants	2025-2030	New	
Emergency Services									
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All Hazards	3.1	High	ES	Local	2025-2030	Carried Forward	County has emergency notification system, social & news media, message boards, etc. Will continue to re-evaluate after events.
ES-2	Maintain/improve shelter capacities with alternative power/heat sources.	All Hazards	4.2	High	ES	Federal; State; Local	2025-2030	Carried Forward	Shelters do not have alternative power sources. Previously submitted a grant application for this action.
ES-3	Review program to maintain continuity of government operations.	All Hazards	3.1	Low	ES	Local	2025-2030	Carried Forward	County's COOP Plan is reviewed annually.
ES-4	Identify alternate/new Emergency Operations Center locations.	All Hazards	3.1	High	ES	Local	2030	Carried Forward	Identification of alternate EOC site in progress.
ES-5	Update and maintain Emergency Plan. Review and update EOP every four years.	All Hazards	3.1	Low	ES	Local	2025-2030	Carried Forward	OEM reviews the EOP annually and updates as needed. The EOP is re-adopted every four years.
Public Education & Awareness									
PEA-1	The Emergency Services Department will periodically make various hazard education items available through various media outlets including websites, newspaper, radio	All Hazards	2.1	Medium	ES	Local	2025-2030	Carried Forward	OEM and Plans Dept. conduct hazard awareness activities.
PEA-2	The Emergency Services Department will establish an annual hazard awareness week in coordination with the media to promote hazard awareness.	All Hazards	2.1	Medium	ES	Local	2025-2030	Carried Forward	OEM conducts hazard awareness along with Emergency Preparedness week annually or as requested and we host regular NWS Storm Ready/Spotter seminars or as requested.
PEA-3	Place flood protection and other hazard mitigation education materials in public buildings (i.e. City Hall, County offices, library etc.).	All Hazards	2.1	Medium	PLAN & ES	Local	2025-2030	Carried Forward	OEM and Planning will maintain educational materials in county offices.
PEA-4	Post warning signage at local parks and outdoor venues with information about severe weather.	Tornadoes & Thunderstorms	2.1	High	ES	Local	2025-2030	Carried Forward	No progress to report. County will continue to seek opportunities for implementation.
PEA-5	Ensure school officials are aware of the best area of refuge in school buildings during orientation.	Tornadoes & Thunderstorms	2.1	High	ES	Local	2025-2030	Carried Forward	OEM will continue to coordinate with public school officials on hazard preparedness.

Table D.16 – Mitigation Action Plan, City of Roxboro

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Status Comments
Prevention									
P-1	Assess purchasing, permitting, and employment policies to ensure compliance with FEMA, NCDPS, and NCEMS requirements for funding eligibility to seek BRIC or other mitigation grant opportunities.	All Hazards	3.1	High	Admin Staff	Local	2030	New	
P-2	Update Street Specifications and UDO Development standards to discourage street development in flood hazard areas and/or increase minimum standards to withstand flood damage.	Flooding	1.1, 1.2	High	Planning and Public Services	Local	2030	New	
P-3	Revise and update the regulatory floodplain maps.	Flooding	4.1	Medium	Planning	Local	2030	Carried Forward	Staff contacted members of the NCDPS about this work needing to be complete, but COR/Person County are not due for new maps yet.
P-4	At the next update of the Unified Development Ordinance (UDO), incorporate Greenway and/or Open Space requirements to increase and protect natural areas.	Flooding	2.1	Medium	Planning	Local	2030	Carried Forward	Action revised. Existing UDO is 10 years old and updates are currently pending budget allowance.
P-5	Create or Update Community Wildfire Protection Plans in each fire district.	Wildfire	3.2	Medium	County Emergency Management, Fire Departments, NC Forest Service	Grant funds	2025-2030	New	
Property Protection									
PP-1	Create a registry of historic properties, including photos and key features. Use registry to identify opportunities for unique hazard mitigation techniques for historically sensitive properties/areas and communicate to property owners.	Flooding, Tornadoes & Thunderstorms, Hurricane & Tropical Storm	2.1, 4.2	Medium	Planning and PIO	Local	2030	New	
PP-2	Create and maintain a list of areas that are repeatedly impacted by flash flood events.	Flooding	4.2	Medium	Planning	Local	2021	Carried Forward	Incomplete. There are no significant floods in our community, but there are areas that could be better documented. Action revised.
PP-3	Pursue the acquisition and/or elevation of flood prone properties.	Flooding	4.2	Low	PLAN, INSP	Local, State grants, Federal grants	2025-2030	New	
Natural Resource Protection									
NRP-1	Assess local water source for vulnerability to various hazards and develop a specific mitigation plan to reduce/avoid impacts.	Drought, Flooding, Wildfire	1.1, 4.1	Medium	Planning, Public Services, and Emergency Services	Local	2030	New	
Structural Projects									
SP-1	Identify at risk facilities and evaluate potential mitigation techniques for all hazards	All Hazards	4.2	High	Planning	Local	2030	Carried Forward	The City is actively working to better identify/map critical facilities and infrastructure in the community.
SP-2	Retrofit existing public facilities and critical facilities to withstand impacts from all hazards	All Hazards	4.2	High	Public Services, Planning	Federal; State; Local	2030	Carried Forward	New staff members are actively working to improve these elements
SP-3	Identify and strengthen public facilities to act as shelters for all hazards	All Hazards	4.2	High	Person County Emergency Services	Federal; State; Local	2025	Carried Forward	No progress to report, but this action remains a priority.
SP-4	Implement drainage improvement projects to reduce flood risk.	Flooding	4.2	Medium	Public Services	State grants, federal grants	2025-2030	New	

Action #	Action Description	Hazard(s) Addressed	Goal & Objective Addressed	Priority	Lead Agency / Department	Potential Funding Source	Implementation Timeline	2020 Status	2020 Status Comments
SP-5	Encourage the identification and retrofitting of safe rooms in public buildings, critical facilities, schools, and nursing homes.	Tornados & Thunderstorms	4.2	Medium	Public Services, Planning	Local	2025	Carried Forward	Some work completed, but this action remains a priority.
Emergency Services									
ES-1	Develop equipment and supply inventory forms/checklists to ensure departments are adequately prepared for various hazardous events.	All Hazards	3.1	High	Admin Staff, Public Services, Planning, Fire, and Police	Local	2030	New	
ES-2	Maintain/improve shelter capacities with alternative power/heat sources.	All Hazards	4.2	High	Person County Emergency Services	Federal; State; Local	2025	Carried Forward	Efforts are ongoing to identify funding and install backup power for shelters.
ES-3	Develop an emergency response communications plan with PIO.	All Hazards	3.1	High	Admin Staff and PIO	Local	2030	New	
Public Education & Awareness									
PEA-3	Place flood protection and other hazard mitigation education materials in public buildings (i.e. City Hall, County offices, library etc.).	All Hazards	2.1	Medium	Planning	Local	2025	Carried Forward	Shared information and now have a PIO that can improve upon what has been done.

APPENDIX A PLAN REVIEW TOOL

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Local Mitigation Plan Review Tool

Cover Page

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

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

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

Plan Information	
Jurisdiction(s)	Alamance County, Durham County, Orange County, Person County and incorporated jurisdictions
Title of Plan	Eno-Haw Regional Hazard Mitigation Plan
New Plan or Update	Update
Single- or Multi-Jurisdiction	Multi-jurisdiction
Date of Plan	4/10/2025
Local Point of Contact	
Title	David Stroud
Agency	WSP
Address	4021 Stirrup Creek Drive, Suite 100, Durham, NC 27703
Phone Number	919-325-6497
Email	david.stroud@wsp.com

Additional Point of Contact	
Title	
Agency	
Address	
Phone Number	
Email	

Review Information	
State Review	
State Reviewer(s) and Title	Click or tap here to enter text.
State Review Date	Click or tap to enter a date.
FEMA Review	
FEMA Reviewer(s) and Title	Click or tap here to enter text.
Date Received in FEMA Region	Click or tap to enter a date.
Plan Not Approved	Click or tap to enter a date.
Plan Approvable Pending Adoption	Click or tap to enter a date.
Plan Approved	Click or tap to enter a date.

Multi-Jurisdictional Summary Sheet

#	Jurisdiction Name	Requirements Met (Y/N)						
		A. Planning Process	B. Risk Assessment	C. Mitigation Strategy	D. Plan Maintenance	E. Plan Update	F. Plan Adoption	G. State Requirements
1	Alamance County							
2	Burlington							
3	Graham							
4	Mebane							
5	Alamance							
6	Elon							
7	Green Level							
8	Haw River							
9	Ossipee							
10	Swepsonville							
11	Durham County							
12	Durham							
13	Orange County							
14	Carrboro							
15	Chapel Hill							
16	Hillsborough							
17	Person County							
18	Roxboro							

Plan Review Checklist

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

Plan updates must include information from the current planning process.

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

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

Element A: Planning Process

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1))		
A1-a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan's development, as well as who was involved?	Section 2, p.7-19; Appendix B	Choose an item.
A1-b. Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?	Section 1.3, p.2; Section 2.3-2.9, p.7-19; Appendix B	Choose an item.
A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process? (Requirement 44 CFR § 201.6(b)(2))		
A2-a. Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity?	Section 2.4, p.11-16; Section 2.5, p.16-17; Section 2.7-2.8, p.18-19, Appendix B	Choose an item.

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1))		
A3-a. Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?	Section 2.4-2.7, p.11-119;	Choose an item.
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))		
A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?	Section 2.3.1, p.9-10	Choose an item.
ELEMENT A REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element B: Risk Assessment

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i))		
B1-a. Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?	Section 4.2, p.95-99, Section 4.5, p.115-347 (Hazard Description, Location, Extent, Hazard Summary by Jurisdiction)	Choose an item.
B1-b. Does the plan include information on the location of each identified hazard?	Section 4.5, p.115-347 ("Location" subheadings)	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-c. Does the plan describe the extent for each identified hazard?	Section 4.5, p.115-347 ("Extent" subheadings)	Choose an item.
B1-d. Does the plan include the history of previous hazard events for each identified hazard?	Section 4.5, p.115-347 ("Historical Occurrences" subheadings)	Choose an item.
B1-e. Does the plan include the probability of future events for each identified hazard? Does the plan describe the effects of future conditions, including climate change (e.g., long-term weather patterns, average temperature and sea levels), on the type, location and range of anticipated intensities of identified hazards?	Section 4.5, p.115-347 ("Probability of Future Occurrence" subheadings)	Choose an item.
B1-f. For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area?	Section 4.5, p.115-347 ("Hazard Summary by Jurisdiction" subheadings); Annexes, p.451-650	Choose an item.
B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))		
B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?	Section 4.3, p.100-103; Section 4.4, p.104-114; Section 4.5, p.115-347 ("Vulnerability Assessment" subheadings); Annexes, p.451-650	Choose an item.
B2-b. For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?	Section 4.5, p.115-347; Annexes, p.451-650	Choose an item.
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?	Section 4.5.5, p.194-195	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
ELEMENT B REQUIRED REVISIONS		
Required Revision**:** Click or tap here to enter text.		

Element C: Mitigation Strategy

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C1. Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3))		
C1-a. Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations?	Section 5, p.348-369	Choose an item.
C1-b. Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?	Section 5, p.348-369	Choose an item.
C2. Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C2-a. Does the plan contain a narrative description or a table/list of their participation activities?	Section 5.3.1.3, p.354-362	Choose an item.
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i))		
C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan?	Section 6.1, p.370-371	Choose an item.
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C4-a. Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?	Section 7, p.374-418; Appendix C	Choose an item.

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C4-b. Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?	Section 7, p.374-418	Choose an item.
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))		
C5-a. Does the plan describe the criteria used for prioritizing actions?	Section 6.2, p. 372-373	Choose an item.
C5-b. Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?	Section 7, p.374-418	Choose an item.
ELEMENT C REQUIRED REVISIONS		
Required Revision**:** Click or tap here to enter text.		

Element D: Plan Maintenance

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))		
D1-a. Does the plan describe how communities will continue to seek future public participation after the plan has been approved?	Section 8.3, p.423	Choose an item.
D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i))		
D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?	Section 8.2, p.420-422	Choose an item.
D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.	Section 8.2, p.420-422	Choose an item.

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?	Section 8.2, p.420-422	Choose an item.
D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii))		
D3-a. Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?	Section 8.1, p. 419-420; Section 8.2, p.420-422	Choose an item.
D3-b. Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?	Section 8.1, p. 419-420; Section 8.2, p.420-422	Choose an item.
D3-c. For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?	Section 8.1, p. 419-420; Section 8.2, p.420-422	Choose an item.
ELEMENT D REQUIRED REVISIONS		
Required Revision**:** Click or tap here to enter text.		

Element E: Plan Update

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))		
E1-a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?	Section 3, p.27-93	Choose an item.
E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))		
E2-a. Does the plan describe how it was revised due to changes in community priorities?	Section 2.1-2.2, p.5-7; Section 6, p.370-373, Section 7, p.374-418	Choose an item.

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?	Section 7, p.374-418; Section 2.9, p.19-26	Choose an item.
E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?	Section 8.1, p.419-420	Choose an item.
ELEMENT E REQUIRED REVISIONS		
Required Revision**:** Click or tap here to enter text.		

Element F: Plan Adoption

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F1-a. Does the participant include documentation of adoption?	Section 9, p.424-450	Choose an item.
F2. For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F2-a. Did each participant adopt the plan and provide documentation of that adoption?	Section 9, p.424-450	Choose an item.
ELEMENT F REQUIRED REVISIONS		
Required Revision**:** Click or tap here to enter text.		

Element G: High Hazard Potential Dams (Optional)

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

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners?	N/A	Choose an item.
HHPD2. Did the plan address HHPDs in the risk assessment?		
HHPD2-a. Does the plan describe the risks and vulnerabilities to and from HHPDs?	N/A	Choose an item.
HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?	N/A	Choose an item.
HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?		
HHPD3-a. Does the plan address how to reduce vulnerabilities to and from HHPDs as part of its own goals or with other long-term strategies?	N/A	Choose an item.
HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals?	N/A	Choose an item.
HHPD4-a. Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?		
HHPD4-a. Does the plan describe specific actions to address HHPDs?	N/A	Choose an item.
HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs?	N/A	Choose an item.
HHPD4-c. Does the plan identify the position, office, department or agency responsible for implementing and administering the action to mitigate hazards to or from HHPDs?	N/A	Choose an item.
HHPD Required Revisions		
Required Revision**:** Click or tap here to enter text.		

Element H: Additional State Requirements

Element H Requirements	Location in Plan (section and/or page number)	Met / Not Met
This space is for the State to include additional requirements		
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.

Plan Assessment

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

Element A. Planning Process

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element B. Risk Assessment

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element C. Mitigation Strategy

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element D. Plan Maintenance

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element E. Plan Update

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element G. HHPD Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element H. Additional State Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

APPENDIX B PLANNING PROCESS DOCUMENTATION

B.1 PLANNING STEP 1: ORGANIZE TO PREPARE THE PLAN

Table B.1 – HMPC Meeting Topics, Dates, and Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
HMPC Mtg. #1 – Project Kickoff	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	September 19, 2024 3 p.m.	Whitted Building 300 West Tryon Street, Hillsborough
HMPC Mtg. #2	1) Review Draft Hazard Identification & Risk Assessment (HIRA)	December 9, 2024 10 a.m.	Microsoft Teams
HMPC Mtg. #3	1) Discuss changes in capability 2) Review and update plan goals and objectives 3) Report on status of actions from the 2020 plan 4) Discuss new mitigation action alternatives	February 11, 2025 10 a.m.	Microsoft Teams
HMPC Mtg. #4	1) Review the Draft Hazard Mitigation Plan 2) Solicit comments and feedback	April 3, 2025 10 a.m.	Microsoft Teams

Note: All HMPC Meetings were open to the public.

HMPC MEETING AGENDAS, MINUTES, AND ATTENDANCE RECORDS

HMPC MEETING 1: SEPTEMBER 19, 2024

Eno Haw Regional Hazard Mitigation Plan Update
Meeting #1
Thursday, September 19, 2024, 3:00 p.m.
Whitted Building, 300 W. Tryon St, Hillsborough, NC 27278

David Stroud, Ranger Ruffins, Abby Moore, and Kimmy Hansen from WSP, the County's consultants, met with the Hazard Mitigation Planning Committee to cover the topics outlined in the following agenda:

1. Introductions
2. Why Plan?
3. Project Overview
4. Planning Process
5. Project Schedule
6. Next Steps
7. Q & A

Attendance

In addition to the consulting team, there were eight attendees who attended in person and 33 attendees who attended virtually through Microsoft Teams. Five representatives from NCEM and one representative from FEMA Region 4 also joined the call. The full list of attendees are as follows:

- Amy Eckberg, Orange County, Sustainability Program Manager
- Ashley Ownbey, Mebane Planning Officer
- McKenzie Bradshaw, Durham County Stormwater Manager
- Chelsea Helton, Duke University
- Chris Roberts, Chapel Hill, Manager of Engineering & Infrastructure
- Chris Saul, Alamance County Emergency Management Coordinator
- Christopher Sandt, Orange County Engineer
- Chief Danial Cremeans, Durham Fire Department
- Jessica Goodstein, Durham County, Stormwater Technician
- Joseph Hoffheimer, Town of Hillsborough, Planner
- Isabell Cooper, Elon, Planner
- John Richardson, Chapel Hill, Community Resilience Officer
- John Wellons, MFD, Mebane Fire Chief
- Jinizha Johnson, Durham County, Emergency Management, All Hazards Planner
- Kevin Turner, Burlington Emergency Management Coordinator
- Kyle Smith, Mebane Public Works Director
- Landon Massey, Elon Fire Chief
- Laura Janway, Carrboro Environmental Planner
- Lauren Johnson, Roxboro Planning Director
- Lori Oakley, Elon Planning Director
- Marty Roupe, Carrboro Development Review Administrator
- Patrick Mallett, Orange County, Deputy Director of Development Services

1 Eno Haw Regional Hazard Mitigation Plan Update | HMPC Meeting #1

- Benjamin Phillips, Durham Water Management
- Nathan Sanders, Durham County, Deputy Chief, Durham County EM
- Elizabeth Schroeder, Durham County, Division Chief of Emergency Management
- Grant Smith, American Red Cross
- Graham Summerson, Durham, Public Works Civil Engineer
- Hannah Tuckman, Orange County, Emergency Management Planner
- Hayden Smith, Durham County Emergency Management Coordinator
- Ian Fowler, Orange County, Deputy Emergency Management Coordinator
- Ryan Eaves, Durham County Erosion Control
- Sue Burke, Chapel Hill, Stormwater Management
- Sarah Pickhardt, Orange County, Division Chief of Emergency Management
- Tanner Deisch, Chapel Hill, Deputy Coordinator of Emergency Management
- Kyle Taylor, Durham, Planning Department
- Thom Schwalenberg, Person County, Director, Emergency Services Department
- Tom Verrault, Durham County, EM, HSSA Coordinator
- Tommy Cole, Graham Fire Chief
- Ray Trapp, Duke Energy
- Trish McGuire, Carrboro, Planning Director
- Will Potter, Carrboro Fire Chief
- Carl Baker, NCEM
- John Mello, NCEM
- Chris Crew, NCEM
- Brent Fisher, NCEM
- Robin Brown, NCEM
- Kymberly Kudla, FEMA Region 4, Planner

INTRODUCTIONS

David Stroud kicked off the meeting with an introduction to the plan update process and the importance of hazard mitigation. David and Abby Moore facilitated the meeting following the agenda above.

