

**2024 Union County Multi-Jurisdictional Hazard Mitigation Plan
for
Union County, South Carolina
City of Union, South Carolina
Town of Carlisle, South Carolina
Town of Lockhart, South Carolina
Town of Jonesville, South Carolina**

**Prepared by Catawba Regional Council of Governments
December 2, 2023, last modified May 28, 2024**



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EXECUTIVE SUMMARY

Union County and its municipalities, Union, Carlisle, Lockhart, and Jonesville, face significant impacts from many natural and man-made hazards. These hazards endanger the health and safety of the community's population, jeopardize its economic vitality, and imperil the quality of its environment. Because of the importance of avoiding or minimizing the vulnerabilities to these hazards, the public interests of Union County and its incorporated municipalities have joined together to create the Union County Mitigation Planning Task Force to undertake a comprehensive planning process that has culminated in the publication of this document: "The Union County Local Hazard Mitigation Plan."

The subject document is a multi-jurisdictional hazard mitigation plan, with the planning effort conducted through a coordinated, cooperative effort of several local governments, including the City of Union, the Town of Carlisle, the Town of Lockhart, and the Town of Jonesville, with assistance from the Catawba Regional Council of Governments. The Mitigation Planning Task Force has also made every effort available to include public input towards included elements of the Hazard Mitigation Plan, including providing for public review and critique of the draft and final document.

The Union County Mitigation Planning Task Force has also conducted detailed studies to identify the hazards threatening the jurisdictions of Union County and to estimate the relative risks posed to the community by those hazards. The Task Force has used this information to prioritize its planning efforts to assess the vulnerabilities of the critical facilities of Union County to the impacts of future disasters involving those hazards. With these vulnerabilities identified, the Task Force has worked to identify, justify, and prioritize specific proposals for projects and programs that will avoid or minimize these vulnerabilities.

These proposed projects and programs to reduce the impacts of future disasters are called "mitigation initiatives" in this document. Mitigation initiatives have been and will be developed by the Task Force for implementation whenever the resources and opportunities become available. The Task Force will continue to help the participating communities become more resistant to future storms' human and economic costs by implementing the mitigation initiatives included within the plan.

This document details the work of the Union County Task Force over the past several months to develop the planning organization, undertake the needed technical analyses, and coordinate the mitigation initiatives that the participating jurisdictions and organizations have proposed. The governing bodies will adopt the draft plan before submission to FEMA for review and submit it for inclusion in the Appendix of this document.

This plan will continue to be updated and expanded as funding becomes available to ensure it addresses changing conditions in the participating jurisdictions, experiences with disasters that do occur, and any changes in the characteristics of the hazards that threaten the involved communities.

The update process and future editions of the mitigation plan will continue to inform and involve the general public and other interested groups to fully participate in making the community more resistant to the impacts of future disasters.

INTRODUCTION

Union County prepared the Union County Hazards Mitigation Task Force to assist the citizens of Union County in becoming more resistant to the impacts of future hazards. The Task Force has undertaken a comprehensive, detailed evaluation of the community's vulnerabilities to all types of future natural, technological, and societal hazards to identify ways to make the communities of the planning area more resistant to their impacts. This document reports the results of that planning process for the current planning period, as indicated in the following text.

PURPOSE

The Task Force intends to implement the Union County Local Hazard Mitigation Plan using the following planning processes to include the following:

Provide a Methodical, Substantive Approach to Mitigation Planning

The approach utilized by the Union County Task Force relies on a step-wise application of soundly based planning concepts in a methodical process to identify vulnerabilities to future disasters and propose the mitigation initiatives necessary to avoid or minimize those vulnerabilities. Each step in the process builds upon the previous step so that there is a high level of assurance that the mitigation initiatives proposed by the participants have a valid basis for both their justification and priority for implementation. One essential purpose of this plan is to document that process and to present its results to the community.

Enhance Public Awareness and Understanding

The Task Force is interested in finding ways to make the community more aware of the natural hazards that threaten public health and safety, the economic vitality of businesses, and the operational capability of essential facilities and institutions. The plan identifies the hazards threatening Union County and assesses their relative risk level. It also details the specific geographic vulnerabilities of Union County and many of the facilities that are important to the community's daily life. The plan also includes several proposals for avoiding or minimizing those vulnerabilities. This information will benefit individuals who wish to understand how the community could become safer from the impacts of future disasters.

The Task Force and its member organizations also conduct community outreach and public information programs. These aim to engage the community in the local mitigation planning process to shape the goals, priorities, and content of the plan and provide information and education to the public regarding ways to be more protected from the impacts of future disasters. The Task Force has been and will continue to be active in communicating with the public and engaging interested community members in the planning process. This document and the analyses contained herein are the principal information resources for this activity and the documentation of past and planned public information activities.

Create a Decision Tool for Management

The Union County Local Mitigation Plan provides information needed by the managers and leaders of local government, business and industry, community associations, and other vital institutions and organizations to act to address vulnerabilities to future disasters. It also proposes specific projects and programs to eliminate or minimize those vulnerabilities.

These proposals, called "mitigation initiatives" in the plan, have been justified based on their economic benefits using a uniform technical analysis and prioritized for implementation using ten objective criteria. Participating organizations and agencies can use this approach to provide a decision tool in the decision-making process for implementation strategies benefiting economic and public welfare.

Promote Compliance with State and Federal Program Requirements

Several state and federal grant programs, policies, and regulations encourage or even mandate local governments to develop and maintain a comprehensive hazard mitigation plan. This plan is intended to assist the participating local governments comply with these requirements and enable them to respond more fully and quickly to state and federal funding opportunities for mitigation-related projects. Because the plan defines, justifies, and prioritizes mitigation initiatives formulated through a technically valid hazard analysis and vulnerability assessment process, the participating organizations are better prepared to develop the necessary grant application materials more quickly and easily for seeking state and federal funding.

Enhance Local Policies for Hazard Mitigation Capability

A component of the hazard mitigation planning process conducted by the Union County Mitigation Planning Task Force is the analysis of the existing policy, program, and regulatory basis for control of growth and development, as well as the functioning of critical facilities and systems. This process involves cataloging the local government's current mitigation-related policies and analyzing the hazards that threaten the jurisdiction and the relative risks these hazards pose to the community. When communities inadequately address dangers posed by a specific threat within the community's policy or regulatory framework, the potential impacts of future disasters can be even more severe. Therefore, the Task Force's planning process supports evaluating the adequacy of the community's policies and programs considering the level of risk posed by specific hazards. Participating local jurisdictions can use this evaluation to justify efforts to propose enhancements in the policy basis to create a more disaster-resistant future for the community.

Assure Inter-Jurisdictional Coordination of Mitigation-Related Programming

A vital purpose of the planning process utilized by the Union County Task Force is to ensure that proposals for mitigation initiatives are reviewed and coordinated among the participating jurisdictions. In this way, there is a high level of confidence that mitigation initiatives proposed by one jurisdiction or participating organization, when implemented, will be compatible with the

interests of adjacent jurisdictions and unlikely to duplicate or interfere with mitigation initiatives proposed by others. The operating procedures of the Task Force, given in this plan, document the details of the planning process utilizing a mandate that all proposed mitigation initiatives, regardless of their origin, will be coordinated among all the participants in the planning before their approval for incorporation into the plan.

Create Jurisdiction-Specific Hazard Mitigation Plans for Implementation

An important purpose of the Union County Hazard Mitigation Plan is to provide each participating local jurisdiction with a plan of action that can be adopted and implemented according to its authorities and responsibilities. The process for formally adopting or approving the mitigation plan is detailed herein. Each jurisdiction provided copies of its adopted resolutions for inclusion in the Appendix of this report. This plan also contains instructions on how all agencies, organizations, and groups within or representing that jurisdiction can incorporate their technical analyses and proposed mitigation initiatives.

In this way, the format of the plan and the operational concept of the planning process ensure that proposed mitigation initiatives are coordinated and prioritized effectively among jurisdictions, using a consistent, valid planning process while nonetheless allowing each jurisdiction to adopt only the proposed mitigation initiatives that it has the authority, the responsibility, and the capability to implement when resources are available.

Provide a Flexible Approach to the Planning Process

The planning process used by the Union County Hazards Mitigation Task Force is very flexible in meeting the analysis and documentation needs of the planning participants. The planning program utilized provides for creating this document and preparing numerous other reports regarding the technical analyses undertaken. The planning participants have also included data and information unique to their communities and planning capabilities. They have used the Catawba Regional Council of Governments to develop GIS-based hazard assessments. In this way, the plan assists the Task Force by utilizing a full range of information in the technical analysis and formulating proposed mitigation initiatives for incorporation into this plan.

Documentation of Plan Progress

Union County has documented its progress in hazard mitigation planning in this Plan update. Since hazard mitigation planning efforts officially began in the County with the development of the initial Hazard Mitigation Plan in 2005, several mitigation actions have been completed and continue to be updated annually in the participating jurisdictions. These actions will help reduce the overall risk of natural hazards for the people and property in Union County. The Mitigation Actions Section identifies completed steps.

The Union County Local Hazard Mitigation Plan detailed sections present detailed information supporting these purposes. The remainder of the plan describes the planning organization developed by the Task Force and its approach to managing the planning process. The plan

describes the mitigation-related characteristics of each participating jurisdiction, such as its land uses and population growth trends, the mitigation-related policies already in place, identified critical facilities present in the community, and if there are properties that past disasters have repetitively damaged. The plan then summarizes the results of the hazard identification and vulnerability assessment process. It addresses the adequacy of the current policy basis for hazard management by the participating jurisdictions and organizations. The plan also documents the structural and non-structural mitigation initiatives proposed by the participating jurisdiction to address the identified vulnerabilities. The plan further addresses the mitigation goals and objectives established by the Task Force and the actions to maintain, expand, and refine the Union County local mitigation plan and the planning process. Finally, the plan documents past and planned efforts of the Task Force to engage the entire community in the mitigation planning process.

CHANGES TO THIS SECTION:

- ✓ Some minor rephrasing to clarify existing concepts.
- ✓ Font changes only

PLANNING PROCESS

INTRODUCTION

This section of the Plan describes the mitigation planning process undertaken by Union County in the preparation of this Hazard Mitigation Plan Update. Several local government agencies and institutions comprise the Union County Hazards Mitigation Plan Task Force. This section describes the local jurisdictions and organizations participating in the Task Force and discusses the organizational structure used to complete the planning process. It also provides a summary of the current status of planning activities by the participants, documenting the level of participation by the jurisdictions making up the Union County Hazards Mitigation Task Force.

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

The Mitigation Section identifies and assigns specific individuals, departments, or agencies responsibility for each mitigation project along with a schedule for its implementation. The plan maintenance section of this report identifies procedures for the routine monitoring of implementation progress, the evaluation, and the enhancement of the mitigation plan itself. The Task Force will conduct an annual meeting to review the hazard mitigation plan and make any necessary revisions. The public will also be invited via the local newspaper to attend to comment on hazard mitigation efforts at a scheduled county council meeting. The County Emergency Management Department will upload a copy of the updated plan on the county website for the public to review before the plan is considered for adoption by the county council. The plan maintenance procedures ensure that Union County's Hazard Mitigation Plan remains a current, dynamic, and effective planning document over time.

Mitigation planning offers many benefits, including:

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

AI. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 4 CFR 201.6(c)(1))

The Union County Hazards Mitigation Task Force encourages participation by all interested local jurisdictions and agencies. The proposed mitigation initiatives developed by the Task Force and listed in this plan, when implemented, are intended to make the entire community safer from the impacts of future disasters for the benefit of every individual, neighborhood, business, and institution.

The approach to developing and updating the Union County Hazards Mitigation Plan and the Union County Hazards Mitigation Planning Task Force was as follows. In March 2023, Union County Emergency Management Division director Lee Brannon contacted each local government to seek individuals to participate in the hazard mitigation planning process. The governments reached were the City of Union, the Town of Carlisle, the Town of Lockhart, and the Town of Jonesville. Each entity selected one representative to participate.

The city and county managers or mayors appointed members to represent their communities on the Hazard Mitigation Plan Task Force Committee. There were no public members selected to participate in the task force.

The County hosted a public open house meeting in August to gather public input about hazards and ideas they may have to address those hazards. Catawba Regional Council of Governments identified County organizations that assist the public and mailed them a copy of the open house public notice to share with their members and posted a public notice in the local newspaper. Each jurisdiction held hearings at Council meetings during the plan adoption process. Each jurisdiction provided public notice for their respective jurisdiction in the local newspapers.

Each jurisdiction was required to perform the following tasks to meet the multi-jurisdictional planning participation requirements:

- Be a member of the Task Force
- Participate in Task Force meetings
- Provide available risk assessment data
- Support the development of the mitigation strategy, including countywide goals and jurisdiction-level projects
- Review and provide comments on the draft of the plan update
- Adopt the Union County Multi-Jurisdictional Hazard Mitigation Plan

Union County Emergency Management provided members of the Hazard Mitigation Plan Task Force committee and participating jurisdiction elected officials an opportunity to review the completed multi-jurisdictional Hazard Mitigation Plan for their respective jurisdictions.

THE TASK FORCE ORGANIZATIONAL STRUCTURE

The Union County Hazards Mitigation Task Force encourages participation by all interested local jurisdictions and agencies.

The proposed mitigation initiatives developed by the Task Force and listed in this plan, when implemented, are intended to make the entire community safer from the impacts of future disasters for the benefit of every individual, neighborhood, business, and institution.

The Defined Duties of the Task Force section, provided in the next section, details the responsibilities and duties of this organizational structure. This section summarizes the roles of the different components of the Task Force and describes the participation that occurred during the planning period covered by this document.

The Union County Emergency Management staff oversees and coordinates the entire planning effort by the Steering Committee. This committee comprises members suggested in the Mitigation Initiative Project 1.2 (a) Union County EMA ensures Hazard Mitigation Plans are kept up to date.

The Steering Committee represents all the local jurisdictions participating in the planning process and is the group that makes the official decisions regarding the planning process.