WHY PLAN

David began the presentation with why we plan in the first place. David discussed the Disaster Mitigation Act (DMA) of 2000, which is codified in 44 CFR 201.6 and requires local government to update their hazard mitigation plans every five years to receive FEMA pre- and post-disaster mitigation funding through the Hazard Mitigation Assistance funding programs.

David also reviewed some trends in disasters including that we now have more frequent and intense hazard events and greater exposure to risk (people, property and critical infrastructure). In 2023 there were 28 billion-dollar disasters, more than any prior year.

David explained that hazard mitigation is a priority for multiple reasons, including that the cost of doing nothing is too high, many events are predictable and repetitive, loss reduction can be effective, cost-beneficial, and environmentally-sound, there are legal and moral responsibilities to prevent disasters, and there are federal funds available to support mitigation. The average benefit-cost ratio (BCR) for federally-funded projects is 6:1; for flood mitigation the average BCR is 7:1.

PROJECT OVERVIEW

David explained that we must follow the DMA planning process, and we will integrate Community Rating System (CRS) Activity 510 planning steps into the DMA four-phase planning process to meet the requirements of both programs. There are three CRS communities participating in this plan: Durham County, City of Durham, and Orange County.

The DMA process provides continued eligibility for mitigation funding, guides mitigation activities in a coordinated and economical manner, integrates hazard mitigation with other planning mechanisms, directs future development in a safe manner, and helps make communities more disaster resistant. The CRS program provides policy holders in participating communities with flood insurance discounts based on the number of CRS points the communities earn. The flood insurance premium reductions are community wide.

Overall, the WSP team will ensure that the updated hazard mitigation plan meets all FEMA planning requirements, coordinates with the natural hazards in the updated State Hazard Mitigation Plan, includes natural and human-caused hazards as identified by the HMPC, incorporates local climate change data and findings, and addresses equitable outcomes.

PLANNING PROCESS

Phase 1

Abby described the planning process in more detail. Phase 1 is already underway. The HMPC was reconvened with some new members and will be asked to attend four meetings, provide input on risk and capability, update mitigation actions, and review plan drafts. HMPC members, especially staff, were also asked to consider ways to involve the public throughout the planning process. Another priority is to identify stakeholders that should be invited to participate in the planning process, especially those that may be able to represent underserved communities and/or vulnerable populations. To maximize CRS credit and support awareness of the plan, 30 outside stakeholders must be invited to participate and provide input. The following stakeholders were suggested by WSP. The Committee will be ask to provide additional suggestions.

- FEMA Region 4
- NOAA, NWS, other federal agencies
- NCEM, NCORR, NCDPS, other state agencies
- Neighboring communities
- Non-profits
- Businesses
- Colleges & universities

Phase 2

Phase 2 covers the risk assessment, which includes the hazard identification, the vulnerability assessment, and the capability assessment. The hazards that were addressed in the previous plan were presented and the planning committee reviewed and discussed potential additional hazards. John Richardson asked if active shooter was included in this plan. Abby noted that this hazard event is not covered in this regional plan. Carl indicated that active shooter events are covered in the State Emergency Action Plan and Emergency Operation Plan. WSP will review these plans for relevant information to include.

Regarding the asset inventory, Abby noted that NCEM iRisk data will be used and communities will be asked to review and update their critical facility list; critical facilities will be categorized by FEMA lifeline in the plan update, which may be helpful to communities when preparing FEMA grant applications.

WSP will use quantitative methods such as property exposure analysis using parcel data, and qualitative methods like past storm narratives and public input to evaluate hazard risks and vulnerabilities. We will also conduct EMAP consequence analysis.

Phase 3

Phase 3 involves developing a mitigation strategy by reviewing and updating the plan goals and objectives, evaluating mitigation alternatives, including existing and new projects, and drafting an action plan with prioritized projects. Abby reviewed different approaches to mitigation, the six FEMA/CRS mitigation categories, and the count of actions by category for each jurisdiction in the existing HMP. In the plan update communities must have at least one action for each natural hazard to meet FEMA

requirements and should include a flood-related action for at least 5 of the 6 mitigation categories to maximize CRS credit.

Phase 4

Phase 4 is where the communities must adopt and implement the plan. The communities and HMPC will meet quarterly to review the action plan and look for funding and opportunities to implement projects. The plan will continue to be updated every five years.

PROJECT SCHEDULE

Abby presented a tentative schedule for the planning process, which includes additional HMPC meetings sometime in November, and January/February. The draft plan is due to NCEM in March. The plan must be approved by NCEM and FEMA and adopted by all communities before the current plan expires in September 2025.

NEXT STEPS & DISCUSSION

Abby discussed public outreach efforts which includes public meetings facilitated by WSP, a public survey, and an informational flyer. Community staff were asked to post outreach on local websites and social media and consider ways to advertise the plan or bring the survey and flyer to community events. A plan website has been developed www.EnoHawHMP.com. WSP will update the website with relevant information. A link and QR code to access the survey via cell phone is provide below.

WSP has begun work on the risk and vulnerability assessment update. The HMPC was asked to begin reviewing the existing mitigation strategy to provide action status updates and look for opportunities to support public engagement.

Plan Website: https://forms.office.com/e/jKQ6cfjEi5

Survey Link: www.EnoHawHMP.com

Eno Haw Regional Hazard Mitigation Plan Update

Hazard Mitigation Planning Committee (HMPC) Meeting #1 – September 19, 2024, 3:00pm

Name	Jurisdiction	Title and Department/Organization	Email
DAVID STROUD	—	WSP	david.stroud@wsp.com
ABBY MOORE	—	WSP	abigail.moore@wsp.com
Joseph Hoffheimer	Town of Hillsborough		joseph.hoffheimer@hillsboroughnc.gov
Thomas Vernault	Durham City.	Emergency Management	tvernault@dcone.gov
RYAN EAVES	DURHAM COUNTY	ENG/STORMWATER	REAVES@DCONC.GOV
Hannah Tuckman	Orange	EM Planner	htuckman@orangecountync.gov
LAUREN JOHNSON	CITY OF ROXBORO	PLANNING DIRECTOR	lwjohnson@cityofroxboro.com
IAN FOWLER	ORANGE CO.	DEPUTY EMC	[illegible]
Graham Summerson	City of Durham	Engineer / Floodplain HMGP	graham.summerson@durhamnc.gov
Sarah Dickhardt	Orange	Division chief EM	spickhart@orangecountync.gov
Kimmy Hansen	—	WSP	Kimberly.Hansen@wsp.com

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HMPC Meeting #1 Online Attendance

In this meeting (41) Mute all

- Ruffins, Ranger
- AE Amy Eckberg (Unverified)
- AO Ashley Ownbey (Unverified)
- CB Baker, Carl (NCEM) (Unverified)
- MB Bradshaw, McKenzie (Unverifie...
- RB Brown, Robin (NCEM) (Unverifi...
- CH Chelsea Helton (Unverified)
- CR Chris Roberts (Unverified)
- CS Chris Saul (Unverified)
- CS Christopher Sandt (Unverified)
- DC Cremeans, Danial (Unverified)
- JC Crew, John (NCEM) (Unverified)
- BF Fisher, Brent (NCEM) (Unverifi...
- JG Goodstein, Jessica (Unverified)
- IC Isabell Cooper (Unverified)
- JR John Richardson (Unverified)
- JM John Wellons MFD (Unverified)
- JJ Johnson, Jinizha M. (Unverified)
- KT Kevin Turner (Unverified)
- KK Kudla, Kymberly (External)
- KS Kyle Smith (Unverified)
- LD Landon/Elon Fire ... (Unverified)
- LJ Laura Janway (Unverified)
- LO Lori Oakley (Unverified)
- MR Martin Roupe (Unverified)
- JM Mello, John (NCEM) (Unverified)
- AM Moore, Abigail Organizer
- PM Patrick R. Mallett (Unverified)
- BP Phillips, Benjamin (Unverified)
- NS Sanders, Nathan M. (Unverified)
- ES Schroeder, Elizabeth B. W. (Un...
- GS Smith, Grant (Unverified)
- HS Smith, Hayden J (Unverified)
- SB Sue Burke (Unverified)
- TD Tanner Deisch (Unverified)
- KT Taylor, Kyle (Unverified)
- TS Thom Schwalenbe... (Unverified)
- TC Tommy Cole (Unverified)
- RT Trapp, Ray L (External)
- TM Trish McGuire (Unverified)
- WP Will Potter (Unverified)

Bradshaw, McKenzie (Unverified) was invited to the meeting.

HMPC MEETING 2: DECEMBER 9, 2024

Eno Haw Regional Hazard Mitigation Plan Update
Meeting #2
Monday, December 9, 2024, 10:00 a.m.
Microsoft Teams Meeting

David Stroud and Abby Moore from WSP, the Region's planning consultants, met with the Hazard Mitigation Planning Committee to cover the topics outlined in the following agenda:

1. Introductions
2. Planning Process Recap
3. Hazard Identification
4. Asset Inventory
5. Hazard Profiles
   a. Summary of each identified natural hazard
   b. Excessive Heat presentation by Nicole Goddard, NCORR
6. Discussion
7. Project Schedule
8. Next Steps

INTRODUCTIONS

In addition to the consulting team, there were 41 attendees who attended virtually through Microsoft Teams. The full list of attendees is as follows:

- AJ Simmons, Green Level, Public Works Director
- Amy Eckberg, Orange County, Sustainability Program Manager
- Ashley Ownbey, Mebane, Planning Department
- Benjamin Phillips, Durham Water Management
- Brent Fisher, NCEM Area 6 Coordinator
- Cameron West, Graham, Senior Planner
- Chelsea Helton, Duke University, Emergency Management Coordinator
- Chloe Hallberg, Duke University Emergency Management, Executive Director
- Chris Crew, NCEM Mitigation Plans Manager
- Chris Roberts, Chapel Hill, Manager of Engineering & Infrastructure
- Chris Saul, Alamance County Emergency Management Coordinator
- Christopher Sandt, Orange County, Engineer
- Chukwuemeka Kanu-Oji, Carrboro, Environmental Planner
- Crystal Donaldson, UNC Chapel Hill
- Graham Summerson, Durham Public Works, Stormwater & Floodplain Engineer
- Grant Smith, American Red Cross, Community Disaster Program Specialist
- Hannah Tuckman, Orange County, Emergency Management Planner
- Isabell Cooper, Elon, Planner
- Jinizha Johnson, Durham County, Emergency Management, All Hazards Planner

- John Wellons, Mebane, Fire Chief
- John Richardson, Chapel Hill, Community Resilience Officer
- Joseph Hoffheimer, Town of Hillsborough, Planner
- Kendra Ferrell, Central Carolina Healthcare Preparedness Coalition, Assistant Healthcare Preparedness Coordinator
- Kevin Turner, Burlington, Emergency Management Director
- Kim Livingston, Eno River Association
- Kyle Smith, Mebane, Public Works Director
- Kyle Taylor, Durham, Planning Department Business Services Manager
- Landon Massey, Elon, Fire Chief
- Lauren Johnson, Roxboro, Planning Director
- Lori Oakley, Elon, Planning Director
- McKenzie Bradshaw, Durham County Stormwater Manager
- Nicole Goddard, NCORR
- Ray Trapp, Duke Energy
- Robin Brown, NCEM Area 10 Coordinator
- Ronnie Jeffreys, Person County
- Ryan Eaves, Durham County Erosion Control
- Sean Tuttle, Durham, Public Works Stormwater
- Sweetly Sanders, American Red Cross, Community Disaster Program Manager
- Thomas Verrault, Durham County, EM, Senior Emergency Management Coordinator
- Trish McGuire, Carrboro, Planning Director
- Will Potter, Carrboro Fire Chief

PLANNING PROCESS

David Stroud kicked off the meeting with a review of the four phases of FEMA hazard mitigation planning plan and the 10 steps of the CRS planning process. We are currently working through Phase 2: Risk Assessment, which aligns with Step 4 (Assess the Hazard) and Step 5 (Assess the Problem) of the CRS planning process. This portion of the plan is referred to as the Hazard Identification and Risk Assessment (HIRA). It involves identifying hazards, profiling hazard events, creating an inventory of assets, and estimating losses.

HAZARD IDENTIFICATION

David presented a list of the hazards that were included in the 2020 Eno Haw Plan and the 2023 State Hazard Mitigation Plan. All hazards from the existing Eno Haw plan were reevaluated in this plan update. The severe weather and tornado hazards were combined into a single tornadoes & thunderstorms hazard profile for this plan update to better align with the hazards in the State Hazard Mitigation Plan.

Past disaster declarations and records of hazard events indicate the wide variety of events that can have a significant impact in the region. The region received 16 disaster declarations, including for hurricanes, severe storms, ice storms, tornadoes, snow, and Covid-19. Impacts of past hazard events reported by NOAA's National Centers for Environmental Information (NCEI) Storm Events Database include over $3b in property damage, 9 deaths, and 21 injuries.

The natural and technological/human-caused hazards in the plan are listed below:

Natural Hazards

- Dam Failure
- Drought
- Earthquake
- Excessive Heat
- Flooding
- Landslide
- Hurricane & Tropical Storm
- Tornadoes & Thunderstorms
- Severe Winter Weather
- Wildfire

Technological/Human-Caused Hazards:

- Civil Disturbance
- Critical Infrastructure Failure
- Cyber Threat
- Hazardous Substances
- Infectious Disease
- Radiological Emergency
- Terrorism/Mass Casualty

ASSET INVENTORY

David reviewed the asset inventory of people and buildings as identified through iRisk data in the State's Risk Management Tool (RMT).

The population inventory uses 2020 Census data compiled by block group using municipal boundaries, including extra-territorial jurisdictions. There were questions from Lauren Johnson and Joseph Hoffheimer about the population counts for Roxboro and Hillsborough. David noted that these discrepancies may be due to the use of ETJs and WSP will get the data from the State on the municipal boundaries used to at least provide context for these values. Abby noted that this was an issue for Roxboro during the 2020 plan update because the ETJ boundary used by the RMT is large. Lauren noted that Roxboro does not have an ETJ.

The building inventory uses building footprints for buildings larger than 500 square feet. Updates to the iRisk building inventory are underway but will not be completed for this plan update. To provide context for the iRisk building inventory, WSP compiled an asset inventory using current parcel data. This analysis identified a total of 288,072 buildings in the region, including 42,665 buildings not included in the iRisk inventory.

The last piece of the asset inventory to be updated is the critical facility inventory. Community staff on the HMPC are asked to update the critical facility inventory using a web map provided by WSP, which includes all critical facilities from the previous HMP. The web map, linked here, can be used to edit existing facilities or add new facilities. Staff should contact Abby with any questions or issues when using the web map. If preferred, communities can alternatively send a GIS with critical facility information for WSP to use in place of the existing inventory. WSP will update the web map to provide a "zoom to community" feature for all jurisdictions and to show the municipal boundaries for all jurisdictions. Staff are asked to provide critical facility updates by January 10th.

HAZARD PROFILES

Abby presented a summary of the risk assessment findings according to each hazard's Priority Risk Index (PRI) score. The PRI is a scoring system for ranking hazards as high, medium, or low priority based on five weighted categories: probability, impact, spatial extent, warning time, and duration. PRI rankings are shown below, and a detailed summary is provided on slide 22.

High Risk (> 3.0)	Excessive Heat Severe Winter Storm Hurricane & Tropical Storm Critical Infrastructure Failure Wildfire
Moderate Risk (2.0 - 2.9)	Dam Failure Drought Flood Tornadoes & Thunderstorms Wildfire Cyber Threat Civil Unrest Hazardous Substances Infectious Disease Terrorism / Mass Casualty Radiological Emergency
Low Risk (< 2.0)	Earthquake Landslide

David suggested that WSP may review and revise the flood risk rating to reflect a higher potential impact and perhaps increases in other categories. Trish McGuire suggested that the drought impact rating be increased, because past droughts have caused more than limited impact.

Abby presented a summary of findings for each of the natural hazards in the plan, summarized below. See slides 23-34 for more details).

- Drought: The region has spent about 50% of the last 24 years in drought, 10% of that time in severe drought or worse. The most severe impacts are on agriculture and recreational industries. Since 2007, the region averaged $1.7m in crop insurance claims annually due to drought. Drought can also impact water supply and increase wildfire risk. Climate change is expected to make drought more frequent and severe.
- Earthquake: Risk and probability are low. Earthquakes are unlikely to be damaging in the region. Four earthquakes occurred within 100 miles of the region since 1970 but all were less than a 4.0 magnitude. Since 1973, only one earthquake was reported as felt within the region, which was a 5.1 magnitude earthquake in August 2020. Lauren Johnson noted that the 2011 Virginia earthquake was also felt in parts of the region.
- Flood: Risk was evaluated using each county's Flood Insurance Rate Maps. About 7.6% of the region is within a Special Flood Hazard Area (1% annual chance floodplain), but more than 10% of Haw River, Swepsonville, and Durham are in the SFHA. The regionwide loss estimate for the 1% annual chance flood event is $37 million. Public survey responses note concerns with building damage, flooded roads, business interruptions, erosion, and a sinkhole. Public input on mitigation recommendations were presented. Trish noted that stormwater management design regulations are another option for mitigation, such as changing the design storm regulation for managing runoff.
- Hurricane & Tropical Storm: These storms can cause widespread wind and flood damage. Most storms have tropical storm or tropical depression level winds by the time they reach the region. Impacts include downed trees and power lines, wind damage to buildings (especially mobile homes), and crop damage. The public noted concerns about extended power outages and related

communication system outages. Recommended mitigation measures included burying power lines, tree maintenance, and expanded emergency alert systems. Trish asked whether burying power lines should continue to be in the action plan since it is very costly and difficult to implement for existing neighborhoods, although it is incorporated in new subdivision design in Carrboro. John Richardson shared that Chapel Hill takes a similar approach and finds it difficult to implement for existing power lines. David noted that mitigating new development with buried power lines is still valid mitigation.

- Tornado & Thunderstorm: 2 injuries and $5.9 million in property damage has been caused by tornadoes since 1999. Though lower magnitude (EF0 to EF2), these events have still caused considerable damage. The region averages 32 wind events, at least one damaging lightning strike, and 10 hail events annually. These hazards have caused over $14 million since 1999. Impacts include downed trees, wind damage, wind-borne debris damages, structure fires, power outages, and crop damages.
- Severe Winter Weather: The region has received four disaster declarations and two emergency declarations for snow and ice. Winter weather has caused a reported $9.1 million in property damage since 1999. The greatest one-day snowfall in the last 20 years was in 2018, with up to 12.5" across the region. Winter weather can cause dangerous travel conditions, downed trees, and extended power outages, which can be particularly harmful when paired with extreme cold temperatures.
- Wildfire: Over 23% of the region has direct exposure to wildfire. Wildfire probability is low regionwide, but the impacts could be severe. The iRisk loss estimate for the region is $7.9 billion. Concerns from the public survey include tree maintenance, fire protection, health impacts of smoke, and response capabilities in rural areas.

Nicole Goddard, Outreach and Engagement Manager with North Carolina Office of Recovery and Resiliency (NCORR) presented information on heat vulnerability for the region. She shared historical data and projected trends for heat from the Climate Projections tool on www.resilienceexchaange.nc.gov which indicate that the number of hot days and extreme heat days will increase substantially, as will the number of hot nights. Nicole shared data on heat related illnesses and the connection between emergency department visits and heat index above 100˚F. She also shared imagery of urban heat islands within the region, which can occur in small areas with impervious surface and limited tree cover. She concluded with a review of the impacts of extreme heat and a list of suggested mitigation measures. See slides 45-46 for details.

PROJECT SCHEDULE

Abby presented an update on the schedule for the planning process, which includes additional HMPC meetings in late January and February/early March. The draft plan is due to NCEM by March 21st. The plan must be approved by NCEM and FEMA and adopted by all communities before the current plan expires in September 2025.

NEXT STEPS & DISCUSSION

Abby presented next steps and action items for WSP and the HMPC. WSP will share the draft HIRA for the committee and public to review and provide feedback. WSP will also be reaching out to collect capability assessment updates and mitigation action status updates.

Community staff on the HMPC are asked to support continued public engagement. The survey has about 90 responses so far. Abby requested another round of outreach about the survey to encourage additional public input. The public survey link and website link were shared, along with a QR code for the survey, below.

Community staff are also asked to provide critical facility updates and mitigation action status updates. Critical facility updates can be provided through the web map and are due by January 10th.

Critical Facility Web Map:
https://experience.arcgis.com/experience/b77bef9b40994f8f9fbdc2afa894d6a2/

Plan Website: https://forms.office.com/e/jKQ6cfjEi5

Survey Link: www.EnoHawHMP.com

6 Eno Haw Regional Hazard Mitigation Plan Update | HMPC Meeting #2

HMPC Meeting #2 Online Attendance

	A	B	C	D
1	1. Summary			
2	Meeting title	Eno Haw HMPC Meeting 2 - HIRA Review		
3	Attended participants	43		
4	Start time	12/09/24, 9:49:27 AM		
5	End time	12/09/24, 11:35:12 AM		
6	Meeting duration	1h 45m 45s		
7	Average attendance time	1h 25m 14s		
8				
9	2. Participants			
10	Name	First Join	Last Leave	In-Meeting Duration
11	Moore, Abigail	12/09/24, 9:49:31 AM	12/09/24, 11:35:12 AM	1h 45m 41s
12	Stroud, David	12/09/24, 9:50:19 AM	12/09/24, 11:34:54 AM	1h 44m 35s
13	Verrault, Thomas A.	12/09/24, 9:52:31 AM	12/09/24, 11:34:49 AM	1h 42m 18s
14	Taylor, Kyle	12/09/24, 9:52:32 AM	12/09/24, 11:32:55 AM	1h 40m 23s
15	Crew, John (NCEM)	12/09/24, 9:52:33 AM	12/09/24, 11:34:53 AM	1h 42m 20s
16	Kyle Smith	12/09/24, 9:52:34 AM	12/09/24, 11:32:51 AM	1h 40m 17s
17	Brown, Robin (NCEM)	12/09/24, 9:54:51 AM	12/09/24, 11:34:52 AM	1h 40m 1s
18	Smith, Grant	12/09/24, 9:54:57 AM	12/09/24, 11:34:52 AM	1h 39m 54s
19	Trish McGuire	12/09/24, 9:55:12 AM	12/09/24, 11:35:01 AM	1h 39m 49s
20	Chris Saul (Alamance EM) (Unverified)	12/09/24, 9:57:27 AM	12/09/24, 11:34:56 AM	1h 37m 28s
21	Kevin Turner	12/09/24, 9:57:40 AM	12/09/24, 11:34:51 AM	1h 37m 11s
22	Kendra Ferrell	12/09/24, 9:58:18 AM	12/09/24, 11:32:44 AM	1h 34m 26s
23	Hannah Tuckman	12/09/24, 9:58:27 AM	12/09/24, 11:34:48 AM	1h 36m 21s
24	13365834555 (Unverified)	12/09/24, 9:58:43 AM	12/09/24, 10:25:39 AM	26m 55s
25	LJ (Unverified)	12/09/24, 9:58:50 AM	12/09/24, 11:34:33 AM	1h 35m 42s
26	Fisher, Brent (NCEM)	12/09/24, 9:58:53 AM	12/09/24, 11:34:53 AM	1h 35m 59s
27	Cameron West - CoG (Unverified)	12/09/24, 9:58:58 AM	12/09/24, 11:32:53 AM	1h 33m 55s
28	Isabell Cooper	12/09/24, 9:59:45 AM	12/09/24, 11:34:42 AM	1h 34m 56s
29	Bradshaw, McKenzie	12/09/24, 9:59:45 AM	12/09/24, 11:28:57 AM	1h 29m 12s
30	Lori Oakley	12/09/24, 9:59:46 AM	12/09/24, 11:34:51 AM	1h 35m 5s
31	Eaves, Ryan D.	12/09/24, 9:59:53 AM	12/09/24, 11:34:50 AM	1h 34m 57s
32	Sanders, Sweetly	12/09/24, 10:00:00 AM	12/09/24, 11:33:49 AM	1h 33m 49s
33	Amy Eckberg	12/09/24, 10:00:06 AM	12/09/24, 11:25:11 AM	1h 25m 4s
34	Trapp, Ray L (External)	12/09/24, 10:00:19 AM	12/09/24, 11:01:16 AM	1h 57s
35	Tuttle, Sean	12/09/24, 10:00:21 AM	12/09/24, 11:34:49 AM	1h 34m 28s
36	Ashley Ownbey	12/09/24, 10:00:21 AM	12/09/24, 10:57:09 AM	56m 47s
37	Chelsea Helton	12/09/24, 10:00:51 AM	12/09/24, 11:25:44 AM	1h 24m 53s
38	Goddard, Nicole	12/09/24, 10:00:51 AM	12/09/24, 11:32:44 AM	1h 31m 53s
39	Joseph Hoffheimer	12/09/24, 10:00:51 AM	12/09/24, 11:34:47 AM	1h 33m 56s
40	John Richardson	12/09/24, 10:01:30 AM	12/09/24, 11:34:45 AM	1h 33m 15s
41	Donaldson, Crystal	12/09/24, 10:01:46 AM	12/09/24, 11:30:10 AM	1h 28m 24s
42	Johnson, Jinizha M.	12/09/24, 10:02:39 AM	12/09/24, 11:35:04 AM	1h 32m 24s
43	Chloe H (Unverified)	12/09/24, 10:02:40 AM	12/09/24, 11:14:16 AM	1h 11m 36s
44	Eno River Association	12/09/24, 10:03:23 AM	12/09/24, 11:35:05 AM	1h 31m 42s
45	Summerson, Graham	12/09/24, 10:05:47 AM	12/09/24, 11:34:44 AM	1h 28m 56s
46	Phillips, Benjamin	12/09/24, 10:06:08 AM	12/09/24, 11:33:12 AM	1h 27m 4s
47	Will Potter	12/09/24, 10:06:43 AM	12/09/24, 11:14:59 AM	1h 8m 15s
48	Chris Roberts	12/09/24, 10:16:03 AM	12/09/24, 11:34:52 AM	1h 18m 49s
49	John (Unverified)	12/09/24, 10:21:33 AM	12/09/24, 11:17:38 AM	56m 4s
50	Landon/Elon Fire Dept (Unverified)	12/09/24, 10:23:17 AM	12/09/24, 11:35:12 AM	1h 11m 55s
51	Christopher Sandt	12/09/24, 10:43:45 AM	12/09/24, 11:34:50 AM	51m 5s
52	AJ Simmons (Unverified)	12/09/24, 10:47:48 AM	12/09/24, 11:34:52 AM	47m 3s
53	Chukwuemeka Kanu-Oji	12/09/24, 11:05:36 AM	12/09/24, 11:34:49 AM	29m 12s
54				

HMPC MEETING 3: FEBRUARY 11, 2025

Eno Haw Regional Hazard Mitigation Plan Update
Meeting #3
Tuesday, February 11, 2024, 10:00 a.m.
Microsoft Teams Meeting

David Stroud, Abby Moore, Ranger Ruffins, and Kimmy Hansen from WSP, the Region's planning consultants, met with the Hazard Mitigation Planning Committee to cover the topics outlined in the following agenda:

1. Introductions
2. Project Overview
3. Capability Assessment
   a. New Capabilities
   b. Substantial Damage Estimate Procedures
4. Mitigation Strategy
   a. Review Goals & Objectives
   b. Mitigation Action Updates
5. Discussion
6. Next Steps

INTRODUCTIONS

In addition to the consulting team, there were 34 attendees who attended virtually through Microsoft Teams. The full list of attendees is as follows:

- AJ Simmons, Green Level, Public Works Director
- Dan Cremeans, City of Durham, Division Chief
- Tanner Deisch, Town of Chapel Hill, Emergency Management
- Sarah Pickhardt, Orange County, Division Chief of Emergency Management
- Ian Fowler, Orange County, Deputy EMC
- Jessica Goodstein, Durham County, Stormwater Specialist
- Barrett Brown, Town of Green Level, Town Administrator
- Amy Eckberg, Orange County, Sustainability Program Manager
- Christina Moon, Town of Carrboro, Interim Planning Director
- Andy Simmons, Town of Hillsborough, Police Major
- Laura Janway, Town of Carrboro, Environmental Planner
- Sue Burke, Town of Chapel Hill, Stormwater Manager
- David Marsee, Orange County, Healthcare Preparedness Coordinator
- Christopher Sandt, Orange County, County Engineer
- Benjamin Phillips, Durham Water Management
- Cameron West, Graham, Senior Planner
- Chelsea Helton, Duke University, Emergency Management Coordinator
- Chris Saul, Alamance County Emergency Management Coordinator
- Crystal Donaldson, UNC Chapel Hill, Emergency Management

- Graham Summerson, Durham Public Works, Stormwater & Floodplain Engineer
- Hannah Tuckman, Orange County, Emergency Management Planner
- Isabell Cooper, Elon, Planner
- Jinizha Johnson, Durham County, Emergency Management, All Hazards Planner
- John Wellons, Mebane, Fire Chief
- John Richardson, Chapel Hill, Community Resilience Officer
- Joseph Hoffheimer, Town of Hillsborough, Planner
- Kendra Ferrell, Central Carolina Healthcare Preparedness Coalition, Assistant Healthcare Preparedness Coordinator
- Kevin Turner, Burlington, Emergency Management Director
- Kyle Taylor, Durham, Planning Department Business Services Manager
- Lauren Johnson, Roxboro, Planning Director
- Lori Oakley, Elon, Planning Director
- Ryan Eaves, Durham County Erosion Control
- Thomas Verrault, Durham County, EM, Senior Emergency Management Coordinator
- Will Potter, Carrboro Fire Chief

PROJECT OVERVIEW

David Stroud kicked off the meeting with a review of the four phases of FEMA disaster mitigation planning process and the 10 steps of the CRS planning process. We are currently working through Phase 3: Mitigation Strategy, which aligns with Step 6 (Set Goals), Step 7 (Review Possible Activities), and Step 8 (Draft an Action Plan) of the CRS planning process. David reminded the committee that there will be one more committee meeting and one more public meeting where WSP will present the draft plan. Afterwards, the plan will be sent to the State for review.

CAPABILITY ASSESSMENT

A capability assessment measures local resources and tools available to support or implement mitigation projects. It identifies gaps, conflicts, and opportunities in existing local plans, policies, and programs. Additionally, a capability assessment identifies mitigation measures already in place or underway.

Indicators of capability in this plan update include the following:

- Plans and Regulatory – plans, programs, ordinances
- Administrative & Technical – staff, training, expertise
- Fiscal Resources – bonds, fees, taxes, CIP, grants
- Education and Resources – engaged stakeholders, public outreach, warning & notification
- Mitigation Resources – grants, past mitigation projects performance
- Political Will – public and leadership support for mitigation, investments, regulation enforcement

Previous Capability Self-Assessment Results

David reviewed the previous capability self-assessment results which can be found in the table below. David asked if these ratings should be changed and reminded the committee that all comments or revisions about the capability self-assessment results can be emailed directly to the consulting team.

Jurisdiction	Plans, Ordinances, Codes and Programs	Administrative and Technical Capability	Fiscal Capability	Education and Outreach Capability	Mitigation Capability	Political Capability	Overall Capability
Alamance County	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Burlington	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Graham	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Mebane	High	High	High	Moderate	Limited	Moderate	Moderate
Town of Elon	Moderate	Moderate	Limited	Limited	Limited	Limited	Moderate
Town of Green Level	Moderate	Moderate	Limited	Limited	Limited	Limited	Moderate
Town of Haw River	Moderate	Moderate	Limited	Limited	Limited	Limited	Moderate
Town of Ossipee	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Swepsonville	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Village of Alamance	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Durham County	High	High	Moderate	Moderate	Moderate	Limited	Moderate
City of Durham	High	High	Moderate	Moderate	Moderate	Limited	Moderate
Orange County	High	High	Moderate	High	High	Moderate	Moderate
Town of Carrboro	High	High	Moderate	High	High	Moderate	Moderate
Town of Chapel Hill	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Hillsborough	Moderate	Moderate	Moderate	Limited	Limited	Moderate	Moderate
Person County	Moderate	Moderate	Moderate	Limited	Moderate	Limited	Moderate
City of Roxboro	Moderate	High	Moderate	Moderate	Moderate	Limited	Moderate

Changes Since the Last Plan Update

David reviewed the changes in capability that have occurred since the last plan update and mentioned other new resources such as Comprehensive/Land Use Plan updates for all communities, BRIC funding of $200,000 to Alamance County in 2022 and BRIC funding of $870,000 to Orange County in 2021. Abby asked the committee if there were any changes that were missing from the list. The HMPC indicated that there are still some mitigation projects that are currently in the works and some communities are working on securing funding. Sarah Pickhardt noted that the Town of Hillsborough also received BRIC funding; we should review and confirm that data on BRIC funds received are up to date. The City of Durham has a new unified development ordinance, updated land use plan, and county wide open space plan in the works. The Town of Chapel Hill is working to install new flood gauges and a warning system in rivers that would provide an early warning of flooding for downstream communities.

New FEMA Requirements

David briefly noted that there is a new FEMA requirement for substantial damage estimate procedures. The plan must include information on how participating communities use the NFIP to reduce risk after a disaster through substantial damage and substantial improvement (SD/SI) procedures.

Capability Vs. Mitigation

David emphasized the difference between capability and mitigation actions and gave examples of different scenarios found on slide 15. Mitigation actions should be applicable to the next five years and

should be specific actions that help achieve the plans goals and objectives. It is important to focus on projects that reduce risk and vulnerability. Abby noted that status updates need to be reported for each individual action and to remove actions that speak to the regular duties of departments.

MITIGATION STRATEGY

A mitigation strategy is meant to reduce the impact of hazards on existing development and ensure future development occurs in a way that minimizes vulnerability.

Goals & Objectives

Abby reviewed the existing goals and objectives from the previous plan update and discussed potential revisions to implement with the committee for the current plan update.

Goal 1: Change, enhance, or adopt plans, ordinances, policies, regulations, and other local tools and mechanisms to better facilitate risk reduction activities and improve overall resiliency.

- Objective 1-1: Strive to ensure that development occurs in such a way as to protect wetlands, floodplains, erosion control measures, and other natural features that serve to reduce hazard risk.
- Objective 1-2: Pursue policies that incorporate hazard mitigation into new development and post-disaster redevelopment.

Goal 2: Protect the public health, safety and welfare by increasing training, education, and public awareness of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.