THE PLANNING PROCESS

The Union County Emergency Management Agency serves as the official liaison of the Task Force to the community. However, most important for this document is the Steering Committee's role in approving proposed mitigation initiatives for incorporation into the Plan, determining the priorities for implementation, and removing or terminating mitigation actions that are no longer desirable.

The Program Staff, consisting of representatives from the Union County Emergency Management Agency and the Catawba Regional Council of Governments, coordinates the actual technical analyses and planning activities that are fundamental to the development of this Plan. These activities include conducting the hazard identification and vulnerability assessment processes and receiving and coordinating the mitigation initiatives the Task Force participants proposed for incorporation into this Plan. The coordinating process between the Steering Committee and the Program Staff constitutes a "peer review" of the proposed mitigation initiatives submitted for incorporation into the Plan. The steering committee reviews each proposed initiative for its consistency with the goals and objectives established for the planning process and its relationship to identified hazards and defined vulnerabilities to those hazards.

Individual jurisdiction's representatives and local organizations are critical to the planning process. The effort begins with developing a community profile of each participating jurisdiction to document their community's essential characteristics relevant to controlling the impacts of disasters. The Program Staff, in conjunction with locally appointed Task Force representatives, then conduct vulnerability assessments of their critical facilities and systems within or serving their area to define, specifically, how these may be vulnerable to the impacts of all types of disasters. Finally, the jurisdictions and their organizations use vulnerability assessments to formulate and characterize mitigation initiatives they could implement if the resources become available. Once the Steering Committee reviews these proposed initiatives, the Catawba Regional Council of Governments will submit the Plan to the South Carolina Emergency Management Department (SCEMD) staff for review. Once the changes, if necessary, are incorporated

into the document, the Catawba Regional Council of Governments will provide the Plan to the Steering Committee members and adjacent County Emergency Managers for review. Upon completion of review by the steering committee and adjacent County Emergency Managers, the Catawba Regional Council of Governments will formally submit the Plan to each jurisdiction's Council for approval. Catawba Regional Council of Governments will submit the approved Plan to FEMA.

The Steering Committee is responsible for coordinating the efforts to involve the community in the mitigation planning process. The Public Involvement subsection of this section provides more detailed information regarding the public information and community outreach activities involved in developing and implementing this Plan.

A1.a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plans' development, as well as who was involved?

Union County prepared the Multi-Jurisdictional Plan over seven months (March to September 2023) with a 3-month review and revision period (September 2023 to November 2023) built in. The review and revision period allows South Carolina and FEMA to review the document and request revisions.

In March 2023, Union County created a task force committee, and meetings were held with the committee on May 11, 2023, June 22, 2023, and September 6, 2023, to gather input. The meeting agendas and sign-in sheets are provided in the appendix of this report.

The plan was developed with input from representatives from Union County, the Town of Carlisle, the Town of Lockhart, the Town of Jonesville, and the public, and in coordination with Lee Brannon, the Catawba Regional Council of Governments led the planning effort. The communities were responsible for attending Task Force meetings, providing data when requested, reviewing mitigation actions, and reviewing the draft and final 2023 Union County Multi-Jurisdictional Hazard Mitigation Plan.

Union County held a public open house-type meeting on Tuesday, August 8, 2023, to gather input from the public. Public comments were presented to the steering committee and reviewed to determine if current mitigation recommendations covered them or if new mitigation recommendations needed to be added to the existing list.

The public had an opportunity to review and comment on the Hazard Mitigation Plan at the regular Union County Council meeting. The plan was provided to the public for review online on the Union County website, and hard copies were provided upon request by Union County Emergency Management staff.

More detail about the Planning process is provided below.

A1-b. Does the plan list the jurisdictions participating in the plan that seek approval and describe how they participated in the planning process?

The Steering Committee is comprised of representatives from Union County, City of Union, Town of Carlisle, Town of Lockhart, Town of Jonesville, and the Catawba Regional Council of Government. The jurisdictions that will seek approval as part of the 2023 Multi-Jurisdictional Hazard Mitigation Plan update are Union County, City of Union, Town of Carlisle, Town of Lockhart, and Town of Jonesville.

CURRENT STATUS OF PARTICIPATION BY COMMITTEE

Currently, the following individuals are serving on the Union County Hazard Mitigation Task Force Steering Committee or Program Staff:

Name	Title	Organization	Committees
Lee Brannon	Director of Union County Emergency Management	Union County	Task Force – Program Staff
Phillip Russell	County Supervisor	Union County	Task Force
Robert Garner	911 Dispatcher at Union County Emergency	Union County	Task Force
Linda Mitchell	E-911 Coordinator	Union County	Task Force
Danny Bright	Union County Councilman	Union County	Task Force
Carl H. Jennings Jr.	Police Chief	Town of Jonesville	Task Force
Ernest Bernard Moore Jr.	Mayor	Town of Jonesville	Task Force
Michael Tyler	Business Administrator	Town of Jonesville	Task Force
Harold E. Thompson	Mayor	City of Union	Task Force
Joe Nichols	Business Administrator	City of Union	Task Force
Robbie McGee	Police Chief	City of Union	Task Force
Donnie Adams	Councilmember	Town of Lockhart	Task Force
Mayor Ferguson-Glenn	Mayor	Town of Carlisle	Task Force
John Glenn	Board member of Town of Carlisle	Town of Carlisle	Task Force
Nicholas Coconato	Mitigation Specialist	South Carolina EMD	Task Force
David Jones	Mitigation Specialist	South Carolina EMD	Task Force
Erika Stahl	Senior Planner	Catawba Regional Council of Governments	Task Force – Program Staff
Stephen Allen	Director of Planning	Catawba Regional Council of Governments	Task Force – Program Staff

2023 TASK FORCE MEETING

All the members of the Task Force were invited by email to a meeting on May 11, 2023, to discuss the 2023 Hazard Mitigation Plan update with specific emphasis on updating the status and prioritizing the mitigation actions. The public was not invited to this meeting, they will be asked to attend an open house public meeting and public hearing for the plan update prior to council adoption. A copy of the plan will be placed on Union County’s website prior to plan adoption. All of the mitigation actions were prioritized, updated, and assigned to a particular department for completion. A sign-in sheet, minutes, and agenda are in Appendix B of the plan.

It was also decided that the Task Force will meet on an annual basis in April or May to discuss current hazard mitigation activities and efforts throughout the county and the municipalities.

The Chart below summarizes each community’s participation:

Community	Name	Organization	Participation
Union County	Lee Brannon, Director of UCEM	Union County Emergency Services	Project and Task Force lead, review of draft plan and amendments, communication with jurisdictions and public
Union County	Brian L. Blackwell, Building Official & Flood Plain Manager	Union County Department of Building Safety	Provided information about Repetitive damaged properties, building codes, and flood codes
Union County	Phillip Russell, County Supervisor	Union County Administration	Task Force, Provided County policy direction for implementation items
Town of Jonesville	Michael Tyler, Business Administrator	Town of Jonesville Administration	Task Force, Provided Town policy direction for implementation items
City of Union	Joe Nichols, Business Administrator	City of Union Administration	Task Force, Provided City policy direction for implementation items
City of Union	Robbie, Police Chief	City of Union Police Department	Task Force
Town of Lockhart	Donnie Adams, Councilmember	Town of Lockhart	Task Force, Provided Town policy direction for implementation items
Town of Carlisle	John Glenn, Board Member	Town of Carlisle	Task Force, Provided Town policy direction for implementation items
Catawba Regional Council of Governments	Erika Stahl, Senior Planner	Catawba COG, Planning Department	Task Force, preparation of plan and amendment, communication with jurisdictions and public
Catawba Regional Council of Governments	Stephen Allen, Director of Planning	Catawba Regional Council of Governments	Task Force, Public Meeting, Plan review

PLAN UPDATE REQUIREMENT

Beginning in March of 2023, Union County Emergency Management, in partnership with Catawba Regional Council of Governments, updated this Plan to comply with South Carolina Emergency Management (SCEM) and the Federal Emergency Management Agency (FEMA) requirements. On April 19, 2022, FEMA released an updated Local Mitigation Planning Policy Guide FP 206-21-0002 (OMB Collection # 660-0062). This new policy guide has an effective date of April 19, 2023. After a review of FEMA’s requirements for local hazard mitigation plan updates, the Task Force reviewed and analyzed each section of the 2018 Multi-Jurisdictional Hazard Mitigation plan and determined that each needed to be updated to some degree to meet the requirements. A significant change to the 2023 plan is that the Catawba Regional Council of Governments reorganized the Plan to address FEMA’s review questions better and incorporate all items from the new FEMA policy report into the Plan. The Plan identifies all notable revisions at the end of each section.

The Steering Committee, led by the Union County Emergency Management Director, was responsible for incorporating changes and input. Catawba Regional Council of Governments, the consultant, guided the update process. The committee met on May 11, 2023, June 22, 2023, and September 6, 2023. The May 11, 2023 meeting covered an introduction of hazard mitigation planning and reviewed existing facilities and infrastructure. The June 22, 2023, covered the identification of the community hazards. The September 6, 2023, meeting covered a review of public comments on public social vulnerabilities and mitigation actions.

During the grant period, two individuals have occupied the Union County Emergency Management Director position. Lee Brannon took over the role of Union County Emergency Management Director in early 2023. The previous director passed away in late 2022. Director Lee Brannon was in charge of the preparation of the revised Plan.

<i>Name</i>	<i>Title</i>	<i>Organization</i>	<i>Dates Involved</i>
Lee Brannon	Director	Union County Emergency Management	January 2023 - present
Robert Fraim	Director	Union County Emergency Management	2020 – December 2022

A.2 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)).

INVOLVEMENT AND CONSULTATION AMONG ADJACENT JURISDICTIONS

Union County is adjacent to the Counties of Spartanburg, Laurens, Newberry, Fairfield, Chester, York, and Cherokee. A copy of the proposed Hazard Mitigation Plan was sent to each neighboring county's County Emergency Management Director and the County Business Administrator in April of 2024 for their input.

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?

Outreach to business, academia, non-profits, and private interests was provided by first compiling a list identifying the agencies and their contact information. Catawba Regional Council of Governments invited the agencies by written correspondence to attend the August 8, 2023, public meeting. In addition, a public notice was provided in the Union County Times on August 1, 2023, and August 8, 2023, to reach the general public. Catawba Regional Council of Governments asked each jurisdiction to inform attendees at their July/early August council meetings of the public hearing date and the public online survey.

The Appendix section of this report provides a list of the agencies contacted for the August 8, 2023, public meeting.

The Catawba Regional Council of Governments sent the South Carolina Office of Emergency Management a copy of the 2023 Union County Multi-Jurisdictional Hazard Mitigation Plan in November 2023 for their input. Revision requests from the South Carolina Emergency Management Department will be completed in November/December of 2023. The Catawba Regional Council of Governments will send the revised plan to each jurisdiction for approval. Once the jurisdictions submit the resolutions of approval, the Catawba Regional Council of Governments will send the report to the Federal Emergency Management Agency for review.

PUBLIC INVOLVEMENT

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))

Public participation is fundamental to Union County's community-based mitigation planning process. Individual citizen involvement gives the Mitigation Task Force a greater understanding of local concerns. It ensures a higher degree of mitigation success by developing community "buy-in" from those directly affected by the planning decisions of the public officials. As citizens become more involved in decisions that affect their lives and safety, they are more likely to gain a greater appreciation of the natural hazards present in their community and take personal steps to reduce their potential impact. Public awareness is a crucial component of an overall mitigation strategy to protect a home, neighborhood, school, business, or city from the possible effects of natural hazards.

Union County and Catawba Regional Council of Governments hosted an open house public meeting on August 8, 2023, at the Bonham Fire Company building during the plan preparation stage to gather public input. The public open house meeting provided maps showing the community facilities and hazards. It offered an opportunity to gather feedback from the public on what they think is a top concern and provided a chance to identify safety needs. It was also a great way to educate the public on how to be prepared for an emergency. Immediately before and a few weeks after the meeting, an online survey will be available for the public to complete to gather comments from those who could not attend the meeting.

Other opportunities for public input include meetings that each jurisdiction will host during the planning process.

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?

Public Input from the August 8, 2023 Public Open House and surveys were reviewed and discussed with the Task Force. Their comments were summarized and included in the plan's appendix. Public suggestions were included, when appropriate, in recommendations or the plan as data.

The public, neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties were allowed to input on the content of the updated plan at a Union County Council Public Hearing. Copies of the Union County Hazard Mitigation Plan were made available to the general public at the public hearing at no expense to the requesting individuals. Union County provided copies of the plan at the Union County Library, the information table, and the Union County Supervisor's office. Union County provided public notice via newspaper advertisements two weeks before the public hearing.

The Public will also be given the opportunity to provide input on the Plan before Plan approval at each jurisdictions' adoption hearing.

PUBLIC NOTICE

Union County is in the process of updating the County's Hazard Mitigation Plan. This plan identifies hazards that can impact Union County and actions to help reduce the effects of these hazards on Union County. This multi-jurisdictional plan includes all cities/towns in Union County. The plan is updated approximately every five years and sent to FEMA for approval. The county must have an updated approved Hazard Mitigation Plan to remain eligible for specific pre- and post-disaster federal and state funding. Union County invites the public to review the plan and provide input on hazards and mitigation methods. This public meeting will be held on _____, _____, at _____PM in the Grand Jury Room, located on the second floor of Union County Court House, 210 W. Main Street, Union, SC. For further information, please contact Lee Brannon, Union County Emergency Management Agency, at (843)-429-1620.

Each jurisdiction should track public comments and email comments to the committee group for review. Union County and Catawba Regional Council of Government staff will review the public statement or question to identify if the Plan requires modification. Catawba Regional Council of Governments will modify the Plan to address the concern if needed. Catawba Regional Council of Governments will provide a note by each comment stating one of the following: the comment is not relevant to the Plan, already included in the Plan with a section noted, or a change made to the Plan and identify section of change.