- Objective 2-1: Implement a public awareness campaign to educate citizens of possible hazards and mitigation options.
- Objective 2-2: Pursue strategies and technologies to improve warning and notification of hazard events and ensure that emergency services are adequate to protect public health and safety.

Goal 3: Improve technical, administrative, financial, and political capability to implement effective mitigation projects and respond to hazards.

- Objective 3-1: Improve operations for hazards and emergencies that cause disruptions to traffic, release times, power outages, sheltering, and communications.
- Objective 3-2: Improve regular regional communication and foster the creation of more multi-jurisdictional regional planning efforts related to risk reduction and resiliency.

Goal 4: Implement structure and infrastructure projects to improve public safety, reduce risk to vulnerable populations, and protect buildings, transportation, and other critical and essential functions of the Eno-Haw Region.

- Objective 4-1: Strive to keep infrastructure extensions out of known hazardous areas in order to actively discourage development in high risk areas.
- Objective 4-2: Retrofit or otherwise protect critical facilities and infrastructure against damages.

No comments or revisions were recommended by the HMPC on Goals 1 through 3. Abby recommended adding another objective under Goal 4 that covers different property types and discusses the protection of existing development. One HMPC member noted that for objective 4-1, some infrastructure does need to be built into hazardous areas. Abby responded that this objective aims at keeping new development and properties out of hazardous areas but agreed it may be beneficial to change the wording to be more specific within this objective. Overall, it was noted that the current goals are comprehensive. Abby noted that the HMPC can still submit any changes or feedback to WSP at this time.

Mitigation Action Requirements

Abby informed the committee that FEMA requires at least one mitigation action for each identified hazard in the plan update. All mitigation actions will need to be organized into the categories found below. Abby noted that to maximize CRS credit they should include flood-related actions in at least five of the six mitigation categories. The HMPC was reminded that they do not have to have mitigation actions for the man-made hazards but to still look for opportunities to include some if applicable.

1. Prevention (land development plans & zoning, freeboard requirements)
2. Property Protection (acquisition, elevation, floodproofing, backup generators)
3. Structural Projects (floodwalls, stormwater improvements, harden critical infrastructure)
4. Emergency Services (warning systems, response capacity & capability improvements)
5. Natural Resource Protection (dune or wetland restoration, vegetative management, open space preservation)
6. Public Education (mailings, websites, social media campaigns, interactive map tools, hazard disclosure requirements, targeted outreach and engagement)

Current Action Plans

Abby reviewed the current action plans in terms of what mitigation categories they cover and what hazards they address. The tables found on slides 21 through 24 include the status updates that have already been sent to the WSP team. Abby noted to the HMPC that there are currently a lot of mitigation actions that are addressing "All Hazards" and it may be beneficial for communities to consider more hazard specific actions in the future.

PRI Summary Results

Abby briefly reviewed the PRI summary results with the committee. Flood, hurricane and tropical storms, excessive heat, drought, severe winter weather, and critical infrastructure failure were the only hazard profiles to be rated a "High Risk" for the Eno-Haw Region. Abby reminded the committee that it is important to consider adding more mitigation actions for the high priority hazards.

High Risk (≥ 3.0)	Flood Hurricane & Tropical Storm Excessive Heat Drought Critical Infrastructure Failure Severe Winter Weather
Moderate Risk (2.0 – 2.9)	Dam Failure Tornadoes & Thunderstorms Wildfire Cyber Threat Civil Unrest Hazardous Materials Incident Infectious Disease Terrorism / Mass Casualty Radiological Emergency
Low Risk (< 2.0)	Earthquake Landslide

New Mitigation Action Ideas

Abby discussed potential new mitigation action ideas that could be added into the plan update. She reminded the committee that these are only ideas to help them think of new actions and have not been added to the plan update. The action ideas presented can be found on slides 27-31. Note that WSP will add the mitigation action recommended by NC Forest Service for wildfire mitigation to all communities' action plans unless there are any objections.

Abby encouraged the committee to look for plan integration opportunities by incorporating actions from their comprehensive plans or capital improvement plans and to include any actions they want to pursue for grant funding in the next five years. NCORR's Resilience Exchange Actions Database was recommended as a resource for new mitigation action ideas.

Survey Results

Abby reviewed results of the public survey which received a total of 144 responses. Abby will send a copy of the survey responses, which can be sorted by jurisdiction to help give specific feedback to the different communities regarding proposed mitigation action ideas.

PROJECT SCHEDULE

Abby presented an update on the schedule for the planning process, which includes additional HMPC and public meetings in March. The draft plan is due to NCEM by March 21st. The plan must be approved by NCEM and FEMA and adopted by all communities before the current plan expires in September 2025.

NEXT STEPS & DISCUSSION

Abby presented next steps and action items for WSP and the HMPC. WSP will send the existing mitigation action plans to the committee; the HMPC were asked to send mitigation action status updates and new mitigation actions to Abby Moore at abigail.moore@wsp.com as soon as possible.

WSP will share the draft plan in March for the committee and public to review and provide feedback. WSP will also be reaching out to schedule a final HMPC and public meetings for March. Based on an informal poll, it was decided that the final meeting will be held virtually.

HMPC Meeting #3 Online Attendance

DS Stroud, David
SB Sue Burke (Unverified)
GS Summerson, Graham (Unverif...
TD Tanner Deisch (Unverified)
KT Taylor, Kyle (Unverified)
TV Verrault, Thomas A. (Unverifie...
WP Will Potter (Unverified)

KH Hansen, Kimberly
AS AJ Simmons (Unverified)
AE Amy Eckberg (Unverified)
AS Andy Simmons (Unverified)
BB Barrett Brown (Unverified)
CW Cameron West - ... (Unverified)
CH Chelsea Helton (Unverified)
CM Christina Moon (Unverified)
CS Christopher Sand... (Unverified)
CS Christopher Saul (Unverified)
DC Cremeans, Danial (Unverified)
DM David Marsee (Unverified)
CD Donaldson, Crystal (Unverified)
RE Eaves, Ryan D. (Unverified)
JG Goodstein, Jessica (Unverified)

HT Hannah Tuckman (Unverified)
IF Ian Fowler (Unverified)
IC Isabell Cooper (Unverified)
JR John Richardson (Unverified)
JW John Wellons (Unverified)
JJ Johnson, Jinizha M. (Unverified)
JH Joseph Hoffheimer (Unverified)
KF Kendra Ferrell (Unverified)
KT Kevin Turner (Unverified)
LJ Laura Janway (Unverified)
CJ Lauren Johnson, ... (Unverified)
LO Lori Oakley (Unverified)
AM **Moore, Abigail**
Organizer
BP Phillips, Benjamin (Unverified)
RN rad.ai meeting no... (Unverified)
Ruffins, Ranger
SP Sarah Pickhardt (Unverified)

HMPC MEETING 4: APRIL 3, 2025

Eno Haw Regional Hazard Mitigation Plan Update
Hazard Mitigation Planning Committee Meeting #4
Thursday, April 3, 2025, 10:00 a.m.
Microsoft Teams Meeting

David Stroud, Abby Moore, Ranger Ruffins, and Kimmy Hansen from WSP, the Region's planning consultants, met with the planning committee to cover the topics outlined in the following agenda:

1. Introductions
2. Planning Process Update
3. Review of Key Plan Components
   a. Planning Process
   b. Risk Assessment
   c. Mitigation Strategy
4. Plan Adoption & Implementation
5. Next Steps
6. Discussion & Feedback on Draft Plan

INTRODUCTIONS

In addition to the consulting team, there were 22 attendees:

- Tanner Deisch, Town of Chapel Hill, Emergency Management
- Jessica Goodstein, Durham County, Stormwater Specialist
- Christopher Saul, Alamance County Emergency Management Coordinator
- Graham Summerson, Durham Public Works, Stormwater & Floodplain Engineer
- Hannah Tuckman, Orange County, Emergency Management Planner
- Isabell Cooper, Elon, Planner
- Jinizha Johnson, Durham County, Emergency Management, All Hazards Planner
- John Richardson, Chapel Hill, Community Resilience Officer
- Joseph Hoffheimer, Town of Hillsborough, Planner
- Kevin Turner, Burlington, Emergency Management Director
- Lauren Johnson, Roxboro, Planning Director
- Ryan Eaves, Durham County Erosion Control
- Thomas Verrault, Durham County, EM, Senior Emergency Management Coordinator
- Reema Garabadu, Eno River Association, Land Conservation Manager
- Martin Roupe, Carrboro, Development Review Administrator
- Ashley Ownbey, Mebane, Development Director
- Crystal Donaldson, UNC Emergency Management, Continuity and Resiliency Planner
- Sue Burke, Chapel Hill, Stormwater Manager
- Lori Oakley, Elon, Planning Director
- Brent Fisher, NCEM
- John Mello, NCEM
- Carl Baker, NCEM

PLANNING PROCESS UPDATE

David Stroud with WSP began the presentation by explaining where we are in the planning process. We are nearing the end of the planning process as we have drafted the plan and now need to finalize it with any new mitigation actions that the communities wish to add. The plan will then need to be adopted and the HMPC and communities will work on implementation for the next five years.

STRUCTURE OF THE PLAN

David provided an overview of the structure of the draft plan including a summary of each section of the plan, as follows.

- **Section 1: Introduction** provides background information on the plan, including context and justification for planning and the scope of the plan.
- **Section 2: Planning Process** summarizes how the planning process was conducted and how all planning requirements were met, including how the communities, public, and stakeholders were involved in the plan. This section also documents implementation progress of the last plan in terms of completed and deleted mitigation actions.
- **Section 3: Planning Area Profile** for summary information on the region and participating communities, including geographic, climate, demographic, and economic characteristics of the region.
- **Section 4: Risk Assessment** contains the bulk of the plan. This section presents the hazard identification and profiles each hazard with information on the location at risk, past occurrences, probability of future occurrence, and vulnerability of people, property, and critical facilities.
- **Section 5: Capability Assessment** summarizes each community's existing tools, staff, and other resources that can support the implementation of mitigation projects.
- **Section 6: Mitigation Strategy** reviews the goals and objectives of the plan and details how mitigation actions were identified and prioritized. David explained that existing mitigation actions from the previous plan were reviewed, and project status updates are reported in the plan. Some projects were carried forward. The HMPC also reviewed new mitigation projects to include in this plan update.
- **Section 7: Mitigation Action Plans** presents the action plan tables for each community.
- **Section 8: Plan Maintenance** describes past plan integration, opportunities for future plan integration, and the process for regular monitoring, maintenance, and implementation of the plan, including ongoing responsibilities of the HMPC.
- **Section 9: Plan Adoption** will document each community's adoption of the plan update.
- **Annexes** are provided for each participating community. The annexes provide an asset inventory with a full critical facility list, risk assessment data with vulnerability assessment results specific to the community for spatially defined hazards, and the mitigation action plan.
- **Appendix A** provides the Local Mitigation Plan Review Tool, which documents for the plan reviewers where the planning requirements were met.
- **Appendix B** provides planning process documentation demonstrating how the HMPC, public, and stakeholders were involved and engaged in the planning process.
- **Appendix C** provides mitigation alternatives analysis, documenting the review of mitigation action options, which is important for the CRS program planning requirements.
- **Appendix D** lists data and resources that were referenced in the plan.

KEY PLAN COMPONENTS

Abby reviewed key parts of the planning process, including the HMPC meetings, the public meetings, and all the participating communities' public outreach efforts. She noted that there is one more opportunity to get the public involved in the planning process with the review of the draft plan. It will be posted on the plan website. Communities can share this link and encourage folks to read and comment on the plan.

Abby reviewed some high-level survey results, which were previously presented to the HMPC. There were 144 responses overall. The hazard risk ratings from the public aligned with the findings of the risk and vulnerability assessment. Regarding past hazard experiences, many responses reference past hurricanes, flooding, thunderstorms & tornadoes, and severe winter storms. Regarding recommended steps local governments could take to reduce hazard impacts, responses include suggestions for drainage improvements, increase education preparedness, and provide prevention activities like planning, development regulations, or stream buffers.

Abby presented the Priority Risk Index results as a summary of the risk and vulnerability assessment. She explained that the PRI is a methodology for comparing the hazards based on five categories: probability, severity, spatial extent, warning time, and duration. Drought, Excessive Heat, Flood, Severe Winter Weather, Hurricane and Tropical Storm, and Critical Infrastructure Failure were rated as "High Risk" for the Eno Haw Region.

Abby presented the goals and objectives which were largely carried forward from the previous plan with some small revisions. The goals and objectives are as follows:

***Goal 1*: Change, enhance, or adopt plans, ordinances, policies, regulations, and other local tools and mechanisms to better facilitate risk reduction activities and improve overall resiliency.**

- Objective 1.1: Strive to ensure that development occurs in such a way as to protect wetlands, floodplains, erosion control measures, and other natural features that serve to reduce hazard risk.
- Objective 1.2: Pursue policies that incorporate hazard mitigation into new development and post-disaster redevelopment.

***Goal 2*: Protect the public health, safety and welfare by increasing training, education, and public awareness of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.**

- Objective 2.1: Implement a public awareness campaign to educate citizens of possible hazards and mitigation options.
- Objective 2.2: Pursue strategies and technologies to improve warning and notification of hazard events and ensure that emergency services are adequate to protect public health and safety.

***Goal 3*: Improve technical, administrative, financial, and political capability to implement effective mitigation projects and respond to hazards.**

- Objective 3.1: Improve operations for hazards and emergencies that cause disruptions to traffic, release times, power outages, sheltering, and communications.
- Objective 3.2: Improve regular regional communication and foster the creation of more multi-jurisdictional regional planning efforts related to risk reduction and resiliency.

***Goal 4*: Implement structure and infrastructure projects to improve public safety, reduce risk to vulnerable populations, and protect buildings, transportation, and other critical and essential functions of the Eno-Haw Region.**

- Objective 4.1: Limit infrastructure extensions into known hazardous areas to actively discourage greenfield development in high risk areas.
- Objective 4.2: Retrofit or otherwise protect existing property, critical facilities, and infrastructure against damages.

Abby reviewed a sample of the mitigation action plan to explain the organization of the table and the information included for each project, such as the lead agency, timeline for implementation, and potential funding sources.

Abby noted that at a minimum, every community in the region will have a general elevation project and a general acquisition project in the plan. Every community will also have a general drainage improvement project in the plan.

Abby also shared an action for Community Wildfire Protection Plans recommended by NC Forest Service. All three of these actions will be added to each communities' plan if they are not already included.

PLAN ADOPTION AND IMPLEMENTATION

Abby explained that every community will need to adopt the plan. A template adoption resolution from NCEM will be provided to all communities. Once NCEM approves the plan, communities can adopt the plan.

Moving forward, the HMPC should meet quarterly to report on progress toward implementation and monitor funding opportunities and implementation of mitigation actions. At minimum, annual HMPC meetings should be held. The plan will continue to be updated every five years.

NEXT STEPS

The HMPC was asked to send any final mitigation actions updates or new actions to Abby by Wednesday, April 9th. WSP will submit the draft plan to NCEM for review and approval on April 10th.

A final public meeting is scheduled for April 9th at 5pm. Community staff are asked to advertise the meeting to the public. It will be a virtual meeting, and attendees must register in advance.

Any other draft plan comments should be sent by Friday, April 25th. Comments will be incorporated into the final approved version of the plan.

HMPC Meeting #4 Online Attendance

KH Hansen, Kimberly
AO Ashley Ownbey (Unverified)
CB Baker, Carl (NCEM) (Unverified)
CS Christopher Saul (Unverified)
CD Donaldson, Crystal (Unverified)
RE Eaves, Ryan D. (Unverified)
BF Fisher, Brent (NCEM) (Unverifi...
JG Goodstein, Jessica (Unverified)
HT Hannah Tuckman (Unverified)
IC Isabell Cooper (Unverified)
JR John Richardson (Unverified)
JJ Johnson, Jinizha M. (Unverified)
JH Joseph Hoffheimer (Unverified)
KT Kevin Turner (Unverified)
LJ Lauren Johnson (Unverified)
LO Lori Oakley (Unverified)
MR Martin Roupe (Unverified)
JM Mello, John (NCEM) (Unverified)
AM **Moore, Abigail** Organizer
RN read.ai meeting n... (Unverified)
RG Reema Garabadu (Unverified)
Ruffins, Ranger
DS Stroud, David
SB Sue Burke (Unverified)
GS Summerson, Graham (Unverifi...
TD Tanner Deisch (Unverified)
TV Verrault, Thomas A. (Unverified)

B.2 PLANNING STEP 2: INVOLVE THE PUBLIC

Table B.2 – Public Meeting Topics, Dates, Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Explanation of mitigation 3) Review of the project schedule 4) Review of hazard identification	September 19, 2024 5 p.m.	Whitted Human Services Building, 300 West Tryon Street, Hillsborough
Public Meeting #2	1) Review "Draft" Hazard Mitigation Plan 2) Solicit comments and feedback	April 9, 2025 5 p.m.	Microsoft Teams

PUBLIC MEETING AGENDAS, MINUTES, SIGN-IN SHEETS, AND ANNOUNCEMENTS

PUBLIC MEETING 1: SEPTEMBER 19, 2024

Eno Haw Regional Hazard Mitigation Plan Update
Public Meeting #1
Thursday, September 19, 2024, 5:00 p.m.
Whitted Building, 300 W. Tryon St, Hillsborough, NC 27278

David Stroud, Ranger Ruffins, Abby Moore, and Kimmy Hansen from WSP, the County's consultants, met with the public to cover the topics outlined in the following agenda:

1. Introductions
2. Why Plan?
3. Project Overview
4. Planning Process
5. Project Schedule
6. Next Steps
7. Q & A

There were no attendees from the public. A presentation was prepared that followed the above agenda.

1 Eno Haw Regional Hazard Mitigation Plan Update | Meeting #1

Eno Haw Regional Hazard Mitigation Plan Update

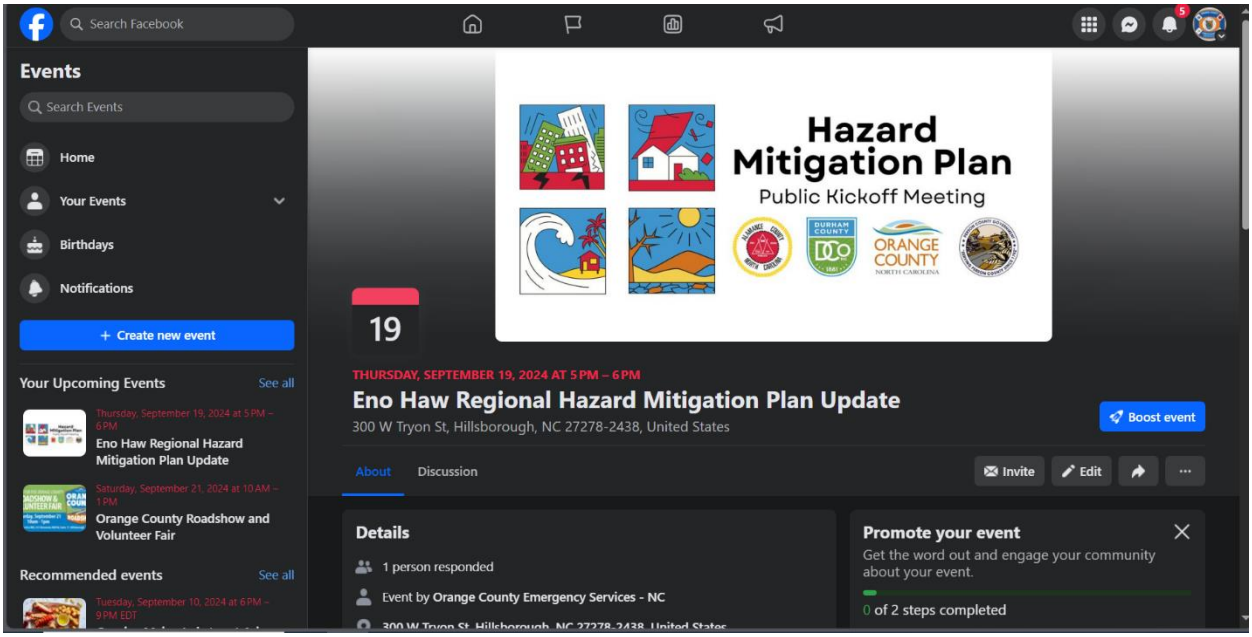
Public Meeting #1 – September 19, 2024, 5:00pm

Name	Agency/Organization/Affiliation	Email
DAVID STROUD	WSP	david.Stroude wsp.com
Kimmy Hansen	WSP	Kimberly.Hansen@WSP.com
ABBY MOORE	WSP	abigail.moore@ wsp.com
Sarah Pickhardt	OCES	spickhardt@orangecountync.gov
Ian Fowler	OCES	ifowler@orangecountync.gov
Hannah Tuckman	OCES	htuckman@orangecountync.gov

1

Meeting materials posted on plan website:

Meeting Advertisements:



Alamance County Emergency Management
Published by Christopher Saul
· September 11 at 8:32 AM ·

It is time for the five-year update to the Eno Haw Regional Hazard Mitigation Plan, which covers the counties of Alamance, Orange, and Durham. We invite all citizens and stakeholders to participate in this process.

This Thursday at 5 PM
Eno Haw Regional Hazard Mitigation Plan Update
300 W Tryon St, Hillsborough, NC 27278-2438, United States
2 people going

Interested

PUBLIC MEETING 2: APRIL 9, 2025

Eno Haw Regional Hazard Mitigation Plan Update
Public Meeting #2
Wednesday, April 9, 2025, 5:00 p.m.
Microsoft Teams

David Stroud, Abby Moore, and Ranger Ruffins from WSP, the County's consultants, met with the public to cover the topics outlined in the following agenda:

1. Introductions
2. Planning Process Update
3. Structure of the Plan
4. Review of Key Plan Components
   a. Planning Process Risk Assessment
   b. Mitigation Strategy
5. Plan Adoption and Implementation
6. Next Steps
7. Discussion/Feedback on Draft Plan

ATTENDANCE

The following individuals were in attendance:

- Arleen Eppinger, Hillsborough resident
- David Stroud, WSP
- Abby Moore, WSP
- Ranger Ruffins, WSP

PLANNING PROCESS UPDATE

David reviewed where we are in the planning process noting that the draft plan has been completed, and the next step will be to adopt the plan. The final step will be to implement the plan and periodically evaluate and revise the plan.

David explained that the planning process followed the DMA planning process and integrated Community Rating System (CRS) Activity 510 planning steps into the DMA four-phase planning process to meet the requirements of both programs.

STRUCTURE OF THE PLAN

David provided an overview of the structure of the draft plan including a summary of each section of the plan, as follows.

- **Section 1: Introduction** provides background information on the plan, including context and justification for planning and the scope of the plan.
- **Section 2: Planning Process** summarizes how the planning process was conducted and how all planning requirements were met, including how the communities, public, and stakeholders were involved in the plan. This section also documents implementation progress of the last plan in terms of completed and deleted mitigation actions.

- **Section 3: Planning Area Profile** for summary information on the region and participating communities, including geographic, climate, demographic, and economic characteristics of the region.
- **Section 4: Risk Assessment** contains the bulk of the plan. This section presents the hazard identification and profiles each hazard with information on the location at risk, past occurrences, probability of future occurrence, and vulnerability of people, property, and critical facilities.
- **Section 5: Capability Assessment** summarizes each community's existing tools, staff, and other resources that can support the implementation of mitigation projects.
- **Section 6: Mitigation Strategy** reviews the goals and objectives of the plan and details how mitigation actions were identified and prioritized. David explained that existing mitigation actions from the previous plan were reviewed, and project status updates are reported in the plan. Some projects were carried forward. The HMPC also reviewed new mitigation projects to include in this plan update.
- **Section 7: Mitigation Action Plans** presents the action plan tables for each community.
- **Section 8: Plan Maintenance** describes past plan integration, opportunities for future plan integration, and the process for regular monitoring, maintenance, and implementation of the plan, including ongoing responsibilities of the HMPC.
- **Section 9: Plan Adoption** will document each community's adoption of the plan update.
- **Annexes** are provided for each participating community. The annexes provide an asset inventory with a full critical facility list, risk assessment data with vulnerability assessment results specific to the community for spatially defined hazards, and the mitigation action plan.
- **Appendix A** provides the Local Mitigation Plan Review Tool, which documents for the plan reviewers where the planning requirements were met.
- **Appendix B** provides planning process documentation demonstrating how the HMPC, public, and stakeholders were involved and engaged in the planning process.
- **Appendix C** provides mitigation alternatives analysis, documenting the review of mitigation action options, which is important for the CRS program planning requirements.
- **Appendix D** lists data and resources that were referenced in the plan.

KEY PLAN COMPONENTS

Abby reviewed key parts of the planning process, including the HMPC meetings, the public meetings, and all the participating communities' public outreach efforts. She noted that there is one more opportunity to get the public involved in the planning process with the review of the draft plan which is posted on the plan website.

Abby reviewed some high-level survey results, which were previously presented to the HMPC. There were 144 responses overall. Most respondents have been impacted by a hazard. Regarding past hazard experiences, many responses reference past hurricanes, flooding, thunderstorms & tornadoes, and severe winter storms.

Arleen asked if the hazard mitigation plan and planning process has been around for a while or if the HMP is a new for the Eno-Haw region. Abby explained that Eno-Haw has had past hazard mitigation plans and that this plan is an update of the previous plan. She also noted that HMPs are updated every five years.

Abby presented the Priority Risk Index (PRI) results as a summary of the risk and vulnerability assessment. She explained that the PRI is a methodology for comparing the hazards based on five

categories: probability, severity, spatial extent, warning time, and duration. Drought, Excessive Heat, Flood, Severe Winter Weather, Hurricane and Tropical Storm, and Critical Infrastructure Failure were rated as "High Risk" for the Eno Haw Region.

Abby presented the goals and objectives which were largely carried forward from the previous plan with some small revisions.

A sample of the mitigation action plan was presented. Abby explained the organization of the table and the information included for each project, such as the lead agency, timeline for implementation, and potential funding sources. Arleen asked if there is a mitigation strategy for each community. Abby confirmed that each county and jurisdictions have their own strategy noting that some projects apply to multiple jurisdictions.

Arleen how communities receive federal funding and if the plan needs to be submitted to the government. Abby explained that the plan is approved by FEMA. She also explained that when communities apply for funding for a project, FEMA requires that the is included in the plan. As such, desired actions should be included in the mitigation plan so that when funding is available, the project can be eligible for funding. Abby also noted that some general language is included in the mitigation plan to ensure projects can still be captured as priorities shift over the next five years.

NEXT STEPS

The draft plan is available for review on the plan website at www.EnoHawHMP.com. Comments should be submitted by Friday, April 25th.

Local adoptions are estimated to be completed in June and July with submission to FEMA for review in July or August. The final plan should be approved before the current plan expires in September 21, 2025.

Public Meeting #2 Online Attendance

Participants

Name	First join	Last leave	In-meeting duration	Registration status	Role
AM Moore, Abigail abigail.moore@wsp.com	4:56 PM	5:51 PM	55m 33s	--	Organizer
DS Stroud, David david.stroud@wsp.com	4:56 PM	5:51 PM	54m 56s	--	Organizer
Ruffins, Ranger ranger.ruffins@wsp.com	4:58 PM	5:51 PM	53m 10s	--	Organizer
AE Arleen Eppinger arleen.eppinger@duke.edu	5:02 PM	5:51 PM	49m 26s	Registered	Attendee

Meeting Advertisements

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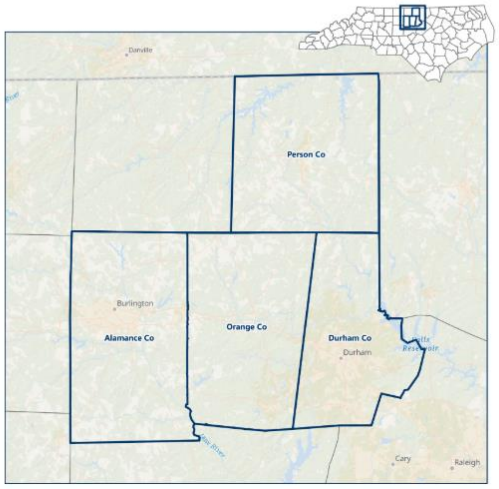
Eno-Haw Regional Hazard Mitigation Plan

Join us for a virtual public meeting on Wednesday, April 9 at 5pm to learn about the plan update and share your input on the draft plan. Register here to attend.

Welcome to the website for the 2024 update of the Neuse River Regional Hazard Mitigation Plan.

Alamance, Durham, Orange, and Person Counties and incorporated communities are updating the Eno-Haw Regional Hazard Mitigation Plan. This plan update is required for all communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. This effort will also help the counties and communities to identify hazard risks, understand vulnerability, and develop ways to proactively mitigate risk. Public input is vital to understanding local risks and mitigation opportunities. On this website you can find information about past and upcoming planning meetings, draft documents, and a survey on hazard risks and vulnerabilities, as well as a way to provide comments to the planning team. Check back for updates and new information throughout the planning process.



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The Eno-Haw Regional Hazard Mitigation Plan Public Meeting - April 9, 2025

The Eno-Haw Regional Hazard Mitigation Plan update is nearly complete, and we want to hear from you! Join us for a virtual public meeting on Wednesday, April 9th at 5pm to learn about the plan update and share your input on the draft plan. Register here to attend.

The hazard mitigation plan evaluates our community's hazard risks and vulnerabilities and establishes goals, objectives, and actions for reducing risk and building local resilience. Visit www.EnoHawHMP.com to learn more about the draft plan and provide your comments to the planning team.

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Contact Information
Address: 104 S. Williamson Ave. Elon, NC 27244
Phone: 336-584-3601

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Monday - Friday 8am - 5pm

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APRIL 09, 2025

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APRIL 09, 2025

The Eno-Haw Regional Hazard Mitigation Plan Public Meeting - April 9, 2025

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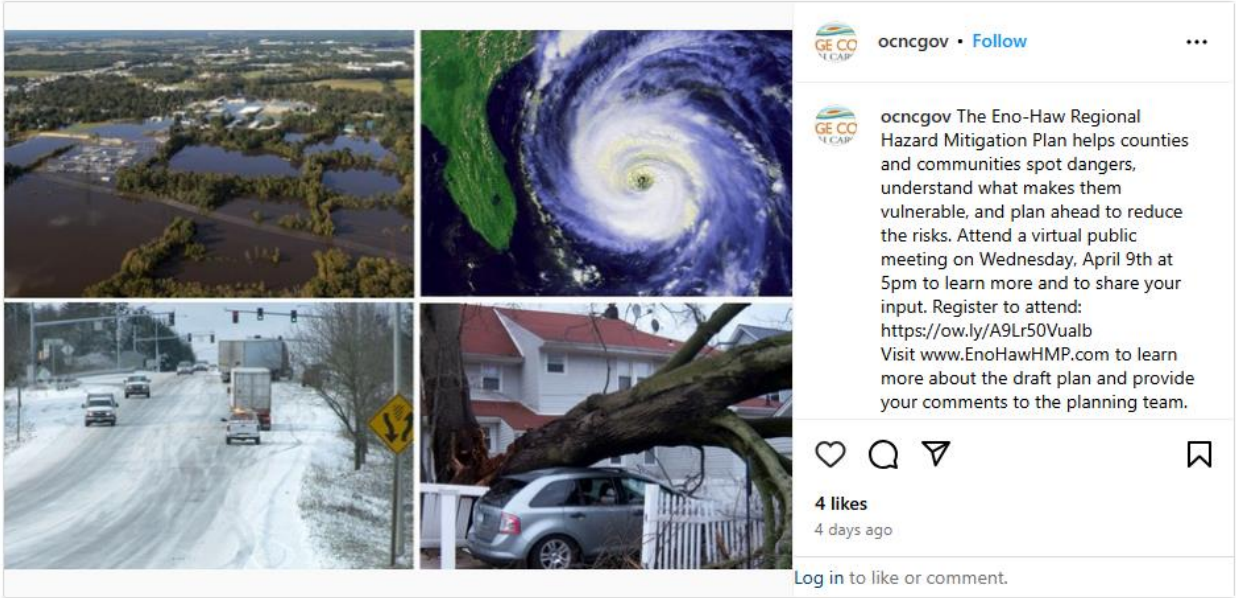
SEE ALL NEWS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ocncgov The Eno-Haw Regional Hazard Mitigation Plan helps counties and communities spot dangers, understand what makes them vulnerable, and plan ahead to reduce the risks. Attend a virtual public meeting on Wednesday, April 9th at 5pm to learn more and to share your input. Register to attend: https://ow.ly/A9Lr50Vualb
Visit www.EnoHawHMP.com to learn more about the draft plan and provide your comments to the planning team.
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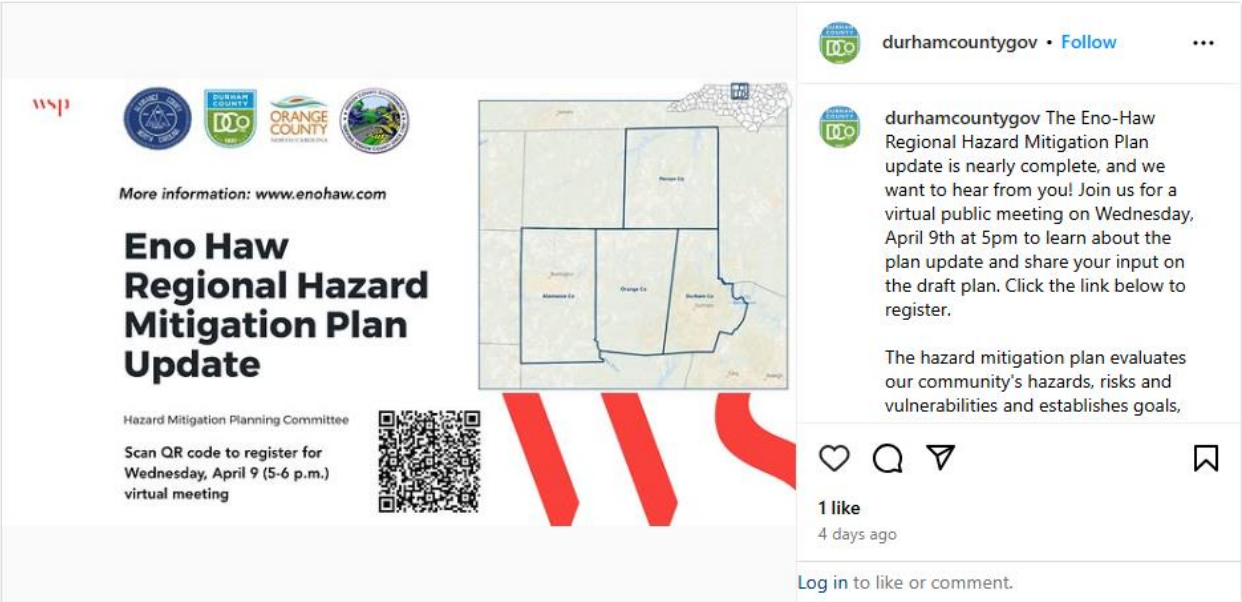
Orange County NC Gov
@OCNCGOV
The Eno-Haw Regional Hazard Mitigation Plan helps counties and communities spot dangers, understand what makes them vulnerable, and plan ahead to reduce the risks. Attend a virtual public meeting on Wednesday, April 9th at 5pm: ow.ly/iMXx50Vualc
4:10 PM · Apr 4, 2025 · 86 Views

ocncgov 4d
The Eno-Haw Regional Hazard Mitigation Plan helps counties and communities spot dangers, understand what makes them vulnerable, and plan ahead to reduce the risks. Attend a virtual public meeting on Wednesday, April 9th at 5pm to learn more and to share your input. Register to attend: ow.ly/9mZI5...
Visit EnoHawHMP.com to learn more about the draft plan and provide your comments to the planning team.


wsp
ORANGE COUNTY
More information: www.enohaw.com
Eno Haw Regional Hazard Mitigation Plan Update
Hazard Mitigation Planning Committee
Scan QR code to register for Wednesday, April 9 (5-6 p.m.) virtual meeting
durhamcountygov • Follow
durhamcountygov The Eno-Haw Regional Hazard Mitigation Plan update is nearly complete, and we want to hear from you! Join us for a virtual public meeting on Wednesday, April 9th at 5pm to learn about the plan update and share your input on the draft plan. Click the link below to register.
The hazard mitigation plan evaluates our community's hazards, risks and vulnerabilities and establishes goals,
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Give Your Thoughts for Hazard Plan

Post Date: April 08, 2025 11:00 a.m.