INTEGRATING THE PLAN INTO LOCAL PLANNING MECHANISMS

A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))

The Union County Hazard Mitigation Plan Task Force will identify opportunities to integrate the requirements of this Plan into other local planning mechanisms and the five-year review process described herein. The Union County Task Force deems developing and maintaining this stand-alone Multi-jurisdictional Hazard Mitigation Plan to be the most effective and appropriate method to implement local hazard mitigation actions. As such, the primary means for integrating mitigation strategies into other regional planning mechanisms will be through the revision, update, and implementation of each jurisdiction’s individual Mitigation Projects that require specific planning and administrative tasks (i.e., plan amendments, ordinance revisions, capital improvement projects, etc.).

Catawba Regional Council of Governments has identified amendments to ordinances and policies in the mitigation recommendations section of this report.

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?

The following documents were reviewed for each jurisdiction:

Plans/Ordinances Reviewed in the Development of the Hazard Mitigation Plan		
Jurisdiction	Plans/Ordinances	Date approved
Union County	<ul style="list-style-type: none"> - 2019 Hazard Mitigation Plan - Emergency Operations Plan - Flood Damage Prevention Ordinance (Chapter 9, Article 2) - Emergency Preparedness Ordinance (Chapter 11, sections 11-1 through 11-13) - 2021 Comprehensive Plan (adopted) 	<ul style="list-style-type: none"> - 2019, approved by FEMA in 2020 - Unknown - Ord. No. 259, Art. I, § A, 7-12-11 - Ord. No. 2, § 1, 1-4-78; Ord. of 11-4-87, § 1; Ord. of 3-17-93(2)

	<ul style="list-style-type: none"> - International Building Codes (Union County Ordinance #248, Chapter 7, Article 1) - Buildings Unfit for Human Habitation (Chapter 7, Article 2, Sections 7-31 through 7-38) 	<ul style="list-style-type: none"> - 2021 - Ord. No. 248, art. I, § I, 6-9-09 - Ord. No. 248, art. II, § I, 6-9-09; Ord. No. 298, § 10, 10-26-15
City of Union	<ul style="list-style-type: none"> - Zoning Ordinance - Flood Damage Prevention Ordinance (Chapter 9.5) - International Building Codes - Drought Management Ordinance and Plan 	<ul style="list-style-type: none"> - January 21, 2017 - Ordinance 1-19-21 (replaced old Flood Ordinance approved on 6-21-11. - Ord. No. 248, art. I, § I, 6-9-09 - Article III Drought Response Section 23.1-6.1 Drought Management Plan (Ord. of 5-10-2003, § 1)
Town of Jonesville	<ul style="list-style-type: none"> - International Building Codes 	<ul style="list-style-type: none"> - Has ordinance adopting Union County's Building Codes/shared service agreement
Town of Lockhart	<ul style="list-style-type: none"> - Flood Damage Prevention Ordinance - International Building Codes - Drought Management Ordinance and Plan 	<ul style="list-style-type: none"> - Has flood damage prevention ordinance according to Flood Insurance, copy can not be found - Does not have any of the ordinances according to the Mayor
Town of Carlisle	<ul style="list-style-type: none"> - Flood Damage Prevention Ordinance - International Building Codes - Drought Management Ordinance and Plan 	<ul style="list-style-type: none"> - Ordinance # 2021-23 - Ordinance No. 18 (shared service agreement with Union County Building Dept. - Ordinance adopted 6/10/03

The Union County building department is responsible for reviewing Union County building applications and has agreements with the Towns of Carlisle and Jonesville to perform their building applications. The City of Union has its own building department. The Union County and City of Union building departments have adopted the latest International Building Codes.

Adherence to these building standards does support mitigation initiatives outlined in the plan. Building code standards also address mitigation concerns by requiring all new construction to meet specific safety standards.

International Building Code Standards give specific consideration to the types, frequency, and intensity of hazards present in the region in determining what the area needs for adequate construction. Consequently, residents and business owners who build structures according to applicable codes construct buildings inherently resistant to many hazards like strong winds, floods, and earthquakes.

There is no county-wide zoning in Union County. The County adopted a comprehensive plan in 2021. The County pursued county-wide zoning; however, the County Council tabled the matter at a Council meeting in 2022. Catawba Regional Council of Governments reviewed the County Comprehensive Plan and, when appropriate, incorporated it into the 2023 Hazard Mitigation Plan.

The Towns of Carlisle, Jonesville, and Lockhart do not have zoning ordinances. The City of Union has and implements its zoning ordinance.

The County and three of the four municipalities have adopted Flood Damage Prevention Ordinances. The ordinance restricts development in certain flood zones and is designed to prevent public and private losses due to flood events. The Town of Jonesville does not have an adopted Flood Damage Prevention ordinance.

The County also has adopted an Emergency Preparedness Ordinance. This ordinance gives the County certain powers during Emergencies and establishes the Office of the Coordinator (Emergency Manager).

Union County also has a “Buildings Unfit for Human Habitation” ordinance (Article II). The purpose of the ordinance is as follows: “It is hereby recognized that there exist within Union County, South Carolina, certain dwellings and other structures which are unfit for human habitation and/or use due to dilapidation, defects increasing the hazards of fire, accidents or other calamities, lack of ventilation, light or sanitary facilities, and/or other conditions rendering such dwellings and/or structures unsafe or unsanitary, dangerous or detrimental to the health, safety or morals or otherwise inimical to the welfare of the residents of the County. (Ord. No. 248, art. II, § I, 6-9-09; Ord. No. 298, § 10, 10-26-15)” The City of Union also has a similar ordinance, Article III: Unsafe Buildings and Structures. This ordinance helps remove dilapidated structures before an emergency and can also assist in rebuilding efforts after a disaster.

MONITORING, EVALUATING, AND UPDATING

Periodic revisions and updates of the Plan are required to ensure that the goals of the Plan are current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan fully complies with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are reviewed and carried out according to each jurisdiction’s individual Mitigation Projects.

The Union County Emergency Management Director will facilitate regular meetings of the Union County Task Force Committee annually during April/May of each year and prepare and distribute an annual report summarizing the status of the mitigation action items.

Union County Emergency Management will hold Additional meetings following any disaster events warranting a re-examination of the mitigation actions being implemented or proposed by the participating jurisdictions.

Specifically, the Emergency Management Director will take the lead in maintaining Plan document files, monitoring the progress of proposed mitigation actions against the estimated timeline for each project's completion, evaluating the effectiveness of each action concerning loss reduction, cost-effectiveness, etc., and seeing that the Action Plan is updated in general when necessary. This process will ensure that the Plan is continuously updated to reflect the changing conditions and needs within Union County. The Emergency Management Director will present a report to local governing bodies of participating jurisdictions to report progress on the actions identified in the Plan and provide information on the latest legislative requirements or changes to those requirements.

FIVE (5) YEAR PLAN REVIEW

At a minimum, the Plan will continue to be reviewed by the Mitigation Task Force within a five-year cycle to determine whether there have been any significant changes in Union County that may, in turn, necessitate change in the types of mitigation actions proposed. New development in identified hazard areas, increased exposure to hazards, increased or decreased capability to address threats, and changes to federal or state legislation may affect the Plan's necessary content.

As determined by this update process, the plan review provides community officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures.

The Catawba Regional Council of Governments will review and identify non-implemented mitigation actions and ascertain whether to keep or remove the mitigation actions. Union County Emergency Management will be responsible for reconvening the Mitigation Task Force and conducting the five-year review.

During the five-year plan review process, the Union County Hazard Mitigation Plan Task Force will consider the following questions as criteria for assessing the effectiveness and appropriateness of the Plan:

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

Following the five-year review, any necessary revisions will be summarized and implemented according to the reporting procedures and plan amendment process outline. Upon completion of the review and update/amendment process, the Union County Multi-Jurisdictional Hazard Mitigation Plan will be

submitted to the State Hazard Mitigation Officer for final review and approval in coordination with the Federal Emergency Management Agency.

PLAN AMENDMENT PROCESS

Upon the initiation of the amendment process, Union County will forward information on the proposed change(s) to all interested parties, including, but not limited to, all affected County and municipal departments, residents, and businesses. Union County will also forward information to the South Carolina Division of Emergency Management. The County will disseminate plan amendment information to the public to seek input on the proposed amendment(s) for a 45-day review and comment period.

At the end of the 45-day review and comment period, the County will forward the proposed amendment(s) and all comments to the Mitigation Task Force for final consideration.

The Task Force will review the proposed amendment along with the comments received from other parties. If acceptable, the Task Force will submit a recommendation for approving and adopting changes to the Plan to each appropriate governing body within 60 days.

In determining whether to recommend approval or denial of a Plan amendment, the Mitigation Task Force will consider the following factors.

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

Upon receiving the recommendation from the Mitigation Task Force and before adopting the Plan, each local governing body will hold a public meeting. The governing body will review the request from the Mitigation Task Force (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing body will take one of the following actions:

- Adopt the proposed amendments as presented.
- Adopt the proposed amendments with modifications.
- Refer the amendments request back to the Mitigation Task Force for further revision or
- Defer the amendment request to the Mitigation Task Force for further consideration or additional hearings.

Continued Public Involvement

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

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

- Advertising meetings of the Mitigation Task Force in the local newspaper, public bulletin boards, and City and County buildings.
- Designating willing and voluntary citizens and private sector representatives as official members of the Mitigation Advisory Committee.
- Utilize local media to update the public on maintenance or periodic review activities.
- Utilizing City and County Web sites to advertise any maintenance or periodic review activities taking place and
- Keep copies of the Plan in public libraries.

CHANGES TO THIS SECTION

- ✓ Updated committee members, organization, and participation
- ✓ Updated the number of meetings, dates of meetings, and locations of meetings.
- ✓ Added a paragraph stating how Union County will address public comments in the plan.
- ✓ Updated and revised Plans and Ordinance Subsections to include missing ordinances/plans from the 2019 Plan and description. The update included adding the ordinance number when known.
- ✓ Added FEMA requirement for local Hazard Mitigation Plan throughout the section and, when necessary, added new paragraphs to address requirements specifically.
- ✓ Font Changes

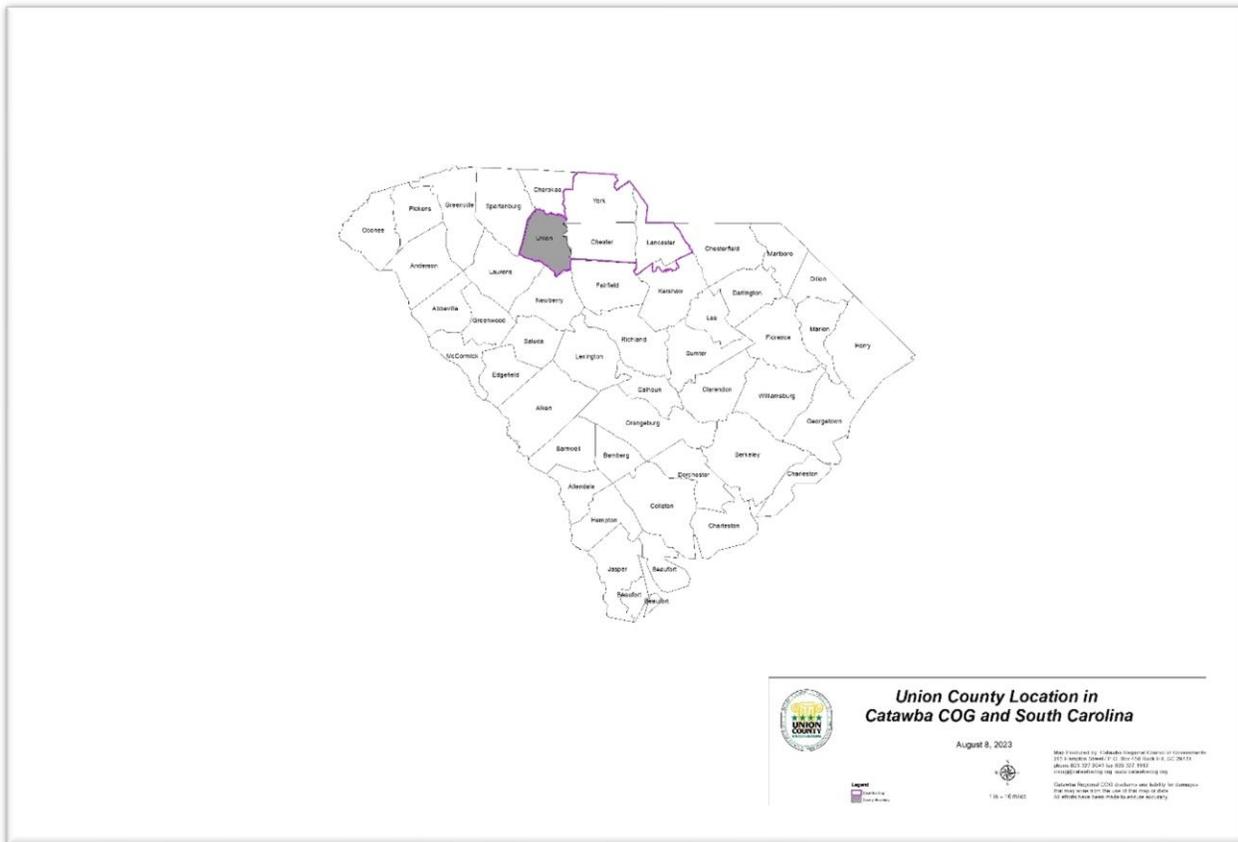
COMMUNITY PROFILE

This section of the Plan provides a general overview of Union County, South Carolina. It consists of the following four subsections:

- Geography and the Environmental
- Population and Demographics
- Housing, Infrastructure, and Land Use
- Employment and Industry

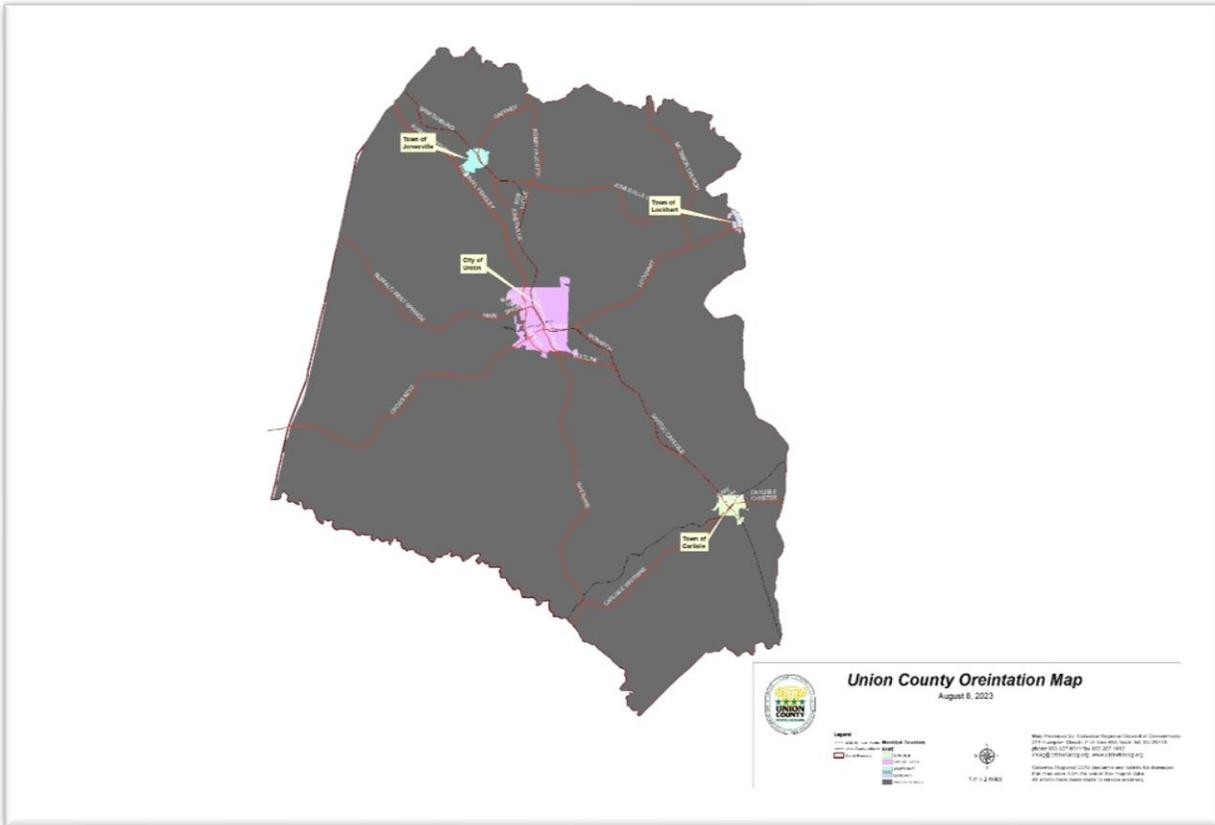
GEOGRAPHY AND THE ENVIRONMENT

Union County is located in the Piedmont Region of South Carolina and is convenient to the major metropolitan areas of Greenville, Columbia, and Charlotte. The County is in the Catawba Regional Council of Government (Catawba Cog) area. Union County is adjacent to seven counties: Spartanburg, Cherokee, York, Chester, Fairfield, Newberry, and Laurens Counties.



Source: South Carolina GIS Data

The County and its four major communities – the City of Union and the towns of Lockhart, Jonesville, and Carlisle provide a rural environment.



Source: Union County GIS Data

The total land area of Union County and its municipalities are:

Total Land Areas of Participating Jurisdictions	
Jurisdiction	Total Land Area (acres)
Union County	322,693
City of Union	5181
Carlisle	880
Jonesville	698
Lockhart	273

Source: Union County GIS Data

CLIMATE

The Union Planning Area is within the northwest climatological division of the state. Union County has a temperate climate characterized by warm, humid summers, long and moderate falls, and relatively mild winters. The mean annual temperature is 61.7 degrees Fahrenheit. The coldest monthly mean temperatures occur in December (degrees F), January, and February, with a winter mean temperature of 49.4 degrees Fahrenheit.

The warmest months are June, July, and August, with a summer mean temperature of 73.9 degrees Fahrenheit.

The fall and spring seasons are generally pleasant, with moderate mean temperatures ranging from a minimum average temperature of 48.2 degrees Fahrenheit to a maximum average of 73.4 degrees Fahrenheit.

The amount of rainfall varies from season to season, with the summer accounting for the most significant amount since thunderstorms and heavy rains are frequent. Winter precipitation consists of sporadic periods of rain with occasional light snowfall. The City of Union receives a mean annual precipitation of 44.58 inches. (Source SC State Climatology Office)

POPULATION AND DEMOGRAPHICS

The City of Union is the most populated jurisdiction located in Union County. The County and its jurisdictions have seen population decline for the past 20 years, from 2000 to 2020. The Towns of Carlisle and Lockhart have experienced the most significant population declines.

Population Counts for Participating Counties				
Jurisdiction	2000 Census	2010 Census	2020 Census	% Change 2010-2020
Union County	29,881	28,961	27,244	-8.8%
City of Union	8,793	8,393	8,174	-7.0%
Town of Carlisle	477	436	321	-32.7%
Town of Jonesville	954	911	852	-10.7%
Town of Lockhart	499	488	384	-23%

Source: U.S. Census Bureau

The jurisdictions' racial characteristics are provided in Table 3.3. Generally, whites make up most of the population in the region, accounting for 64.9% percent of the population in Union County. The City of Union has the most diversity in the County. The Town of Carlisle has the highest percentage of Black or African American residents.

Demographics of Participating Jurisdictions							
Jurisdiction	White, Percent (2021)	Black or African American, Percent (2021)	American Indian or Alaska Native, Percent (2021)	Asian, Percent (2021)	Native Hawaiian or Other Pacific Islander, Percent (2021)	Persons of Hispanic Origin, Percent (2021)	Two or More Races, Percent (2021)
Union County	64.9%	30%	0.1%	0.1%	0%	1.8%	4.5%
City of Union	50.6%	46.4%	0.1%	0%	0%	3.2%	2.6%
Town of Carlisle	8.5%	90.8%	0%	0%	0%	0%	0.7%
Town of Jonesville	54.7%	31.7%	0%	0%	0%	2.4%	13.5%
Town of Lockhart	92.4%	0.0%	0%	0%	0%	0%	7.4%

Source: American Community Survey 2021 5-year estimate

Most of the concentrated development is in the City of Union, Town of Carlisle, Town of Jonesville, and Town of Lockhart. The majority of the Union County remains as unincorporated land under the jurisdiction of Union County.

Housing Characteristics of Participating Jurisdictions					
Jurisdiction	Housing Units	Mobile Homes	# of Homes Constructed before 1959	Median Home Value (2020-2023)	Occupancy Rate
Union County	13,542	2812	4,135	\$81,400	82.3%
City of Union	4,378	219	2014	\$82,100	84.9%
Town of Carlisle	266	62	37	\$47,300	74.4%
Town of Jonesville	536	90	299	\$68,900	74.8%
Town of Lockhart	243	5	172	\$36,700	70.8%

Source: 2021 American Community Survey 5 Year Estimates Data Profiles, DP04 Selected Housing Characteristics

The median household income for Union County is \$40,048, and the per capita income is \$23,885.00.

INFRASTRUCTURE

Transportation

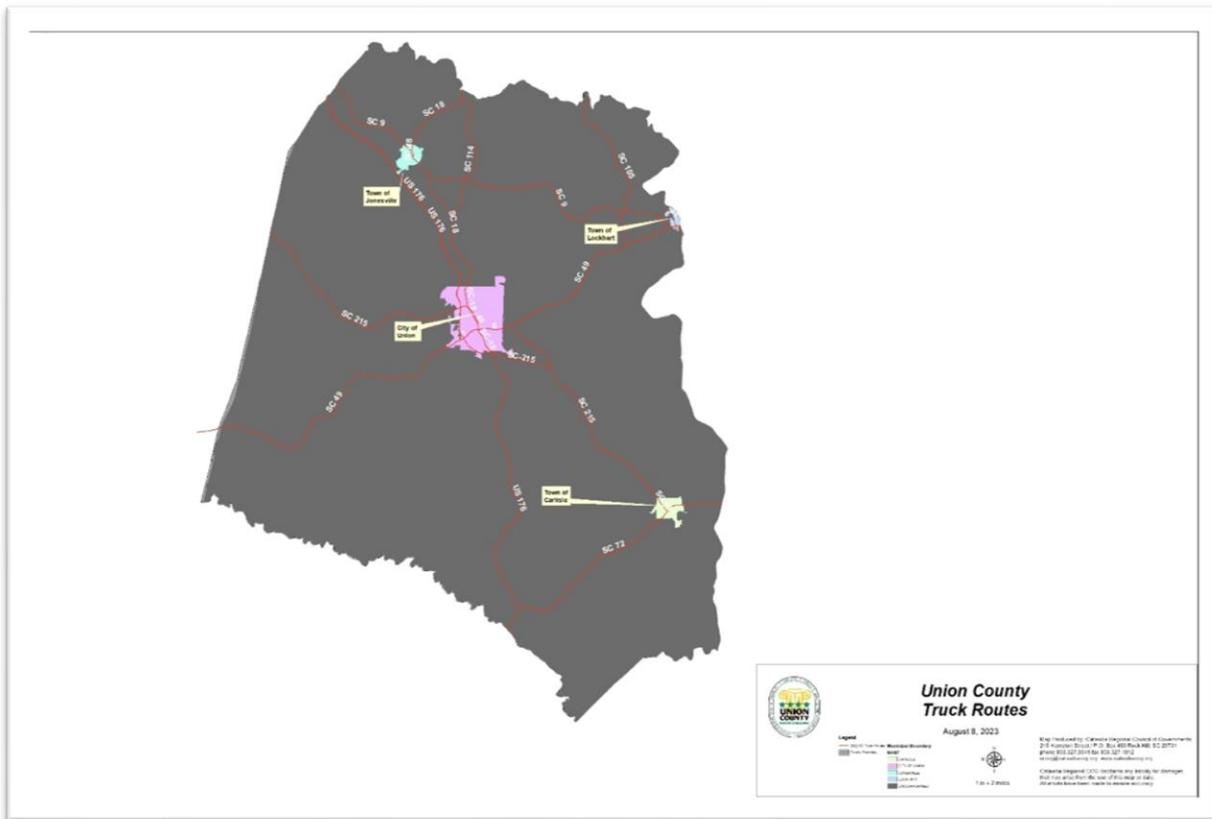
Union County has rail lines, truck routes, freight routes, and a county airport.

Highways

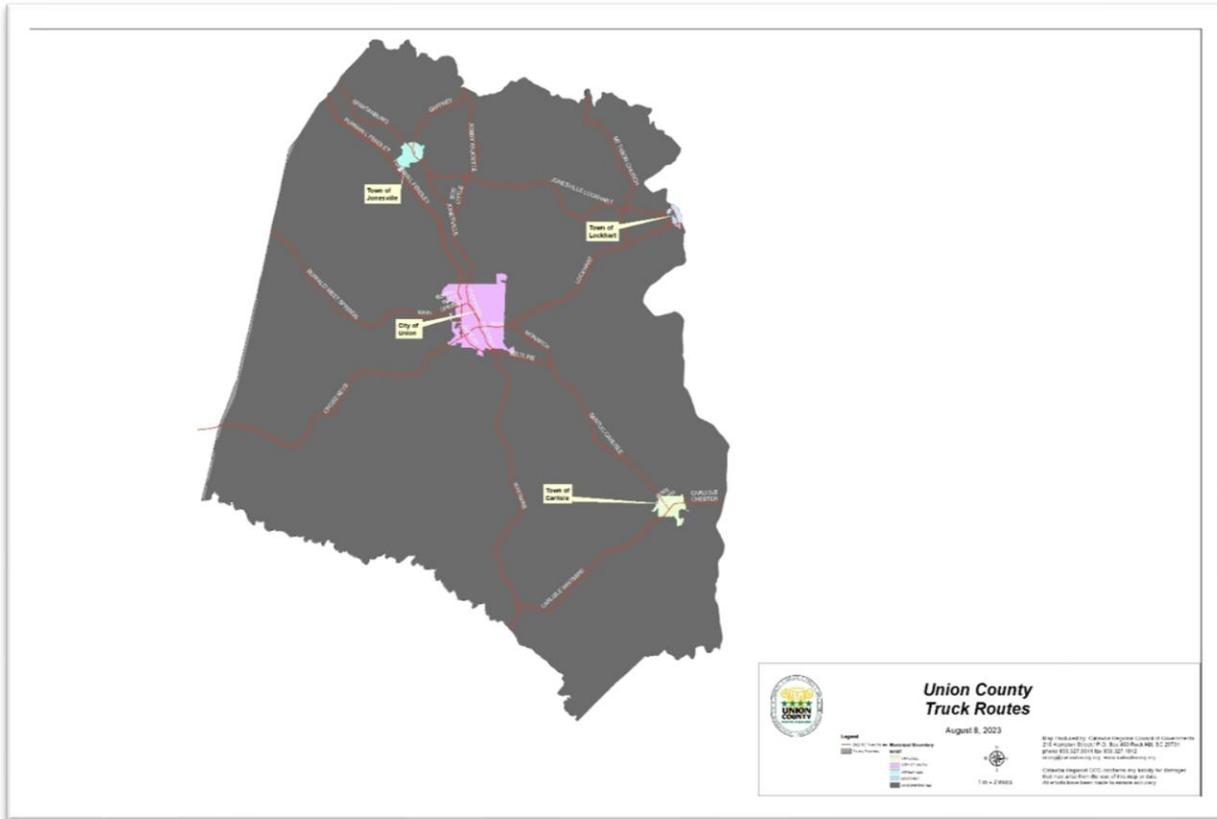
Union County’s highway infrastructure includes access within a 30-minute drive time of I-26 and I-85. The County is within a 1.5-hour drive of I-40, I-20, and I-77. The County is within a 2-hour drive of I-95.