Your input is wanted to help reduce risks in the Eno and Haw rivers region.

Join the Town of Hillsborough, Orange County and others at a virtual meeting next week to learn about an update to the region's hazard mitigation plan and to provide your input on the draft plan.

The virtual public meeting about the Eno-Haw Regional Hazard Mitigation Plan will be at 5 p.m. Wednesday. Register to attend. Participants will be able to:

- Share their experiences and identify recurring risks.
- Discuss mitigation actions that will enhance the region's resiliency.
- Provide feedback to create a plan that reflects and serves the region.

Alamance, Durham, Orange and Person counties and the incorporated communities within them began work on updating the plan in September. The project is nearly complete. The draft plan:

- Evaluates the community's hazard risks and vulnerabilities.
- Establishes goals, objectives and actions to reduce risk and build local resilience.

The update is required for the participating communities to maintain eligibility for pre- and post-disaster mitigation funding from the Federal Emergency Management Agency. The plan also will help communities in the region to identify hazard risks, understand vulnerability and develop ways to reduce risk.

See the Eno-Haw Regional Hazard Mitigation Plan website for more information and to provide comments to the planning team. All comments on the draft plan are due by April 25.

Durham County Government
23h

The Eno-Haw Regional Hazard Mitigation Plan update is nearly complete, and we want to hear from you! Join us for a virtual public meeting on Wednesday, April 9th at 5pm to learn about the plan update and share your input on the draft plan. Click the link below to register.

The hazard mitigation plan evaluates our community's hazards, risks and vulnerabilities and establishes goals, objectives, and actions for reducing risk and building local resilience. Visit www.EnoHawHMP.com to learn more about the draft plan and provide your comments to the planning team.

Register: https://events.teams.microsoft.com/.../6532be8a-77e0-4cf2... (or scan QR code)

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The Eno-Haw Regional Hazard Mitigation Plan 2025 update is nearly complete. Durham City-County residents are encouraged to review and comment during plan updates. Join us for a virtual public meeting on Wednesday, April 9th at 5pm to learn about the plan update and share your input on the draft plan. Register here to attend.

PLAN WEBSITE AND OUTREACH

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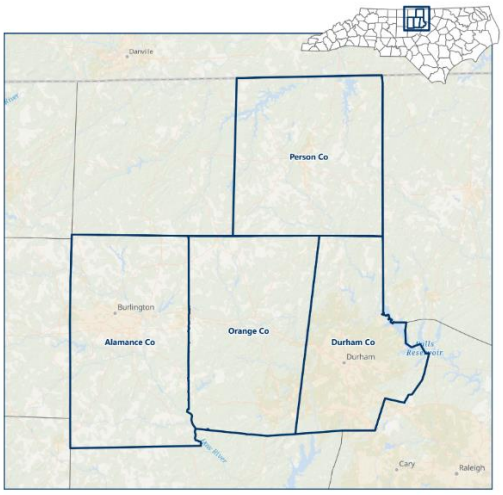
Eno-Haw Regional Hazard Mitigation Plan

Welcome to the website for the 2024 update of the Neuse River Regional Hazard Mitigation Plan.

Alamance, Durham, Orange, and Person Counties and incorporated communities are updating the Eno-Haw Regional Hazard Mitigation Plan. This plan update is required for all communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. This effort will also help the counties and communities to identify hazard risks, understand vulnerability, and develop ways to proactively mitigate risk. Public input is vital to understanding local risks and mitigation opportunities. On this website you can find information about past and upcoming planning meetings, draft documents, and a survey on hazard risks and vulnerabilities, as well as a way to provide comments to the planning team. Check back for updates and new information throughout the planning process.

→ TAKE THE SURVEY (open through December 2024)



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Environmental Health Division

Alerts

- There are no alerts at this time.

LOCATION	HOURS	CONTACT
Physical Address: 131 W Margaret Lane Unit 100 Hillsborough, NC 27278 Directions **Mailing Address:** PO Box 8181 Hillsborough, NC 27278	**Monday - Friday:** 8:00 am - 5:00 pm Closed on Orange County Holidays.	**Phone:** (919) 245-2360 **Need to find our staff?** Click here for contacts and bios. Find staff schedules, areas of expertise, and organizational information. **Have a Question?** Ask an Environmental Health Specialist

What's new?

The Eno-Haw Regional Hazard Mitigation Plan update is underway and we need your input! Respond to this survey to share your concerns about hazard risks and your ideas for mitigation.

Visit www.enohawhmp.com for more information about the plan update.

Eno-Haw Regional Hazard Mitigation Plan Public Survey

GET A SAME-DAY WELL GROUT APPOINTMENT BY EMAIL OR TEXT!

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- Long Term Recovery and Transformation Plan
- Climate Action Plan
- Regional Resilience Assessment

Eno-Haw Regional Hazard Mitigation Plan

Eno-Haw Regional Hazard Mitigation Plan

"Through a coordinated regional planning effort, create and implement an effective hazard mitigation plan that will identify and reduce risk to natural hazards in order to protect the health, safety, quality of life, environment, and economy of the Eno-Haw area."

Take Part in the 2024 Plan Update

The Eno-Haw Regional Hazard Mitigation Plan update is underway, and we need your input! This plan update is required for the participating counties, municipalities, and tribes to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. The plan will also help our communities to identify hazard risks, understand vulnerability, and develop ways to proactively reduce risk.

Click Here to learn more about the plan and planning updates.

Take the Survey (open through December 2024)

- Local Mitigation Planning Handbook (PDF)
- Mitigation Ideas (PDF)
- Integrating Hazard Mitigation Into Local Planning (PDF)
- Integrating Historic Property and Cultural Resource Considerations (PDF)
- Building a Disaster Resistant University (PDF)

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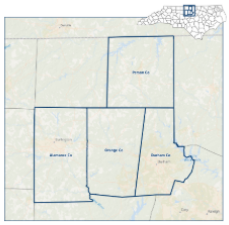
News Flash Home

The original item was published from 12/10/2024 12:02:57 PM to 2/20/2025 4:42:30 PM.

Carrboro Town News

Posted on: December 10, 2024

[ARCHIVED] Provide Input on the Eno-Haw Regional Hazard Mitigation Plan



CARRBORO, N.C. -- Carrboro and its regional hazard mitigation planning partners are seeking public input as part of the five-year update of the Eno-Haw Regional Hazard Mitigation Plan. The plan includes information about natural and man-made hazards, associated risks, and actions we can undertake to reduce exposure. An up-to-date plan is required for the participating counties, municipalities, and tribes to maintain eligibility for pre- and post-disaster mitigation funding from the Federal Emergency Management Association (FEMA).

- Take the online survey through the end of December.
- Visit the project webpage to learn more at https://www.enohawhmp.com/.

If you have questions about Carrboro's hazard mitigation efforts, contact:

- Will Potter, Fire Rescue Chief at wpotter@carrboronc.gov or 919-918-7349
- Trish McGuire, Planning Director at pmcguire@carrboronc.gov or 919-918-7327

###

Other News in Carrboro Town News

Durham City/County Emergency Management
October 14, 2024 ·

The Eno-Haw Regional Hazard Mitigation Plan update is underway and we need your input! Respond to this survey to share your concerns about hazard risks and your ideas for mitigation. Visit www.enohawhmp.com for more information about the plan update.

Survey link: https://forms.office.com/e/jKQ6cfjEi5

Durham County Government City of Durham, NC Government Ciudad de Durham en Español

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Durham County, NC
@DurhamCounty

The Durham County Emergency Management Division of the Office of Emergency Services and other partner county organizations are in the process of updating the Eno-Haw Regional Hazard Mitigation Plan. Public input is critical to the planning process. If you live in Durham, Alamance, Orange, or Person County, or you live outside the Eno-Haw Region but work or recreate in the area, please take a few minutes to complete a brief public survey to provide your input on hazard risks and mitigation options.

The survey can be found here - forms.office.com/pages/response...

For more information about the plan update, visit the project website at enohawhmp.com. On this site you will find information about upcoming and past Hazard Mitigation Planning Committee meetings and public meetings, a link for the public survey, draft documents, and other mitigation planning resources.

Please share this survey with those you think might have feedback!

10:30 AM · Dec 28, 2024 · **226** Views

Durham County Government
December 28, 2024 ·

The Durham County Emergency Management Division of the Office of Emergency Services and other partner county organizations are in the process of updating the Eno-Haw Regional Hazard Mitigation Plan. Public input is critical to the planning process. If you live in Durham, Alamance, Orange, or Person County, or you live outside the Eno-Haw Region but work or recreate in the area, please take a few minutes to complete a brief public survey to provide your input on hazard risks and mitigation options.

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SURVEY - Regional Hazard Mitigation Plan

Post Date: 11/25/2024 2:02 PM

Alamance, Durham, Orange, and Person Counties are updating their Regional Hazard Mitigation Plan to identify and assess our communities' risks from hazards such as flooding, drought, heat, hurricane, severe weather, winter weather, and other hazards. Public input is critical to the planning process. Please take a few minutes to complete a brief public survey to provide your input on hazard risks and mitigation options. Click here or scan the QR code for the survey.

For more information about the plan update, visit the project website at www.enohawhmp.com. On this site you will find information about upcoming and past Hazard Mitigation Planning Committee meetings and public meetings, a link for the public survey, draft documents, and other mitigation planning resources.

CITY OF ROXBORO NC

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NEWS

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Eno Haw Hazard Mitigation Plan update is underway, and we need your input!

Post Date: 09/16/2024 1:33 PM

The Eno-Haw Regional Hazard Mitigation Plan update is underway, and we need your input! This plan update is required for the participating counties, municipalities, and tribes to maintain eligibility for pre- and post-disaster mitigation funding from FEMA. The plan will also help our communities to identify hazard risks, understand vulnerability, and develop ways to proactively reduce risk. A public meeting will be held on Thursday, September 19th to discuss the plan update process, review the identified hazards, and gather feedback from the public.

Please participate in the Hazard Mitigation public survey: **https://www.enohawhmp.com/**. Your feedback is important!

Return to full list >>

DRAFT RISK ASSESSMENT & DRAFT PLAN POSTED FOR PUBLIC REVIEW

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Project Updates

Posted here when available.

Project Timeline

Project Kickoff Date	April 2024
Committee and Public Meeting 1	September 2024
Committee Meeting 2	December 2024
Committee Meeting 3	February 2025
Final Committee and Public Meeting	April 2025
Proposed Delivery of Draft	April 2025
Existing Plan Expiration Date	September 21, 2025

Draft Documents

Check back for updates throughout the planning process.

- Draft Hazard Identification and Risk Assessment
- Draft Hazard Mitigation Plan

CITY OF DURHAM

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The Eno-Haw Regional Hazard Mitigation Plan 2025 update is nearly complete. Durham City-County residents are encouraged to review and comment during plan updates. Join us for a virtual public meeting on Wednesday, April 9th at 5pm to learn about the plan update and share your input on the draft plan. Register here to attend.

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Give Your Thoughts for Hazard Plan

Post Date: April 08, 2025 11:00 a.m.

Your input is wanted to help reduce risks in the Eno and Haw rivers region.

Join the Town of Hillsborough, Orange County and others at a virtual meeting next week to learn about an update to the region's hazard mitigation plan and to provide your input on the draft plan.

Eno-Haw Regional Hazard Mitigation Plan

PUBLIC SURVEY

The Eno-Haw Region distributed a public survey, shown below, that requested public input into the Hazard Mitigation Plan planning process and the identification of mitigation activities that could lessen the risk and impact of future flood hazard events. The survey was announced at the first public meeting, provided via a link on participating jurisdictions web and social media accounts, and made available online on the plan website.

Eno-Haw Regional Hazard Mitigation Plan Public Survey

Alamance, Durham, Orange, and Person Counties are beginning to update the Hazard Mitigation Plan to identify and assess our communities' risks from hazards such as flooding, drought, heat, hurricane, severe weather, winter weather, and other hazards. This plan will help determine how to best minimize or manage those risks.

This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand local hazard risks and problems and can lead to mitigation activities that help lessen the impacts of future hazards.

1. Where do you live?

- ◯ Alamance County
- ◯ Durham County
- ◯ Orange County
- ◯ Person County
- ◯ I live outside of the Eno-Haw Region but work or recreate in the region.
- ◯ Other

2. Have you ever experienced or been impacted by a hazard or disaster in the Eno-Haw Region?

- ◯ Yes
- ◯ No

3. If you answered "Yes" to question 2, please explain your experience and where it occurred.

Enter your answer

4. On a scale of 1-5, how concerned are you about the possibility of your community being impacted by a hazard event?

1	2	3	4	5
Not at all concerned				Very concerned

5. Please review the list of hazards below and rate each hazard based on how much risk you think it poses to your community.

	No risk	Low risk	Moderate risk	High risk
Dam Failure	○	○	○	○
Drought	○	○	○	○
Earthquake	○	○	○	○
Extreme Heat	○	○	○	○
Flood	○	○	○	○
Hurricane	○	○	○	○
Landslide	○	○	○	○
Severe Weather (Thunder-storm, lightning, hail)	○	○	○	○
Winter Storm	○	○	○	○
Tornado	○	○	○	○
Wildfire	○	○	○	○
Civil Unrest	○	○	○	○
Critical Infrastructure Failure	○	○	○	○
Cyber Threat	○	○	○	○
Hazardous Materials Incident	○	○	○	○
Infectious Disease	○	○	○	○
Radiological Emergency	○	○	○	○
Terrorism	○	○	○	○

6. Is your home located in a floodplain?

- ○ Yes
- ○ No
- ○ No, but I still experience flooding
- ○ I don't know

7. Do you have flood insurance for your home and/or personal property?

- ○ Yes
- ○ No
- ○ I don't know

8. If you do NOT have flood insurance, what is the reason?

- ◯ It's too expensive
- ◯ I never really considered it
- ◯ I don't need it because my home is elevated or otherwise protected
- ◯ Other

9. Have you taken any actions to protect your home or neighborhood from hazards?

- ◯ Yes
- ◯ No

10. If you answered "Yes" to question 9, what actions have you implemented?

Enter your answer

11. Do you know what government office to contact to learn more about your hazard risks and how to reduce vulnerability in your area?

- ◯ Yes
- ◯ No

12. What are some steps your local government could take to reduce the risk of future hazard damages in your neighborhood?

Enter your answer

13. Many community-wide activities can reduce our risk from hazards. These activities generally fall into one of the following six broad categories:

- **Prevention:** administrative and regulatory actions, plans, policies, and ordinances that influence how land is developed and buildings are built. *Examples include planning and zoning, building codes, open space preservation, land use, and floodplain regulations.*
- **Property Protection:** actions that involve the modification of existing buildings to protect them from a hazard or remove them from a hazardous area. *Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.*
- **Natural Resource Protection:** actions that minimize hazard losses and preserve or restore the functions of natural systems. *Examples include floodplain protection, habitat preservation, slope stabilization, stream buffers, wetland and marsh protection, and forest management.*
- **Structural Projects:** actions that lessen the impact of a hazard by modifying the natural progression of a hazard. *Examples include dams, levees, floodwalls, berms, drainage infrastructure, detention/retention basins, channel modifications, retaining walls, and storm sewers.*
- **Emergency Services:** actions that protect people and property during and immediately after a hazard event. *Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.*
- **Public Education and Awareness:** actions to inform the public about hazards and techniques they can use to protect themselves and their property. *Examples include outreach projects, school education programs, library materials, and demonstration events.*

Please rank these categories by how important you think each one is for your community to consider pursuing.

	1 - Most Important	2	3	4	5	6 - Least Important
Prevention	○	○	○	○	○	○
Property Protection	○	○	○	○	○	○
Natural Resource Protection	○	○	○	○	○	○
Structural Projects	○	○	○	○	○	○
Emergency Services	○	○	○	○	○	○
Public Education	○	○	○	○	○	○

14. What is the best way for you to receive information about how to make your home or neighborhood more resistant to flood damage? Please select your top three choices.

Please select 3 options.

- ☐ Newspaper
- ☐ TV Ads/Programming
- ☐ Radio Ads/Programming
- ☐ Public library
- ☐ Public workshop/meetings
- ☐ School meetings
- ☐ Mail
- ☐ Email
- ☐ Text message
- ☐ Local government website
- ☐ Local government social media
- ☐ Other

Submit

The Region received 144 responses to the survey. Questions and response data are detailed in Figure B.1 through Figure B.11.

Figure B.1 – Survey Response, Place of Residence

1. Where do you live?

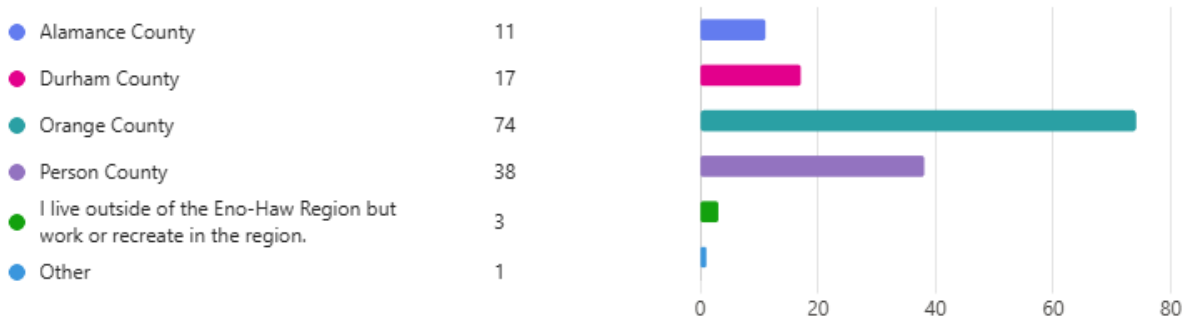


Figure B.2 – Survey Response, Past Hazard Experience

2. Have you ever experienced or been impacted by a hazard or disaster in the Eno-Haw Region?

Figure B.3 – Survey Response, Past Hazard Experience Explanation

3. If you answered "Yes" to question 2, please explain your experience and where it occurred.

More details

56
Responses

Latest Responses
"1996 Hurricane Fran was the worst without eletricity and a/c for weeks. Blizz... "
...