The major routes connecting Union County to the interstate highway systems are U.S. Highway 176, a four-lane divided east-west highway, and South Carolina Highway 49. U.S. Highway 176 connects the County to I-85 in Spartanburg. South Carolina Highway 49 is a north-south trade route that connects the County to Charlotte, North Carolina (1 hour north), and I-26 and I-385 to the south near Clinton, South Carolina.

This Plan provides two maps showing Union County’s Truck Routes. One map uses Road Names, and the other Highway numbers.



Source: Union County GIS Data



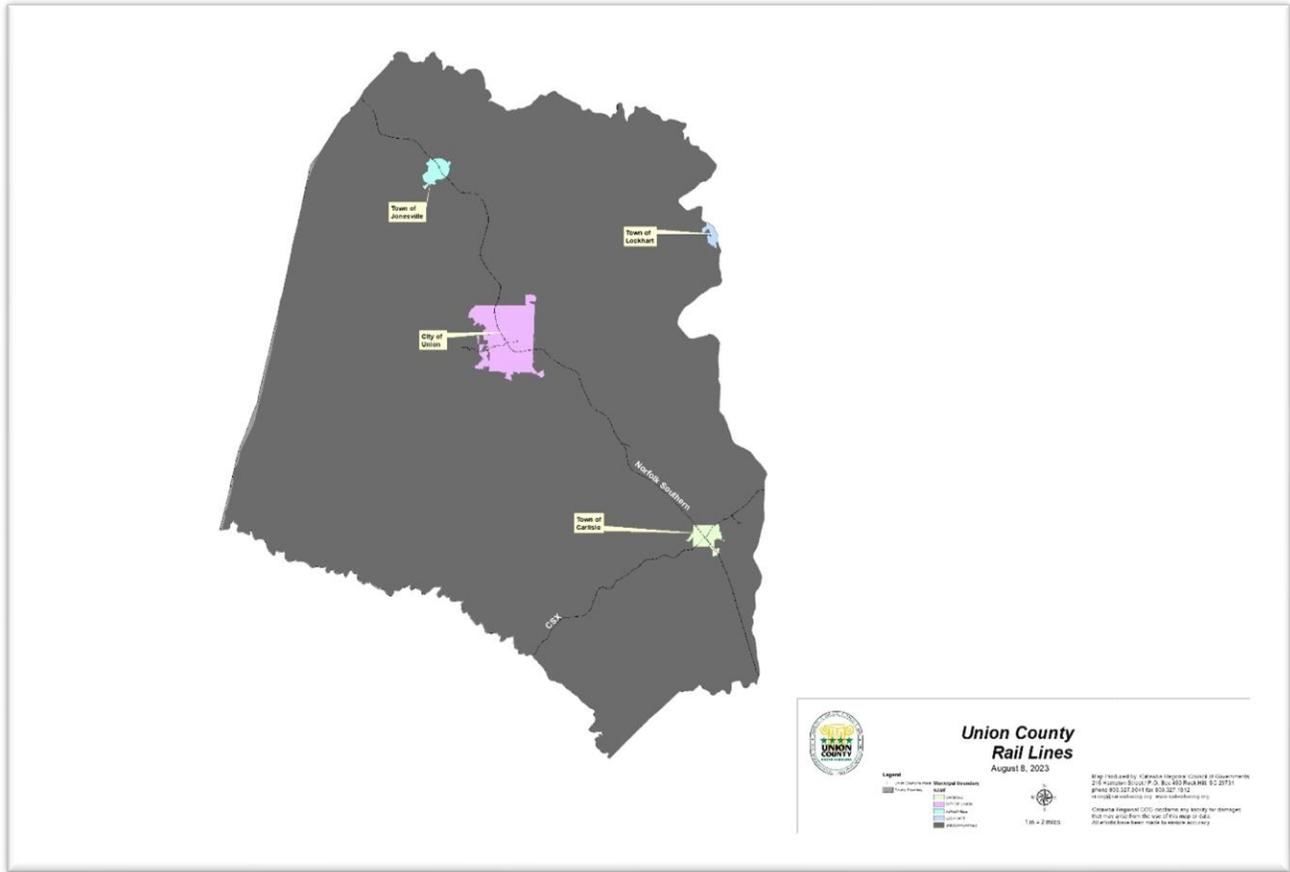
Source: Union County GIS Data

Public Transportation

Union County offers an on-demand public transportation program through a partnership with Chester Connector. The program began in 2023 and is in a pilot program phase. A public transportation feasibility study was prepared in 2018 and recommended an on-demand shuttle program (currently being implemented) and a fixed Route on Highway 176 from Spartanburg to the City of Union. It is still being determined when or if the South Carolina Department of Transportation will implement the fixed route.

Rail

Union County receives rail service from Norfolk-Southern Railway and CSX Railway. The Norfolk Southern Railway runs east to west through the City of Union and the Towns of Carlisle and Jonesville. The line connects Union County to Inland Port Greer, Spartanburg, Columbia, and Charleston Port. The CSX line runs north to south, connecting Union to Chester and Newberry Counties and eventually North Carolina and Atlanta.



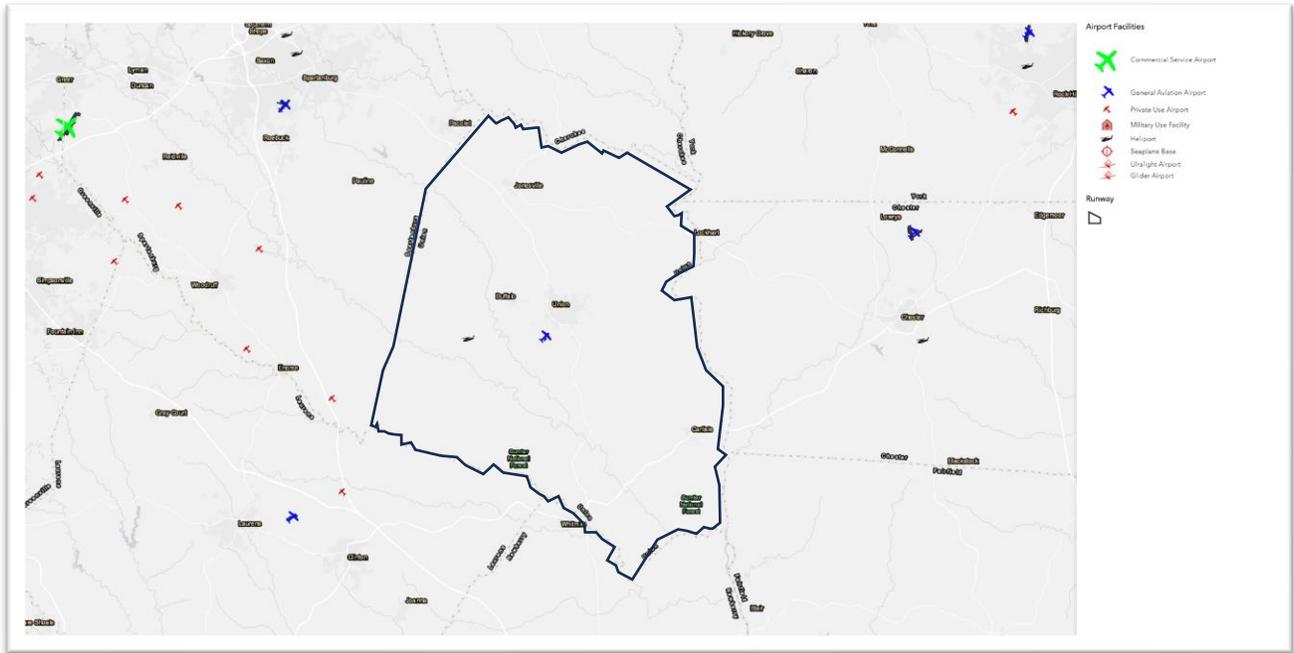
Source: Union County GIS Data

Passenger Rail

There are no passenger rail services that travel through Union County. However, the Crescent long-distance passenger rail line does stop in Spartanburg. The Crescent Amtrak trains travel between New York City and New Orleans. It’s a long-distance route that travels through college and mountain towns. The Crescent long-distance passenger rail line also travels to Northeast and Southern cities (including Atlanta). One of the notable highlights is travel over Lake Pontchartrain near New Orleans via the longest rail bridge in the United States.

Airport

Union County, SC, has one airport called Troy Shelton Field. Troy Shelton Field is off Sardis Road, one mile west of the Union city limits on Airport Road. The field has a 3,500-foot paved runway capable of handling twin-engine business aircraft. The airport is 608 feet above sea level and has fuel and other service facilities. Troy Shelton Field has a rotating beacon on the field and runway lights that can be turned on by radio from approaching aircraft.



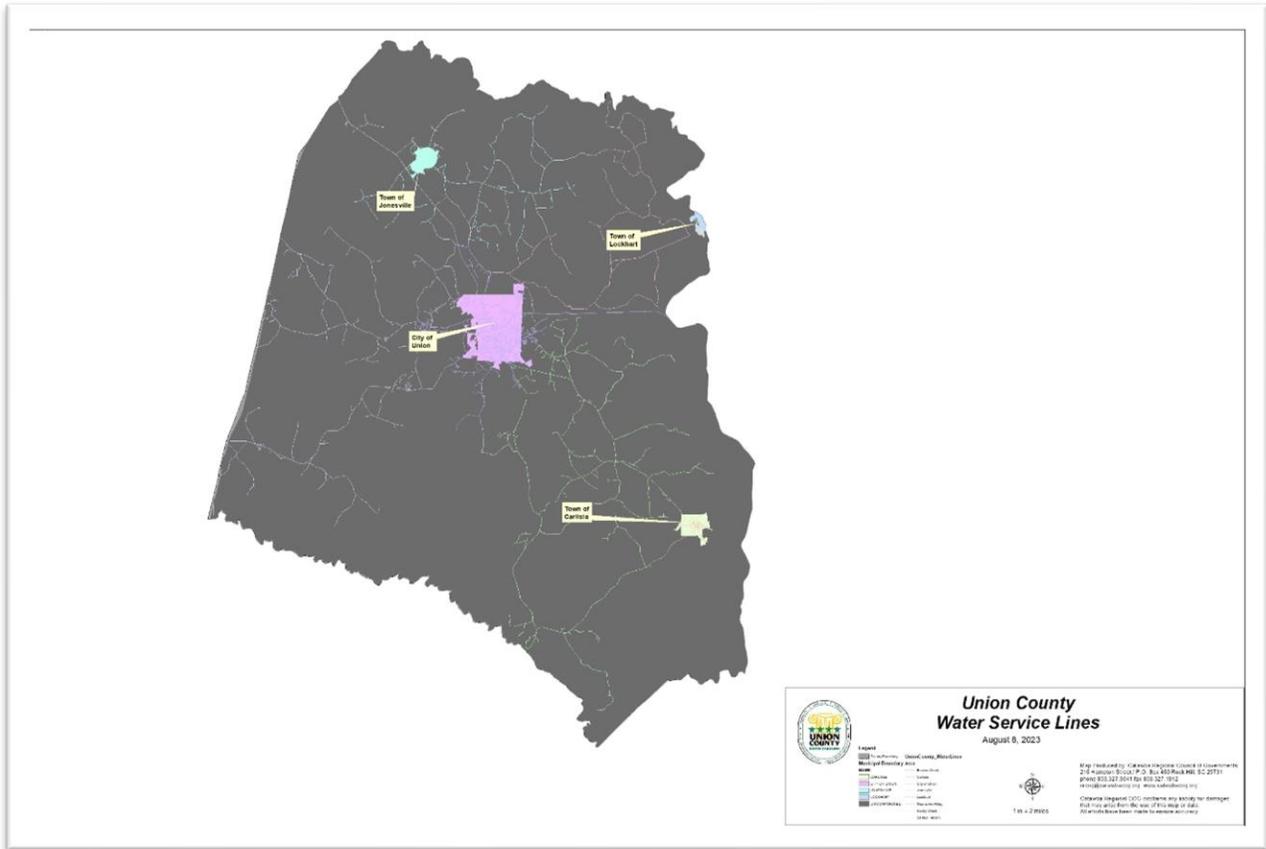
Source: South Carolina Aeronautics Commission SC All Data Viewer

The closest commercial service airport is Greenville Spartanburg International. Other commercial service airports include Charlotte International Airport and Columbia Metropolitan Airport.

UTILITIES

The City of Union, Dominion Energy, Duke Energy, Broad River Electric Cooperative, and Lockhart Power Company provide electric power in Union County. The City of Union is a mutual aid community. Mutual aid communities assist each other to get electric services back on after significant storm events.

The City of Union, Town of Carlisle, Town of Jonesville, Brown’s Creek Water District, Meansville Riley Road Water District, Rocky Creek Water District, Santuc Hebron Water District, and Spartanburg Water provide water services in Union County.

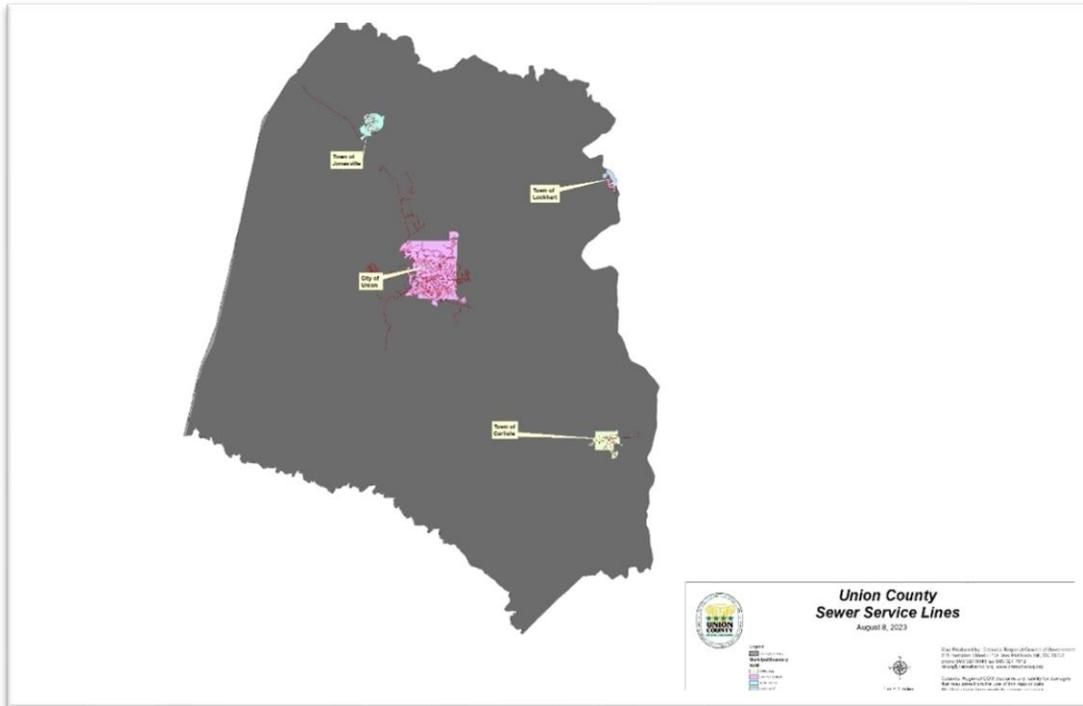


Source: Union County GIS Data

The City of Union, the Town of Jonesville, and the Town of Lockhart provide Sewer Services.

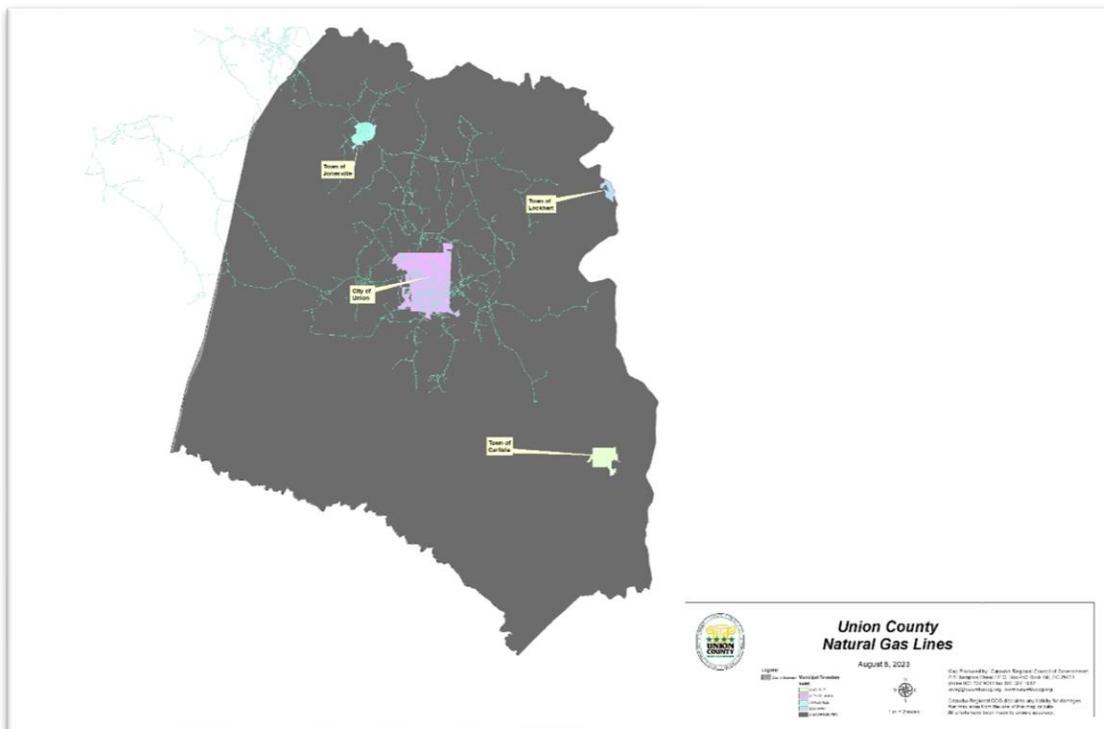
Carlisle Finishing Textile Mill provided sewer service to the Town of Carlisle. The facility closed and sold the property. The South Carolina Department of Health and Environmental Control stepped in to ensure sewer service continued until the contractor completed the sewer extension line from the City of Union to Carlisle. The Town of Carlisle will provide sewer service to town residents once the contractor completes the sewer extension line connecting the Town of Carlisle and the City of Union later in 2023.

South Carolina has funded a line extension from the City of Union to the Town of Jonesville, due to be completed in a few years. The sewer line extension to Jonesville will improve sewer capacity for the community.



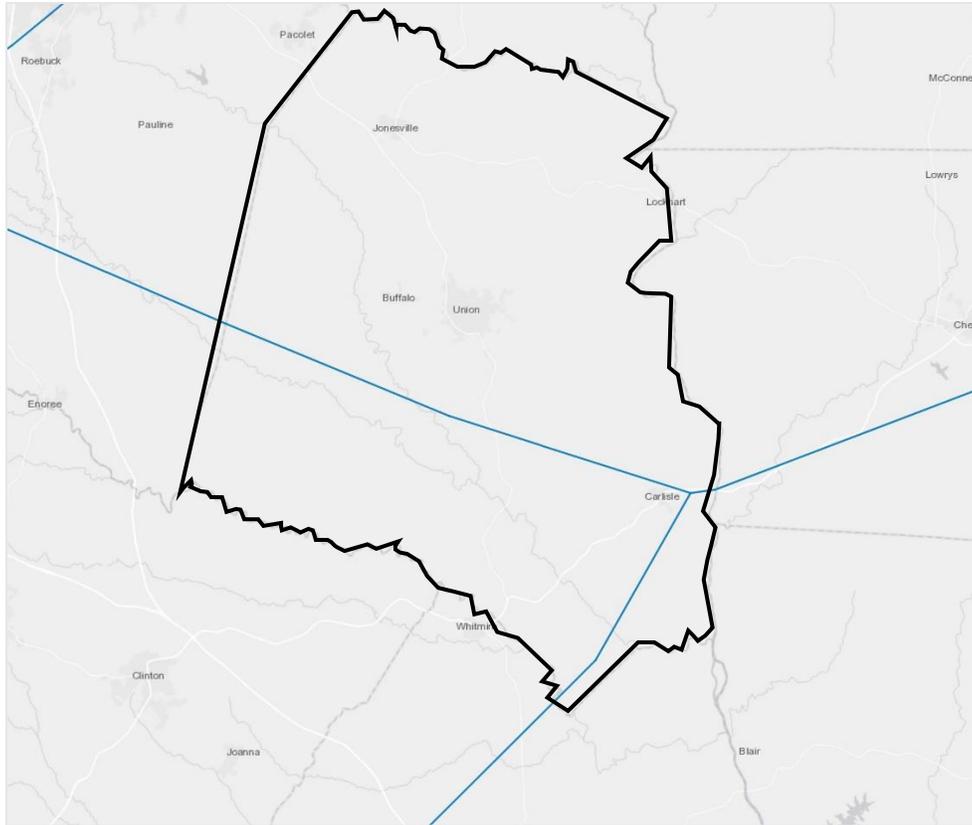
Source: Union County GIS Data

The City of Union and Carolina Gas Transmission provide Natural Gas to the County. The towns of Carlisle and Lockhart do not have natural gas service available.



Source: Union County GIS Data

National Gas Transmission lines cut through Union County in a south-to-north direction. An east-to-west line ends in Carlisle.



Source: National Pipeline Mapping System

COMMUNITY FACILITIES

There are many public buildings and community facilities located throughout Union County. The Community Facilities section of this report provides a thorough list of all the facilities that support the FEMA life construct. There are sixteen (16) fire/EMS stations, three (3) police stations, and ten (10) public schools in the area.

Union County has sixteen (16) parks, playgrounds, and ballfield sites. The sites are City Park Ballfields, Forster Park Ballfield, Union Center, Monarch Ballfield, South Hills Complex (Skatepark, playground, trike track, two adult softball fields, two youth ballfields, and one youth t-ball field), Lukesville Ballfield, Buffalo Mill Pond, Jonesville Mini Park/ Mac Cunningham Sports Complex, Cross Keys Ballfield, Santuc Community Ballfield, Kelton Ballfield, James F. Moorner Park (Perrin Avenue), Union County High School Tennis Courts, Dixie Youth Ball Field (Buffalo Complex), West Springs Ballfield, and Excelsior Ballfields.

LAND USE

Union County's population declined between 2010 and 2020 despite its proximity to the growing City of Spartanburg. The four jurisdictions located in Union County have also seen a population decline over the past ten years. Stabilizing the population and growing the community are top concerns. Union County's population is concentrated in the incorporated areas of the City of Union, Towns of Carlisle, Jonesville, and Lockhart.

Many commercial and institutional businesses are in the City of Union or on the outskirts of the city limits. Other areas of high business concentration include industrial parks along SC -176 north of the City of Union and South of Jonesville. As further discussed in the Economic Hazards section of this report, many of the communities in Union County have suffered from the closure of textile mills.

The City of Union has adopted a Comprehensive Land Use Plan and Zoning ordinance. Union County has an adopted Comprehensive Land Use Plan but no zoning ordinance. The Towns of Carlisle, Jonesville, and Lockhart have not prepared and adopted Comprehensive Land Use Plans or zoning ordinances. Both the Towns of Jonesville and Lockhart have prepared Strategic Plans for the future redevelopment of their communities.

Sewer and water infrastructure capacity has limited development growth in Union County. The City of Union has received funding to extend sewer infrastructure lines to Jonesville and Carlisle. After the contractor completes the sewer infrastructure extension project, Jonesville may see increased housing and business development pressure. South Carolina approved funding for the sewer extension project in 2023, which the contractor will complete sometime in 2025-2026.

It is unknown if the Town of Carlisle will experience growth pressures after completing the sewer infrastructure connection to the City of Union's Sewer Infrastructure. The Town of Carlisle experienced the closing of the Carlisle Finishing Textile Mill Closure in 2020.

The City of Union is experiencing the relocation of the Union Medical Center, currently located on Main Street. The new facility will move to the outskirts of the community; however, it is still a short commute to its existing location. Redevelopment of this site will be critical.

Union County has identified two areas of SC-176 for future economic development: 1. SC-176 north of Jonesville and 2. SC-176 south of Jonesville and north of the City of Union. Developers have constructed industrial manufacturing facilities and other compatible uses in the area on SC-176 between Jonesville and the City of Union. It is anticipated future development of that area will continue to be for manufacturing uses. The Belk Distribution facility was closed in 2022. Planning efforts should focus on reusing or redeveloping the former Belk Distribution site.

Union County's character will remain rural in the foreseeable future.

EMPLOYMENT AND INDUSTRY

Manufacturing is the dominant industry in Union County. Other leading industries include Health Care and Social Assistance.

Union County’s Labor Force Participation Rate is significantly lower than the state and national averages, as noted in the table below.

Labor Force Participation (2017-2021 ACS 5-Year Estimates)			
	Union	SC	National Average
Labor Force Participation Rate	52.00%	57.80%	62.60%
Not in Labor Force	48.00%	42.20%	37.40%
Female Labor Participation Rate	52.40%		57.40%
Women Not in Labor Force	47.60%		42.60%
Women % of total population	51.70%		
Prime Working Age workers (25-54 years)	10,238.25		
Not in Labor Force	4,914.36		
Prime Working Age women	5,293.18		
Women Not in Labor Force	2,519.55		
Population under 5	1,531.00		
5-9 years	1,654.00		
10-14 years	1,574.00		

Source: 2017-2021 5-year ACS Data

Union County municipalities have had a rich textile mill history. Many of the Textile Mills have closed over the past 20 years, with the latest closing in Carlisle. The Towns of Carlisle, Jonesville, and Lockhart still feel the impact of the Textile Mills closures.

DECLARED DISASTERS FOR UNION COUNTY

From 1954 through 2022, South Carolina experienced 33 federally declared disasters, of which 20 were major disaster declarations, which allows federal Hazard Mitigation Grant Program (HMGP) funding to be made available statewide in addition to recovery assistance programs in declared counties. Of the 20 major disaster declarations, ten (10) have occurred since 2014. Since the 2014 Ice Storm, South Carolina has had \$1,819,209,225 in disaster public infrastructure and response costs, with 4,247 total projects completed and 70% of those paid. A list of federally declared disasters, emergency declarations, and fire management assistance declarations has been compiled for South Carolina. The types of hazards that led to these declarations are ice storms, fire, winter storms, hurricanes, severe storms, flooding, and pandemic disease.

The table below lists South Carolina's Major Disaster and Emergency Declarations. The events that impacted Union County are highlighted in yellow.