11 respondents (20%) answered power outages for this question.

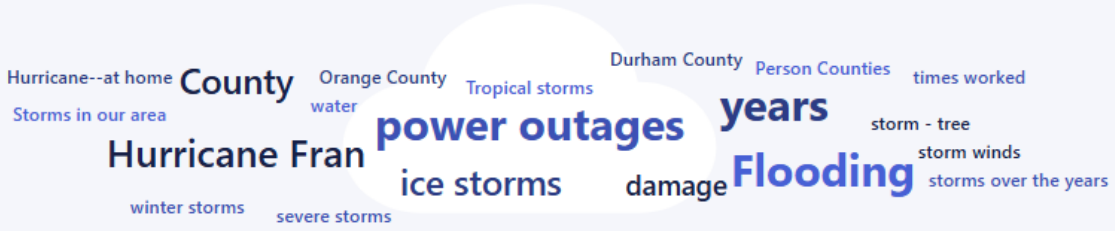


Figure B.4 – Survey Response, Concern About Hazards

4. On a scale of 1-5, how concerned are you about the possibility of your community being impacted by a hazard event?

3.39
Average Rating

1 2 3 4 5

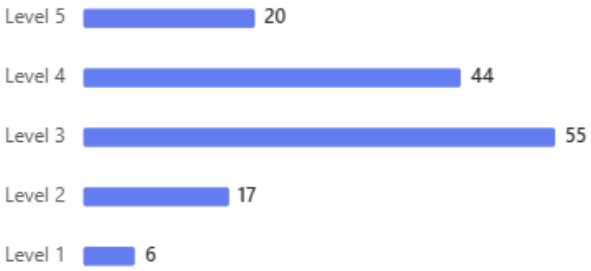


Figure B.5 – Survey Response, Hazard Risk Ratings

5. Please review the list of hazards below and rate each hazard based on how much risk you think it poses to your community.

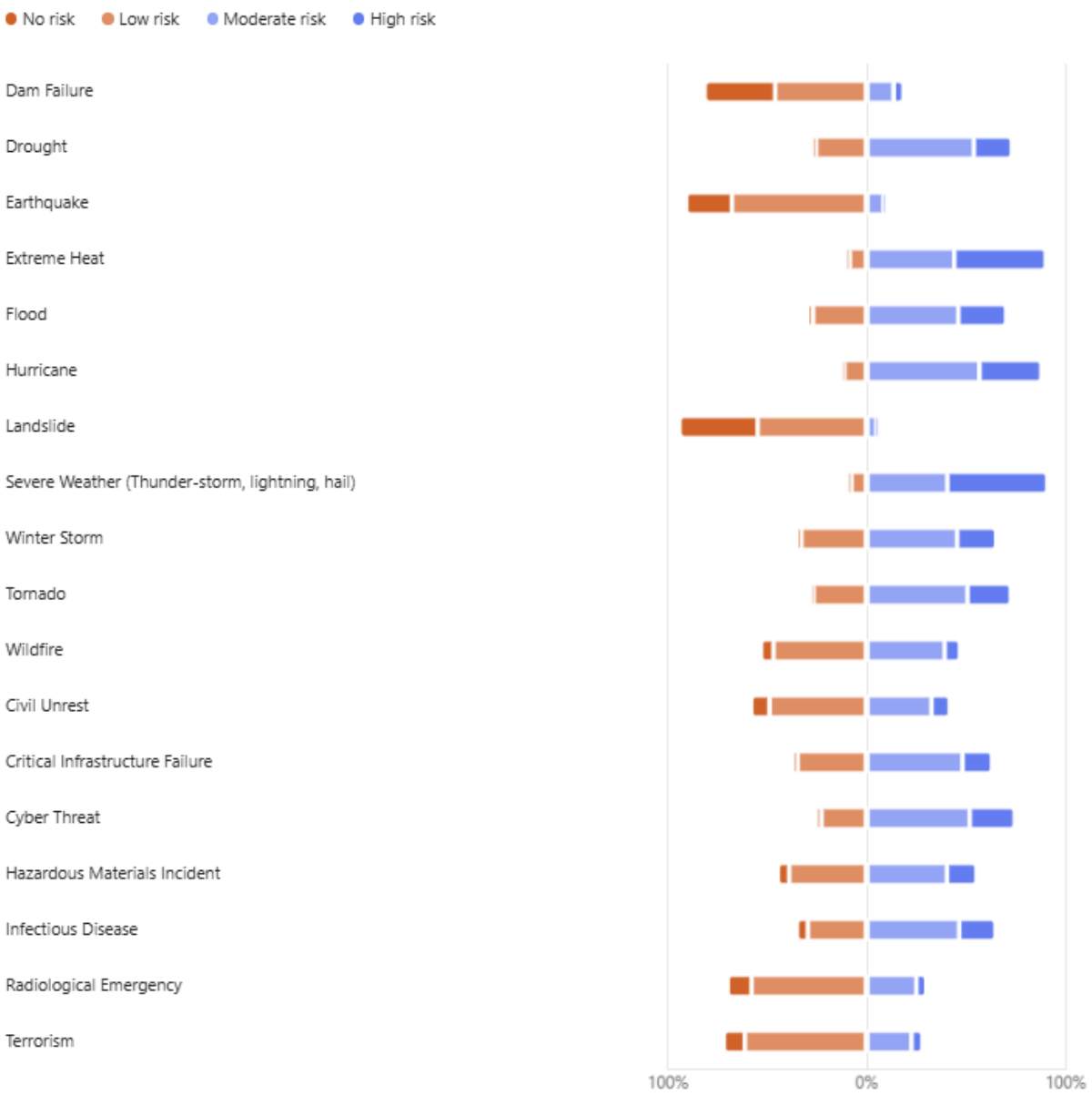


Figure B.6 – Survey Response, Home in Floodplain

6. Is your home located in a floodplain?

Yes	7
No	103
No, but I still experience flooding	12
I don't know	22

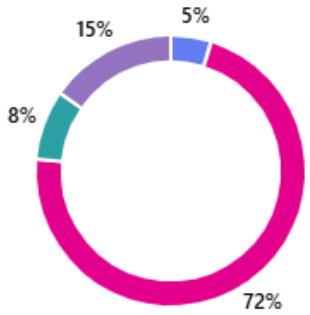


Figure B.7 – Survey Response, Flood Insurance

7. Do you have flood insurance for your home and/or personal property?

Yes	13
No	121
I don't know	10

Figure B.8 – Survey Response, Reason for Not Having Flood Insurance

8. If you do NOT have flood insurance, what is the reason?

It's too expensive	8
I never really considered it	30
I don't need it because my home is elevated or otherwise protected	80
Other	9

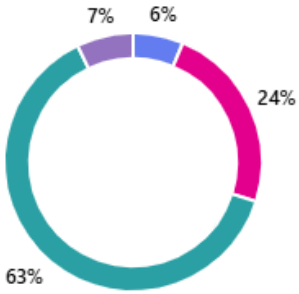


Figure B.9 – Survey Response, Personal Actions Taken for Mitigation

9. Have you taken any actions to protect your home or neighborhood from hazards?

Figure B.10 – Survey Response, Personal Actions Taken for Mitigation, Explained

10. If you answered "Yes" to question 9, what actions have you implemented?

More details

64
Responses

Latest Responses

"Our yard floods, our high lea crawl space has flooded. When it rains hard I h... "

"no trees close to home in case of wild fire. solar lights for extra security."

...

23 respondents (36%) answered trees for this question.

Figure B.11 – Survey Response, Knowledge of Who to Contact for More Information

11. Do you know what government office to contact to learn more about your hazard risks and how to reduce vulnerability in your area?

Yes	44
No	98

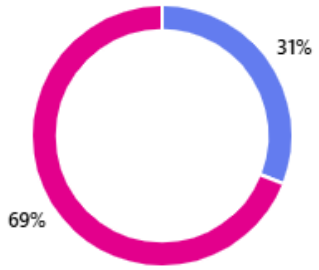


Figure B.12 – Survey Response, Suggested Mitigation

12. What are some steps your local government could take to reduce the risk of future hazard damages in your neighborhood?

More details

97
Responses

Latest Responses
"Stop building in flood plains. Stop burning coal at the UNC plant."
"Provide an informational video on this matter on the county website."
...

11 respondents (11%) answered areas for this question.

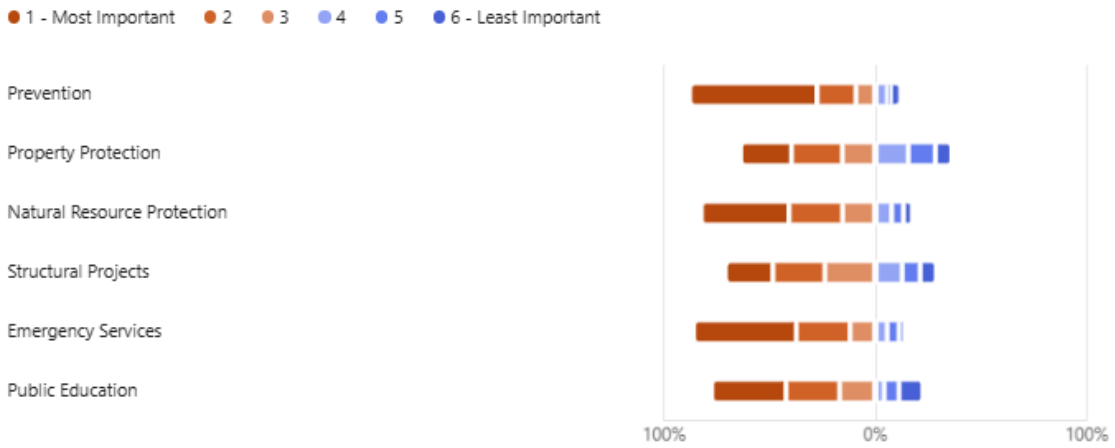
Figure B.13 – Survey Response, Preferred Mitigation Categories

13. Many community-wide activities can reduce our risk from hazards. These activities generally fall into one of the follo wing six broad categories:

- **Prevention:** administrative and regulatory actions, plans, policies, and ordinances that influence how land is de veloped and buildings are built. *Examples include planning and zoning, building codes, open space preservation, land use, and floodplain regulations.*
- **Property Protection**: actions that involve the modification of existing buildings to protect them from a hazard or remove them from a hazardous area. *Examples include acquisition, relocation, elevation, structural retrofits, a nd storm shutters.*
- **Natural Resource Protection**: actions that minimize hazard losses and preserve or restore the functions of nat ural systems. *Examples include floodplain protection, habitat preservation, slope stabilization, stream buffers, wet land and marsh protection, and forest management.*
- **Structural Projects**: actions that lessen the impact of a hazard by modifying the natural progression of a hazar d. *Examples include dams, levees, floodwalls, berms, drainage infrastructure, detention/retention basins, channel modifications, retaining walls, and storm sewers.*
- **Emergency Services**: actions that protect people and property during and immediately after a hazard event. *E xamples include warning systems, evacuation planning, emergency response training, and protection of critical e mergency facilities or systems.*
- **Public Education and Awareness**: actions to inform the public about hazards and techniques they can use to protect themselves and their property. *Examples include outreach projects, school education programs, library m aterials, and demonstration events.*

More details

Please rank these categories by how important you think each one is for your community to consider pursuing.



B.3 PLANNING STEP 3: COORDINATE

This planning step credits the incorporation of other plans and other agencies' efforts into the development of the Hazard Mitigation Plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the Hazard Mitigation Plan, to determine if their programs or initiatives may affect the community's program, and to see if they could support the community's efforts. To incorporate stakeholder input into the plan, a variety of stakeholders were identified by the HMPC and sent an email inviting them to attend a public meeting, review the draft plan, and provide feedback and comments. The coordination letter sent via email is provided below. A list of stakeholders detailing their involvement is provided in Table B.3.

Stakeholders were also involved through specific requests for data to support the development of the plan.

From: Moore, Abigail
Sent: Thursday, April 10, 2025 2:32 PM
Subject: Eno-Haw Regional Hazard Mitigation Plan Stakeholder Notice

Good afternoon,

Alamance, Durham, Orange, and Person Counties and their incorporated jurisdictions have updated the Eno-Haw Regional Hazard Mitigation Plan and are seeking stakeholder input on the draft plan. You are receiving this email because the plan participants identified you as a stakeholder of this plan. This plan update is required for all communities to maintain eligibility for pre- and post-disaster mitigation funding from FEMA, and it will also help the participating communities to understand vulnerabilities and proactively mitigate risk.

To learn more about the plan update and to review the draft plan, please visit www.EnoHawHMP.com. If you would like to share any information or feedback that might be relevant to the plan and local mitigation efforts, you can reply to this email or submit your comments via this form by Friday April 25, 2025.

We appreciate any input you may wish to share and thank you for your assistance with this planning effort!

Abby Moore, AICP, CFM
Hazard Mitigation & Resilience Planner
She/Her

T +1 919-767-1112

WSP
4021 Stirrup Creek Drive, Suite 100
Durham, NC 27703

wsp.com

Table B.3 – Stakeholder List

First Name	Last Name	Organization, Title
Non-Profit Organizations		
Guenevere	Abernathy	The Conservation Fund, North Carolina State Director
Jim	Warren	NC WARN
Katherine	Skinner	The Nature Conservancy, Executive Director North Carolina
Tania	Dautlick	Keep Durham Beautiful, Executive Director
Tracey	Grayzer	Impact Alamance, President
Janet	Johnson	American Red Cross Triangle Area, Executive Director
Donna	Carrington	Community Empowerment Fund, Executive Director
Sandy	Sweitzer	Triangle Land Conservancy, Executive Director
Educational Institutions		
Danielle	Jones	Orange County Schools, Superintendent
Nyah	Hamlett	Chapel Hill-Carborro City Schools, Superintendent
Anthony	Lewis	Durham Public Schools, Superintendent
Rodney	Peterson	Person County Schools, Superintendent
Aaron	Fleming	Alamance Burlington School System, Superintendent
Susan	Bowen	Durham Tech Chief Campus Operations Officer
David	Prevatte	Alamance County Community College, Director of Public Safety
Darrell	Jeter	UNC-CH Emergency Management and Planning Director
John	Noonan	Duke University, Vice President Facilities
Surrounding Municipalities		
Barry	Lynch	Caswell County Emergency Management Coordinator
Matthew	Hoagland	Caswell County Planning Director
Rodney	Cates	Rockingham County Emergency Management Director
Tommy	Sluder	Guilford County Senior Emergency Management Coordinator
Christie	McCorquodale	Randolph County Emergency Management, Major
Steve	Newton	Chatham County Emergency Management Director
Joshua	Creighton	Wake County Emergency Management Deputy Director
Jason	Reavis	Granville County Emergency Services Director
Federal Government		
Jason	Hunter	FEMA Region IV, Chief, Floodplain Management & Insurance Branch
Valerie	Anderson	FEMA Region IV, Natural Hazards Program Specialist
Dewana	Davis	FEMA Region IV, Insurance Specialist
Roy	McClure	FEMA NFIP/CRS Specialist
Kymberly	Kudla	FEMA Mitigation Planning Specialist
David	Holcomb	ISO/CRS Specialist
Mike	Bratcher	ISO/CRS Specialist
Sherry	Harper	ISO/CRS Technical Coordinator
Katherine	Smith	USGS Climate Adaptation Science Center
State Government		
Steve	Garrett	State NFIP Coordinator
Steve	McGugan	State Hazard Mitigation Officer
Linda	Culpepper	DEQ Division of Water Resources, Director

First Name	Last Name	Organization, Title
Hannah	Thompson-Welch	NC Forest Service, Wildfire Mitigation Specialist
Becca	Gallas	NCDOT Division 5
Wright	Archer	NCDOT Division 7
Business Community		
Aaron	Nelson	Secretary and CEO, Chapel Hill-Carborro Chamber
Jeri Lynn	Schulke	Downtown Chapel Hill, Executive Director
Paige	Shepard	Burlington Downtown Corporation, Downtown Manager
Bennie	Clayton	Roxboro Chamber of Commerce, Board Chair
Geoff	Durham	Greater Durham Chamber of Commerce, President

C MITIGATION ALTERNATIVES

44 CFR Subsection D §201.6(c)(3)(ii): [The mitigation strategy section shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

As part of the process of developing the mitigation action plans found in Section 7, the HMPC reviewed and considered a comprehensive range of mitigation options before selecting the actions identified for implementation. This section summarizes the full range of mitigation measures evaluated and considered by the HMPC, including a review of the categories of mitigation measures outlined in the 2017 CRS Coordinator's Manual, a discussion of current local implementation and CRS credits earned for those measures, and a list of the specific mitigation projects considered and recommended for implementation.

Mitigation alternatives identified for implementation by the HMPC were evaluated and prioritized using the criteria discussed in Section 6 of this plan.

C.1 CATEGORIES OF MITIGATION MEASURES CONSIDERED

Once it was determined which flood hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process.

- Prevention
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services
- Public Information and Outreach

Action ideas within each of these categories were discussed and considered for inclusion in the plan. The HMPC was encouraged to select actions to pursue within most if not all of these categories so as to develop a comprehensive approach to hazard mitigation.

C.2 ALTERNATIVE MITIGATION MEASURES PER CATEGORY

This section presents a summary review of the mitigation measures that were considered by the HMPC. Note: the CRS Credit Sections are based on the 2017 CRS Coordinator's Manual and the 2021 Addendum.