South Carolina Major Disasters and Emergency Declarations			
Year	Declaration Date	Event	Declaration Type
2022	11/21	Hurricane Ian	Major Disaster Declaration
2022	9/29	Hurricane Ian	Emergency Declaration
2020	5/01	Severe Storms, Tornadoes, and Straight-Line Winds	Major Disaster Declaration
2020	3/27	COVID-19	Major Disaster Declaration
2020	3/17	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	Major Disaster Declaration
2020	3/13	COVID-19	Emergency Declaration
2019	9/30	Hurricane Dorian	Major Disaster Declaration
2019	9/01	Hurricane Dorian	Emergency Declaration
2018	9/16	Hurricane Florence	Major Disaster Declaration
2018	9/10	Hurricane Florence	Emergency Declaration
2017	10/16	Hurricane Irma	Major Disaster Declaration
2017	9/07	Hurricane Irma	Emergency Declaration
2016	11/12	Pinnacle Mountain Fire	Fire Management Assistance Declaration
2016	10/11	Hurricane Matthew	Major Disaster Declaration
2016	10/06	Hurricane Matthew	Emergency Declaration
2015	10/05	Severe Storms and Flooding	Major Disaster Declaration
2015	10/03	Severe Storms and Flooding	Emergency Declaration
2014	3/12	Severe Winter Storm	Major Disaster Declaration
2014	2/12	Severe Winter Storm	Emergency Declaration
2009	4/23	Highway 31 Fire	Fire Management Assistance Declaration
2006	1/20	Severe Ice Storm	Major Disaster Declaration
2005	9/10	Hurricane Katrina Evacuation	Emergency Declaration
2004	10/07	Tropical Storm Frances	Major Disaster Declaration
2004	9/15	Tropical Storm Gaston	Major Disaster Declaration
2004	9/01	Hurricane Charley	Major Disaster Declaration
2004	2/13	Ice Storm	Major Disaster Declaration
2003	1/08	Ice Storm	Major Disaster Declaration
2002	6/18	Legends Fire	Fire Management Assistance Declaration
2001	11/13	Long Bay Fire	Fire Management Assistance Declaration
2000	1/31	Winter Storm	Major Disaster Declaration
1999	9/21	Hurricane Floyd	Major Disaster Declaration

1999	9/15	Hurricane Floyd	Emergency Declaration
1998	9/04	Hurricane Bonnie	Major Disaster Declaration
1996	9/30	Hurricane Fran	Major Disaster Declaration
1990	10/22	Flood	Major Disaster Declaration
1989	9/21	Hurricane Hugo	Major Disaster Declaration
1984	3/30	Severe Storms, Tornadoes	Major Disaster Declaration
1977	8/04	Drought	Emergency Declaration
1955	8/20	Hurricanes	Major Disaster Declaration
1954	10/17	Hurricane Hazel	Major Disaster Declaration

Source: FEMA

Union County was eligible for Federal Assistance for the following events:

Hurricane Ian (September 25 – October 4, 2022)

DR-4677-SC

Union County was eligible for Public Assistance B

Covid-19 (January 2020 - May 11, 2023)

DR-4992-SC

Union County was eligible for Public Assistance and Individual Assistance

Hurricane Irma (October 16 - November 1, 2017)

DR-4346-SC

Union County was eligible for Public Assistance B

Severe Winter Storms (February 10 - February 14, 2014)

DR-4166-SC

Union County was eligible for Public Assistance B

Winter Storm (January 22-February 1, 2000)

DR-1313-SC

Union County was eligible for Public Assistance

Drought (August 4, 1997)

DR-3047-SC

Union County was eligible for Public Assistance

CHANGES TO THIS SECTION

- ✓ This is a new section.

COMMUNITY FACILITIES

Catawba Regional Council of Governments utilized the FEMA lifeline construct to identify all community facilities. A lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.

FEMA has identified lifelines as the integrated network of assets, services, and capabilities used daily to support the community's recurring needs. When incidents disrupt lifelines, decisive intervention is required to stabilize the incident, such as rapid service re-establishment or employment of contingency response solutions.

Safety and Security

Law Enforcement/Security					
Contact	Organization Name	Type of Law Enforcement /Security	Address	Phone	email
	Jonesville Police Department	Police Stations	131 N. Main Street Jonesville, SC 29353	(864) 674-5262	
Police Chief Robbie McGee, Director	City of Union Public Safety Department	Police Stations	215 Thompson Blvd Union, SC	(864) 429-1713	publicsafetydir@cityofunion.org
Sheriff Jeff Bailey	Union County Sheriff's Office	Law Enforcement	200 East Main Street Union, SC 29379	(864) 429-1612	sheriffjbailey@countyofunion.com
None Known		Site Security			
Neil McKeown, Director	Union County Detention Center	Correctional Facilities	1657 Jonesville Highway Union, SC 29379		nmckeown@countyofunion.com

Fire Services

Name	Type of Fire Service	Address	Phone
Monarch Fire Department – Union Co. Station 800	Fire Station	1508 Lockhart Hwy Union, Sc 29379	(864) 429-1699
Union County Fire & Rescue	Fire Station	813 Duncan Bypass Union, SC 29279	(864) 424-9202
Southside Fire Department	Fire Station	131 Lovers Lane Rd Union, SC 29379	(864) 429-1776
Philippi Fire Department	Fire Station	263 Philippi Church Rd Union, SC 29379	
Union PSD Fire Station	Fire Station	215 Thompson Blvd Union, SC 29379	(864) 429-1710
Santuc Fire Department	Fire Station	841 Tinker Creek Rd Union, SC 29379	(864) 427 -6004
Cross Keys Fire Department – Union Co. Station 400	Fire Station	4483 Cross Keys Hwy Union, SC 29379	(864) 427-0029
Bonham Fire Department	Fire Station	2091 Jonesville Hwy Union, SC 29379	(864) 429-1674
Kelly Kelton Fire Department – Union Co. Station 600	Fire Station	130 Pea Ridge Hwy Jonesville, SC 29353	(864) 674-1300
Jonesville Fire Department – Union Co. Station 500	Fire Station	101 Webber Street Jonesville, SC 29353	
Buffalo Fire District Station #2	Fire Station	3873 Buffalo-West Springs Hwy Jonesville, SC 29353	(864) 429-1794
Lockhart Fire Department	Fire Station	208 S 1 st St Lockhart, SC 29364	(864) 545-6537
Buffalo Fire District “Headquarters” – Union Co. Station 200	Fire Station	132 Bailey Road Buffalo, SC 29321	(864) 429-1794
Carlisle Fire Department	Fire Station	4600 King Kennedy St Carlisle, SC 29031	
City of Union Public Safety Department – Fire Coordinator	Firefighting Resources (Fire Coordinator, Fire Inspections & Arson Investigations)	215 Thompson Blvd Union, SC 29379	(864) 429 - 1713
US Forest Service Work Station	US Forest Service	3557 Whitmire Hwy Union, SC 29379	(864) 427-7100

Search and Rescue

Name	Type	Address	Phone
Spartanburg County Search and Rescue (SCSAR)	Local Search and Rescue (mutual aid agreement with Union County?)	175 Community College Drive Spartanburg, SC 29301	(864) 316-3014 After 5 minutes call: (864) 270-3131 or (864) 764-5855

Government Services

Name	Type	Address	Phone
Union County Emergency Operations Center (Lee Brannon, Director)	Emergency Operation Centers	414 S. Pinckney Street Union, SC 29379	(864) 466-4778
Union County Public Works and Recycling	Essential Government Functions	1246 S. Duncan Bypass Suite B Union, SC 29379	(864) 466-4712
Union County (Phillip Russell, Supervisor/Chairman)	Government Offices	Union County Court House 210 W. Main Street Union SC, 29379	(864) 429-1600 prussell@countyofunion.com
City of Union (Joe Nichols, City Business Administrator)	Government Offices	101 Sharp Avenue P.O. Box 987 Union, SC 29379	(864) 429-1700
Town of Jonesville (Michael Tyler, Town Administrator)	Government Offices	131 N Main Street Jonesville, SC 29353	(864) 674-5746
Town of Lockhart	Government Offices	118 Mill Street P.O. Box 250 Lockhart, SC 29364	(864) 545-2103
Town of Carlisle (Shannon McBride, Town Administrator)	Government Offices	3911 Fishdam Avenue P.O. Box 305 Carlisle, SC 29031	(864) 427-1505
Monarch Elementary	Schools	218 Monarch Drive, Union SC 29379	(864) 429-1733
Foster Park Elementary	Schools	901 Arthur Blvd Union, SC 29379	(864) 429-1737
Buffalo Elementary	Schools	733 Main Street Buffalo, SC 29321	(864) 429-1730
Jonesville Elementary/Middle	Schools	350 New Hope Church Road Jonesville, SC 29353	(864) 674-5518
Sims Middle School	Schools	2200 Whitmire Highway Union, SC 29379	(864) 429-1755
Union Christian Day School	Schools	331 Meansville Road Union, SC 29379	(864) 429-1765
Union County High School	Schools	1163 Lakeside Drive Union, SC 29379	(864) 429-1765
Union County Career and Technology Center	Schools	1165 Lakeside Drive Union, SC 29379	(864) 429-1750

University of SC-Union (Dean Randy Lowell, Ph.D)	Schools	311 East Main Street Union, SC	864-424-8019 lowell@mailbox.sc.edu
Spartanburg Community College Quickjobs Development Center	Schools	1401 Furman Fendley Highway Union, SC	(864) 466-1060
Union County Clerk	Public Records	210 West Main Street Union, SC 29379	(864) 429-1630
City of Union Clerk	Public Records	101 Sharpe Avenue P.O. Box 987 Union, SC 29379	(864) 429-1700 cityclerk@cityofunion.org
Town of Jonesville Clerk	Public Records	131 North Main Street Jonesville, SC 29353	(864) 674-5746
Town of Carlisle Clerk	Public Records	3911 Fishdam Avenue Carlisle, SC 29031	(864) 427-1505
Union County Historical Society & Museum	Historical/ Cultural Resources	127 West Main Street P.O. Box 220 Union, SC	(864) 429-5081 unionscmuseum@gmail.com

Community Safety			
Name	Type	Address	Phone
Town of Jonesville (April Smith, Town Clerk & NFIP Flood Plain Manager)	Flood Control	131 North Main Street Jonesville, SC 29353	(864)674-5746 jonesvilleclk@bellshouth.net
Town of Lockhart (Shannon Perry, Town Clerk & NFIP Flood Plain Manager)	Flood Control	118 Mill Street P.O. Box 250 Lockhart, SC 29364	(864)545-2103
Town of Carlisle (Tim Roseborough, Building Official & NFIP Flood Plain Manager)	Flood Control	101 Sharpe Avenue P.O. Box 987 Union, SC 29379	(803)317-7555 troseborough@cityofunion.org
City of Union (Tim Roseborough, Building Official & NFIP Flood Plain Manager)	Flood Control	101 Sharpe Avenue P.O. Box 987 Union, SC 29379	(803)317-7555 troseborough@cityofunion.org
Union County (Tim Roseborough, Building Official & NFIP Flood Plain Manager)	Flood Control	101 Sharpe Avenue P.O. Box 987 Union, SC 29379	(803)317-7555 troseborough@cityofunion.org
Union County (Lee Brannon, Emergency Management)	Other Hazards	414 S. Pinckney Street Union, SC 29379	(864) 466-4778
Union County (Lee Brannon, Emergency Management)	Protective Actions	414 S. Pinckney Street Union, SC 29379	(864) 466-4778

Food, Water, and Shelter

Food			
Name	Type	Address	Phone / email
Dollar General Distribution Center	Commercial Food Distribution (also household goods, beauty products and more)	1451 Spartanburg Hwy, Jonesville, SC 29353	(864) 674-2600
Hereford Hills Ranch	Commercial Food Supply Chain – Grass Fed Beef	1141 Pineland Road Union, SC 29379	(864) 426-8962
Sheeplly Farm	Local Food Supply – Eggs, Ducks, Chickens and Wood	412 Kelly Rd Union, SC 29379	(803) 868-0949
Coyote Bee Company	Local Food Supply – Honey	301 Bennett Street Union, SC 29379	(803) 275-7279
Fawken Farm	Commercial Food Supply chain – Cows and Bulls	328 Fowken Farm Road Jonesville, SC 29353	(864) 426-3281
The Potters House Food Ministry	Food Distribution Programs – Food Pantry	106 S Main Street Jonesville, SC 29353	(864) 466-5675 Prophetessd1261@gmail.com
Jonesville Nutrition Site	Food Distribution Programs – Group onsite prepared meals (geared towards Seniors)	131 N Main Street Jonesville, SC 29353	(864) 426-8394
Biker’s Against Hunger	Food Distribution Programs – Food Pantry	1734 Jonesville Hwy Union, SC 29379	(864) 542-4377
Union Council on the Aging	Food Distribution Program – Home delivered meals for Seniors	237 N Gadberry St Union, SC 29379	(864) 429-1682
Carolina Community Action	Food Assistance Program – Grocery Assistance	201 E Main St Union, SC 29379	(864) 427-0336
South Carolina Department of Social Services – Union County	Food Assistance Program – Food stamps/SNAP	200 S Mountain St Union, SC 29379	(864) 429-1660
The Salvation Army of Union County	Food Distribution Programs – Food Pantry	215 S Mountain St Union, SC 29379	(864)427-0656
Mon-Aetna Baptist Church	Food Distribution Programs – Food Pantry	1431 Lockhart Hwy Union, SC 29379	(864) 441-8192

Source: SC Food Resource Map prepared by the Department of Health and Environmental Control and Clemson University College of Behavioral, Social and Health Sciences

Water			
Name	Type	Address	Phone
City of Union Utility Department	Drinking Water Utilities (intake, treatment, storage, and distribution)	101 Sharpe Avenue Union, SC 29379	(864) 429-1700 & 864-319-1322(admin Assistant Mary Jo Sanders)
Town of Jonesville	Drinking Water Utilities (intake, treatment, storage, and distribution)	131 N Main Street Jonesville, SC 29353	(864) 674-5746
Brown's Creek Water Company Inc.	Drinking Water Utilities (intake, treatment, storage, and distribution)	4287 Lockhart Highway Union, SC 29379	(864) 424-9820
Meansville Riley Water Company	Drinking Water Utilities (intake, treatment, storage, and distribution)	1779 Cross Keys Hwy, Union, SC 29379	864-427-5832
Santuck Hebron Water Company	Drinking Water Utilities (intake, treatment, storage, and distribution)	174 State Road, Carlisle, SC 29379	(864) 429-0807
Town of Carlisle Water district	Drinking Water Utilities (intake, treatment, storage, and distribution)	3911 Fishdam Avenue P.O. Box 305 Carlisle, SC 29031	(864) 427-1505
Spartanburg Water	Drinking Water Utilities (intake, treatment, storage, and distribution)	200 Commerce Street Spartanburg, SC 29306	(864) 583-7361 (administration) (864) 585-8296 (after hours emergency line)
None known	Commercial Water Supply Chain		