C.2.1 PREVENTATIVE AND REGULATORY MEASURES

Preventative measures are designed to keep a problem, such as flooding, from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to

damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include:

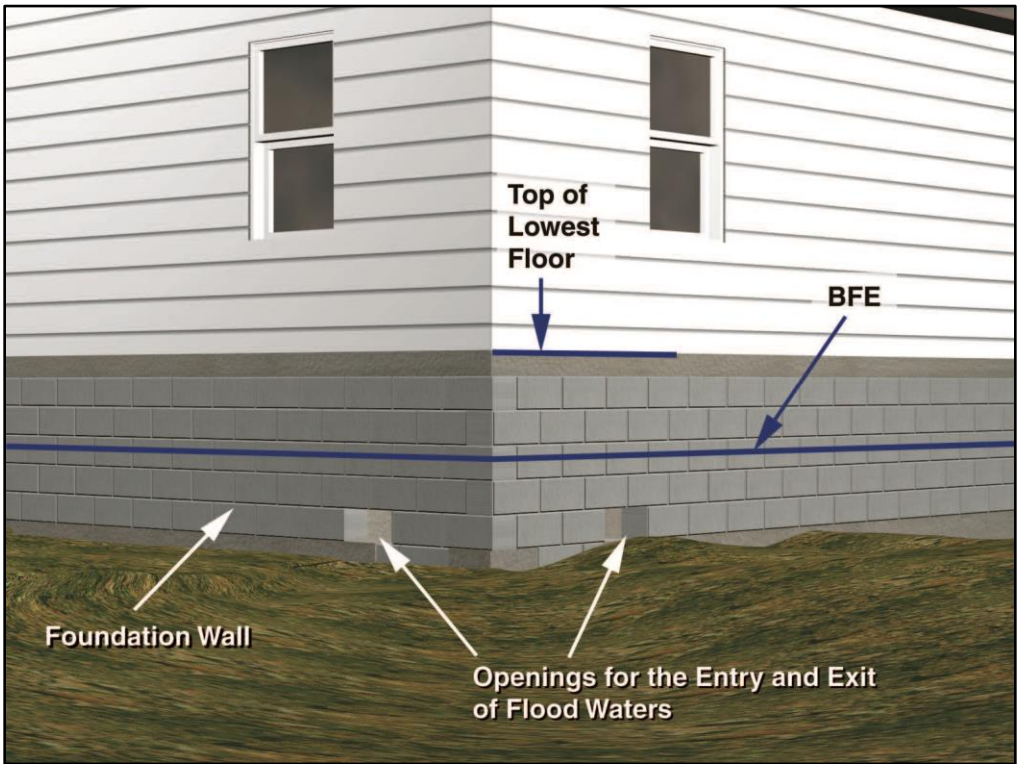
- Building codes
- Zoning ordinance
- Comprehensive or land use plan
- Open space preservation
- Floodplain regulations
- Subdivision regulations
- Stormwater management regulations

BUILDING CODES

Building codes provide one of the best methods for addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure B.1.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.

Figure C-1 – Building Codes and Flood Elevations



Source: FEMA Publication: *Above the Flood: Elevating Your Floodprone House, 2000*

ASCE 24 is a referenced standard in the International Building Code. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24. Freeboard is required as a function of the nature of occupancy and the flood zone. Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE.

COMPREHENSIVE OR LAND USE PLAN

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open space or recreation.

OPEN SPACE PRESERVATION

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes.

ZONING ORDINANCE

Zoning enables a community to designate what uses are acceptable on a given parcel. Zoning can ensure compatibility of land use with the land's level of suitability for development. Planning and zoning activities can also provide benefits by allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach. Zoning regulations describe what type of land use and specific activities are permitted in each district, and how to regulate how buildings, signs, parking, and other construction may be placed on a lot. Zoning regulations also provide procedures for rezoning and other planning applications. The zoning map and zoning regulations provide properties with certain rights to development. Zoning is tied to land use planning; rezonings generally must be in agreement with a community's future land use map.

FLOODPLAIN REGULATIONS

A Flood Damage Prevention Ordinance sets development standards for Special Flood Hazard Areas (SFHAs). Communities participating in the National Flood Insurance Program (NFIP) are required to adopt a flood damage prevention ordinance that meets at least the minimum standards of the NFIP; however, a community can incorporate higher standards for increased protection. For example, communities can adopt higher regulatory freeboard requirements, cumulative substantial damage definitions, fill restrictions, and other standards.

Another important consideration in floodplain regulations is the protection of natural and beneficial functions and the preservation of natural barriers such as vegetation. Vegetation along a stream bank is extremely beneficial for the health of the stream. Trees and other plants have an extensive root system that strengthen stream banks and help prevent erosion. Vegetation that has sprouted up near streams

should remain undisturbed unless removing it will significantly reduce a threat of flooding or further destruction of the stream channel.

STORMWATER MANAGEMENT REGULATIONS

Stormwater runoff is increased when natural ground cover is replaced by urban development. Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality. There are three ways to prevent flooding problems caused by stormwater runoff:

1. Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties;
2. Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions; and
3. Set construction standards so buildings are protected from shallow water.

REDUCING FUTURE FLOOD LOSSES

Zoning and comprehensive planning can work together to reduce future flood losses by directing development away from hazard prone areas. Creating or maintaining open space is the primary way to reduce future flood losses.

Planning for open space must also be supplemented with development regulations to ensure that stormwater runoff is managed and that development is protected from flooding. Enforcement of the flood damage prevention ordinance and the flood protection elevation requirement provides an extra level of protection for buildings constructed in the planning area.

Stormwater management and the requirement that post-development runoff cannot exceed pre-development conditions is one way to prevent future flood losses. Retention and detention requirements also help to reduce future flood losses.

LOCAL IMPLEMENTATION RECOMMENDATIONS

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and points are awarded for adopting the International Code series. In North Carolina, communities are limited by the State Building Code Council which has not implemented the most current version of the International Building Code.

CRS credits are available for regulations that encourage developers to preserve floodplains or other hazardous areas away from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Communities in the Eno-Haw Region could receive credit for Activity 430 – Higher Regulatory Standards and for Activity 420 – Open Space Preservation for preserving parcels within the SFHA as open space. Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. The credits in the 2017 manual have doubled for OSP (Open Space Preservation). The participating communities could also receive credit for Activity 450 – Stormwater Management for enforcing regulations for stormwater management and soil and erosion control. Several prevention actions considered by the HMPC are detailed below.

Table C.1 – Prevention Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by HMPC and Not Recommended			
-	Continue enforcement of state building codes and more stringent local building requirements	The City and County has established this as an ongoing policy and does not need to commit additional resources through this plan update process to complete this activity.	n/a
-	Continued enforcement of zoning and development regulations	The HMPC has established this is an ongoing policy and is unlikely to need additional resources to continue pursuing this preventative measure	n/a
Prevention Measures and Funding Recommended for Implementation			
Alamance P-4	Review the subdivision regulations and make appropriate changes to encourage alternatives to placing lots in flood-prone areas and to minimize impervious surface coverings, if necessary.	Updates to the subdivision ordinance helps prevent new development occurring in known flood areas.	Local
Elon P-2	Consider adopting a policy prohibiting the development of critical public facilities in the 100-year floodplain in cases where viable alternatives exist.	By preventing the development of critical facilities in high risk areas, the town can ensure continued operation of key infrastructure and services when a flood occurs.	Local

C.2.2 PROPERTY PROTECTION MEASURES

Generally, natural hazards do not damage vacant areas; the major impact of hazards is to people and improved property. Property protection measures are used to modify buildings or property that are subject to damage in order to reduce their vulnerability. Property protection measures fall under three approaches:

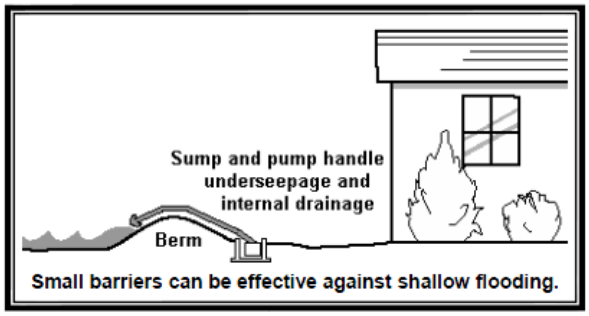
- Modify the site to keep the hazard from reaching the building;
- Modify the building (retrofit) so it can withstand the impacts of the hazard; and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

KEEP THE HAZARD AWAY

In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

BARRIERS



Small barriers can be effective against shallow flooding.

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

MODIFY THE BUILDING

There are several common methods to keep a flood from damaging a building:

- Move the building out of the flood-prone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.
- Retrofit the building to reduce the impact of flooding when it occurs.

This low floodwall has landscaping to minimize the adverse impact on the property's appearance.

RELOCATION

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

Small, wood frame buildings are the easiest to relocate

Source: Kennedy House Movers, Huntsville, AL

BUILDING ELEVATION

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

DEMOLITION

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

Demolishing a repetitively flooded home

PILOT RECONSTRUCTION

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

RETROFITTING

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

— **Dry Floodproofing**

Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

— **Wet Floodproofing**

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

INSURANCE

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, so long as the policy is in force, without requiring human intervention for the measure to work.

— **Private Property**

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

— **Public Property**

Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

LOCAL IMPLEMENTATION RECOMMENDATIONS

The CRS provides the most credit points for acquisition and relocation under Activity 520, because this measure permanently removes insurable buildings from the floodplain. Communities in the Eno-Haw Region could receive credit for Activity 520 – Acquisition and Relocation, for acquiring and relocating buildings from the SFHA. The HMPC recommended that communities pursue the purchase of repetitive loss buildings and other buildings which are subject to flood damage in order to return this land to open space.

The CRS also credits barriers and elevating existing buildings under Activity 530. The credit for Activity 530 is based on the combination of flood protection techniques used and the level of flood protection provided. Points are calculated for each protected building. Bonus points are provided for the protection of repetitive loss buildings and critical facilities. Communities could receive credit for Activity 360 – Flood Protection Assistance by providing advice and assistance to homeowners who may want to flood proof their home or business. Advice is provided both on property protection techniques and on financial assistance programs to help fund mitigation.

Flood insurance information for each community is provided in Section 5 and in greater detail in each community's annex. There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that, among other topics, explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage. Communities in the Eno-Haw Region could receive credit for Activity 330 – Outreach Projects. Property protection mitigation options considered by the HMPC are described below.

Table C.2 – Property Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Property Protection Measures Considered by HMPC and Not Recommended			
-	Flood barriers	Due to the nature of flooding in this region, barriers are not a preferred mitigation technique	n/a

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Property Protection Measures and Funding Recommended for Implementation			
Durham PP-1	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed County or City critical facilities	This effort will help the Town and County protect its critical facilities to provide continuity of operations during a flood or other event.	Local, State, Federal
Orange PP-5	Pursue the acquisition and/or elevation of flood prone properties, including repetitive loss properties and substantially damages properties.	This action can help proactively protect properties known to flood and prevent future recovery efforts.	Local, State, Federal

C.2.3 NATURAL RESOURCE PROTECTION

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and stormwater in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. This section covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Six areas were reviewed:

- Wetland protection
- Erosion and sedimentation control
- Stream/River restoration
- Best management practices
- Dumping regulations
- Farmland protection

WETLAND PROTECTION

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

EROSION AND SEDIMENTATION CONTROL

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

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices.

STREAM/RIVER RESTORATION

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

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

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

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

Communities are required by state and federal regulations to monitor storm water drainage outfalls and control storm water runoff.

BEST MANAGEMENT PRACTICES

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture,

construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

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

DUMPING REGULATIONS

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

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

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

FARMLAND PROTECTION

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

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

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

LOCAL IMPLEMENTATION RECOMMENDATIONS

There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. Communities in the Eno-Haw Region could receive credit for Activity 420 – Open Space Preservation for preserving a portion of the SFHA as open space.

Additionally, credit is available for Activity 540 – Drainage System Maintenance. Having a portion of the drainage system inspected regularly throughout the year and maintenance performed as needed would earn a community credit. Communities could also get credit under this activity for providing a listing of problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program.

Table C.3 – Natural Resource Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Natural Resource Protection Measures Considered by HMPC and Not Recommended			
-	Continued enforcement of soil erosion and sedimentation control ordinance.	The Town now has a program in place, and additional funding is not needed for continued enforcement.	n/a
Natural Resource Protection Measures and Funding Recommended for Implementation			
Durham NRP-1	Identify and obtain additional properties to increase protected open space as a land-use tool to reduce adverse impacts from floods	Creation of open space through acquisition of flood prone properties protects natural resources and reduces potential future losses.	Federal w/ State/Local Match
Durham NRP-2	Complete one (1) stream restoration project to reduce flooding risk by restoring or enhancing stream channels to improve natural flow and capacity of streams, allowing them to better handle increased water volume during storms.	Stream restoration can reduce flooding risk by enhancing stream channels and increase capacity to better handle water volume during storms.	Local

C.2.4 EMERGENCY SERVICES MEASURES

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

THREAT RECOGNITION

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area,

but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

WARNING

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

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

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

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

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

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

STORMREADY

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

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

Being designated a NWS StormReady community is a good measure of a community's emergency warning program for weather hazards.

RESPONSE

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

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

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

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

EVACUATION AND SHELTER

There are six key components to a successful evacuation:

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

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

LOCAL IMPLEMENTATION RECOMMENDATIONS

Flash flood warnings are issued by National Weather Service Offices, which have the local and county warning responsibility. Flood warnings are forecasts of coming floods, are distributed to the public by the NOAA Weather Radio, commercial radio and television, and through local emergency agencies. The warning message tells the expected degree of flooding, the affected river, when and where flooding will begin, and the expected maximum river level at specific forecast points during flood crest.

Communities in the Eno-Haw Region could receive credit for Activity 610 – Flood Warning Program for maintaining a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. Community

Rating System credits are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits for additional measures, like telephone trees. Being designated as a StormReady community also provides additional credits.

Table C.4 – Emergency Services Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Emergency Services Measures Considered by HMPC and Not Recommended			
-	Develop an Emergency Operations Plan	This was noted as a gap in the capability assessment but is not currently being pursued	n/a
Emergency Services Measures and Funding Recommended for Implementation			
Orange ES-2	Identify and implement strategies to increase swift water rescue capacity.	Training will support improved rescue and response capabilities	Local, Federal
Orange ES-2	Engage with regional stakeholders in comprehensive emergency response planning including Complex Coordinated Terror Attack response and Mass Casualty Incident response planning.	Such planning will improve inter-jurisdictional capacity to respond to events including but not limited to flooding.	Local

C.2.5 STRUCTURAL PROJECTS

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting citizens' homes and businesses.
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

Advantages

- They may provide the greatest amount of protection for land area used
- Because of land limitations, they may be the only practical solution in some circumstances
- They can incorporate other benefits into structural project design, such as water supply and recreational uses
- Regional detention may be more cost-efficient and effective than requiring numerous small detention basins

Disadvantages

- They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat
- They require regular maintenance
- They are built to a certain flood protection level that can be exceeded by larger floods

— They can create a false sense of security
— They promote more intensive land use and development in the floodplain

LEVEES AND FLOODWALLS

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

RESERVOIRS AND DETENTION

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

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

Retention pond

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

DIVERSION

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

LOCAL IMPLEMENTATION RECOMMENDATIONS

Structural flood control projects that provide at least 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS so as not to duplicate the larger premium reduction provided by removing properties from the mapped floodplain. Other flood control projects can be accepted by offering a 25-year flood protection.

Table C.5 – Structural Projects Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures Considered by HMPC and Not Recommended			
-	Explore the possibility of retrofitting existing critical facilities with back-up generators.	Orange county has 20 total county facilities with backup generators installed and functioning. The County determined this action to be completed.	n/a

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures and Funding Recommended for Implementation			
Durham SP-1	Seek funding to retrofit critical facilities and City- and County-owned facilities for improved resilience to all hazards with the use of the latest building materials and technology.	Structural improvements to City- and County-owned facilities will ensure resilience and continuity of operation from multiple hazards.	Local, State, Federal
Orange SP-2	Conduct a cost-benefit review during the planning and design phase of construction of new government owned facilities or critical facilities to determine the feasibility of equipping the facility with back-up generators, lightening protection, high wind protection, and/or 361 compliant tornado shelters.	Prioritizing resilience during the design and construction phase of new Government owned buildings enhances resilience longer term and prevents necessity of future retrofits.	Local, State, Federal

C.2.6 PUBLIC INFORMATION

OUTREACH PROJECTS

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

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

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

LIBRARIES AND WEBSITES

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about floods for children.

TECHNICAL ASSISTANCE

HAZARD INFORMATION

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

PROPERTY PROTECTION ASSISTANCE

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Explain when building permits are needed for home improvements.

PUBLIC INFORMATION PROGRAM

A Program for Public Information (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- The local flood hazard
- The property protection measures appropriate for the flood hazard
- Flood safety measures appropriate for the local situation
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- Goals for the community's public information program
- The outreach projects that will be done each year to reach the goals
- The process that will be followed to monitor and evaluate the projects

LOCAL IMPLEMENTATION RECOMMENDATIONS

Communities in the Eno-Haw Region could receive credit under Activity 330 – Outreach Projects as well as Activity 350 – Flood Protection Information. Credit is available for targeted and general outreach

projects. Credit is also provided for making publications relating to floodplain management available in the reference section of the local library.

Table C.6 – Public Information and Outreach Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Public Information and Outreach Measures Considered by HMPC and Not Recommended			
-	Continue All-Hazards Public Information campaign	This program is already in existence, and no additional funding is need to continue its operation	n/a
Public Information and Outreach Measures and Funding Recommended for Implementation			
Orange PEA-2	Engage in regional events, activities, and training opportunities related to natural hazards in order to improve communication, enhance, partnerships, and improve planning efforts with other local jurisdictions.	The County will enhance inter-jurisdictional capacity for education, outreach, and response.	Local
Orange PEA-1	Provide education and outreach to Orange County residents in multiple languages before, during, and after a hazardous weather event and maintain a link to the Eno-Haw Regional Hazard Mitigation Plan on Orange County's Website.	The County will ensure as many residents as possible are included in communications and can act accordingly by utilizing multiple languages.	Local

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