Wastewater			
Name	Type	Address	Phone
City of Union Wastewater Division (Utilities Department)	Wastewater Systems	101 Sharpe Avenue Union, SC 29379	(864) 429-1700 & 864-319-1322(admin Assistant Mary Jo Sanders)
Town of Jonesville	Wastewater Systems	131 N Main Street Jonesville, SC 29353	(864) 674-5746
Town of Lockhart	Wastewater Systems (payment only)	118 Mill Street P.O. Box 250 Lockhart, SC 29364	(864) 545-2103
CSWR South Carolina Utility Operating Company, LLC (bought out TESI in 2022)	Wastewater Systems (for Town of Lockhart)		1-866-747-0493 (emergencies) 1-866-747-0493 (customer service) support@cswrscouthcarolinauoc.com
Carlisle Finishing Plant (until July 2023 or until line connection to Union County Sewer is complete)	Wastewater Systems (Town of Carlisle)	3863 Carlisle Chester Hwy Carlisle, SC 29031	(864) 427-6221 (Jerry Bruce, Plant Manager)

Shelters					
Name	Type	Address	Phone	Generator	Wheelchair Access
None known	Homeless Shelters				
Union County High School (evacuation capacity 825)	Emergency Shelters	1163 Lakeside Drive Union, SC 29379		unknown	yes
Monarch Elementary School (evacuation capacity 2,650)	Emergency Shelter	218 Monarch Drive Union, SC 29379		No	yes
Mon Aetna Christian Fellowship Center (evacuation capacity 416)	Emergency Shelter	1431 Lockhart Hwy Union, SC 29379		No	Unknown
Foster Park Elementary School (evacuation capacity 660)	Emergency Shelter	901 Arthur Blvd Union, SC 29379		No	Yes
Union YMCA (evacuation capacity 425)	Emergency Shelter	106 Lakeside Drive Union, SC 29379		No	Yes
Jonesville Elementary and Middle School (evacuation capacity 150)	Emergency Shelter	350 New Hope Road Jonesville, SC 29353		No	Yes
Tabernacle Baptist Church (evacuation capacity 1100)	Emergency Shelter	915 S. Pinckney St Union, SC 29379		No	Yes
Excelsior Middle School (evacuation capacity 3100)	Emergency Shelter	212 Culp Street Union, Sc 29379		No	Yes
Sims Middle School (evacuation capacity 4440)	Emergency Shelter	2200 Whitmire Hwy Union, SC 29379		No	Yes
Jonesville High School (evacuation capacity 2700)	Emergency Shelter	131 N. Main Street Jonesville, SC 29353		No	No
Jonesville Baptist Church	Emergency Shelter	301 Church Street Jonesville, SC 29353		No	Yes
Duncan Acres United Methodist Church (evacuation capacity 69)	Emergency Shelter	417 Rice Avenue Union, SC 29379		Unknown	No
First Presbyterian Church (Evacuation capacity 220)	Emergency Shelter	101 W. South St. Union, SC 29379		No	Yes

Shelters					
Name	Type	Address	Phone	Generator	Wheelchair Access
First Baptist Church of Union Christian Family Life Center (evacuation capacity 150)	Emergency Shelter	405 East Main St. Union, SC 29379		Unknown	Yes
Calsan Head Start (evacuation capacity 145)	Emergency Shelter	3288 Santuc-Carlisle Hwy Union, SC 29379		No	Yes
Lockhart School (evacuation capacity 330)	Emergency Shelter (in 100 year flood plain)	212 Lockhart Drive P.O.Box 220 Lockhart, SC 29364		Unknown	unknown
Lockhart First Baptist Church Family Life Center (evacuation capacity 249)	Emergency Shelter	126 Armory Rd Lockhart, SC 29379		No	Yes
Buffalo Elementary School (Shelter Capacity 3,265)	Emergency Shelter	733 Main Street Buffalo, Union		No	Yes
Carlisle Town Hall Janie Glymph Goree Building (0 capacity for evacuation and 27 post impact capacity)	Emergency Shelter – Post Emergency	3911 Fishdam Avenue Carlisle, SC 29031		Unknown	Unknown
Quality Inn	Commercial Facilities (hotels)	315 N. Duncan Bypass Union, SC 29379	(864) 427-5060		
Days Inn of Union	Commercial Facilities (hotels)	101 Toshes Creek Circle Union, SC 29379	(864) 427-0308		
American Inn	Commercial Facilities (hotels)	755 N Duncan Bypass Union, SC 29379	(864) 427-5444		
Palmetto Inn	Commercial Facilities (hotels)	1235 S Duncan Bypass Union, SC 29379	(864) 427-5682		
Knights Inn	Commercial Facilities (hotels)	481 Fairwood Blvd Union, SC 29379	(864) 427-9041		

Agriculture

Name	Type	Address	Phone
Union County Animal Shelter	Animal Shelter & Animal Control Officer	1657 Jonesville Hwy Union, SC 29379	(864) 429-2803
Union County SC Fair Grounds – Emergency Evacuations only	Emergency Shelter (Livestock, cats, and dogs)	106 Fair Lane Union, SC 29379	(864) 429-2808
Clemson Union County Extension Office	Agriculture & Farm Animals Care	120 Kirby Street Union, SC 29379	(864) 365-0642 (Extension Director) (864) 649-8251 (Christopher LeMaster – Area livestock and Forages, agent)
Down South Outdoor Supply and Feed	Food	1434 Peach Orchard Road Union, SC 29379	(864) 466-2087
Tractor Supply Co.	Food & agricultural tools	320 Buffalo-West Springs Hwy Union, SC 29379	(864) 441-0072
Walmart Supercenter	Food, gardening supplies	513 N. Duncan Bypass Union, SC 29379	(864) 429-0598

Health and Medical

Medical Care			
Name	Type	Address	Phone
Union Medical Center	Hospitals	322 West South Street Union, SC 29379	864-301-2000
Low Country Urgent Care - Union County	Urgent Care	440 N. Duncan Bypass Union, SC 29379	864-424-9576
Union County Public Health Department Clinic (Regenes Health Care) (Temporarily closed) – Services provided at Cherokee County Clinic	Health Clinic	115 Thomas Street Union, SC 29379	(864) 582-2411
Dialysis Clinic, Inc	Dialysis	921 Thompson Blvd. Union, SC 29379	(864) 427-8250
Union Family Pharmacy	Pharmacy	528 A Rice Avenue Union, SC 29379	(864) 427-3700
CVS	Pharmacy	599 Rice Avenue Union, SC 29379	(864) 427-7668
Walmart Pharmacy	Pharmacy	513 N. Duncan Bypass Union, SC 29379	(864) 427-6114
Ellen Sager Nursing Center	Long-Term Care Facilities	1817 Jonesville Highway Union, Sc 29379	864-301-03500
Promedica Skilled Nursing and Rehabilitation	Long-Term Care Facilities	709 Rice Avenue Union, SC 29379	(864) 427-0306
Whitney Place (Assisted Living)	Long-Term Care Facilities	107 Cornwell Street Union, SC 29379	(864) 427-4275
Spartanburg VA Clinic	VA Health System	279 North Grove Medical Park Drive Spartanburg, SC 29303-4222	(864) 582-7025
Union County Veterans Services	Veteran Services	320 E. Main Street Union, SC 29379	(864) 429-1605
Saint Paul Adult Daycare	Adult Daycare	308 Wallace Street Union, SC 29379-2451	(864) 429-8771
Sunshine Adult Daycare	Adult Daycare	506 S. Duncan Bypass Unit B Union, SC 29379-7219	(864) 429-0505
Union County Home Health Services	Home Care	115 Thomas Street Union, SC	(877) 409-0666

Medical Care			
Name	Type	Address	Phone
Kindred at Home Union	Home Care	161 Duncan Avenue Union, SC	(877) 409-0666
Blue Ridge Hospice	Hospice	839 Main Street Buffalo, SC	(864) 441- 0620
Blue Ridge Hospice in Union	Hospice	103 S Boyce Street Union, SC 29379	(864) 466 -1024
Hospice Care of Tri-County	Hospice	720 Duncan By Pass Union, SC	(864) 427-8322
Triangle Veterinary Clinic	Veterinary Services	1261 Duncan Bypass Union, SC 29379	(864) 427-3177
Clemson Union County Extension Office	Livestock Services	120 Kirby Street Union, SC 29379	(864) 365-0642 (Extension Director) (864) 649-8251 (Christopher LeMaster – Area livestock and Forages, agent

Patient Movement			
Name	Type	Address	Phone
Union County EMS (Eric Harold, Director)	Emergency Medical Services	1262 S. Duncan Bypass Union, SC 29379	(864) 427 - 0681

Fatality Management			
Name	Type	Address	Phone
Community Mortuary Inc.	Mortuary Services (preparation of bodies for burial, cremation)	361 Meansville Road P.O. Box 1156 Union, SC 29379- 1156	(864) 427-6055
Divine Mortuary	Mortuary Services (preparation of bodies for burial, cremation)	190 Lover’s Lane Rd. Union, SC 29379	(864) 427 - 7770
Holcombe Funeral Home, Inc.	Mortuary Services (preparation of bodies for burial, cremation)	310 W South Street Union, SC 29379	(864) 427-3665
Lewis Funeral Home and Crematory	Mortuary Services (preparation of bodies for burial, cremation)	1247 Duncan Bypass Union, SC 29379	(864) 429-9741

Fatality Management			
Name	Type	Address	Phone
Union Community Funeral Home	Mortuary Services (preparation of bodies for burial, cremation)	219 W. Main Street Union, SC 29379	(864) 429-9741
Whitney Funeral Home	Mortuary Services (preparation of bodies for burial, cremation)	2212 Santuc Carlisle Hwy Union, SC 29379	(864) 427-8288
Union County Coroner	Post-Mortuary Services (autopsies)	310 West South Street Union, SC 29379	(864) 427-3665

Public Health			
Name	Type	Address	Phone
None known in Union County	Epidemiological Surveillance		
None known in Union County	Laboratory		
None known in Union County	Clinical Guidance		
None known in Union County	Assessment/ Interventions/ Treatments		
Union County Department of Social Services	Human Services	200 S Mountain Street Union, SC 29379	(864) 429-1660
Union Mental Health Center	Behavioral Health	130 Medical Sciences Drive Union, SC 29379	(864) 427-1224

Medical Supply Chain

Name	Type	Address	Phone	Backup Power Source
CSL Plasma (formerly Haemonetics Corporation)	Blood/Blood Products – liquid saline and sodium citrate, which are solutions used in the plasmapheresis, or plasma collection, process.	155 Medical Sciences Drive Union, SC 29379	(864) 427-6293	
None known	Manufacturing – Pharmaceutical			
None Known	Manufacturing – Device			
None known	Manufacturing – Medical Gases			
None Known	Distribution			
Velocity Clinical Research (respiratory trials)	Critical Clinical Research	1005 Thompson Blvd Union, SC 29379	(864) 427-1172	Backup Generator
None Known	Sterilization			
None Known	Raw Materials			

Energy

Power Grid			
Name	Type	Address	Phone
Lockhart Power company	Electricity Generation and Transmission Systems	420 River Street Lockhart, SC 29364 (mailing address: P.O. Box 10 Lockhart, SC 29364)	(864) 545-2211
City of Union Utility Department	Electricity Generation and Transmission Systems	101 Sharpe Avenue Union, SC 29379	(864) 429-1700 & 864-319-1322(admin Assistant Mary Jo Sanders)
Broad River Electric Corporate Inc.	Electricity Generation and Transmission Systems	1036 Webber Rd Cowpens, SC 29330	(866) 687-2667
Laurens Electric Corporative Inc.	Electricity Generation and Transmission Systems	2254 SC- 14 Laurens, SC 29360	1-800-942-3141
S.C. Electric & Gas	Electricity Generation and Transmission Systems		1-800-251-7234

Natural Gas			
Name	Type	Address	Phone
Carolina Gas Transmission	Natural Gas	121 Moore Hopkins Lane Columbia SC 29210	1-800-789-7272 Emergency Line (866) 401-5248 (customer relations)
City of Union Utility Department	Natural Gas	101 Sharpe Avenue Union, Sc 29379	(864) 429-1700 & (864) 319-1322 (admin Assistant Mary Jo Sanders)

Fuel			
Name	Type	Address	Phone
None located in Union County	Refineries / Fuel Processing		
KinderMorgan Plantation Pipeline	Pipelines (Petroleum products and biodiesel)	City of Spartanburg nearest portion of pipeline	(800) 276-9927 Publicawareness@kindermorgan.com
Colonial Pipeline Co	Pipelines (Petroleum products)	City of Spartanburg	(678) 762-2250 Fax (678) 762-2315 dharring@colpipe.com

Fuel			
Name	Type	Address	Phone
Carolina Gas Transmission, LLC (located in Union County)	Pipeline (Natural Gas)	925 White Oaks Blvd. Bridgeport, WV 26330	(681)842-3200 Samantha.Norris@bhegts.com
Southeast Emulsions Inc., Southeast Emulsions Union Asphalt	Petroleum Product Terminal (storage facility)	1404 Jonesville Hwy, Union SC 29379	(706) 244-0772
City West Diesel Plant – Lockhart Power Co. (Electric Utility)	Petroleum Liquids (Fossil Fuel Electric Power Generator)	198 Times Blvd Union, SC 29379	
Webb Foraging Plant – Electric Utility	Petroleum Liquids	160 Webb Foraging Road, Carlisle, SC 29031	1-800-804-7424 customer@stanteccooper.com
Murphy USA	Fuel Distribution (gas stations)	309 Buffalo-West Springs Hwy Union, SC 29379	(864) 427 - 3567
Wingo’s Tires	Fuel Distribution (gas stations)	501 Thompson Blvd Union, SC 29379	(864) 427-3151
Marathon	Fuel Distribution (gas stations)	908 S. Duncan Bypass Union, SC	(864) 427-4512
Valero	Fuel Distribution (gas stations)	100 N. Duncan Bypass Union, SC	(864) 429-0550
Gene’s One Stop	Fuel Distribution (gas stations)	870 Jonesville Hwy Jonesville, SC 29353	(864) 674-5425
J& T Express	Fuel Distribution (gas stations)	2549 Santuc Drive Union, SC	(864) 427-4210
Mobile	Fuel Distribution (gas stations)	439 N Duncan Union, SC 29379	(864) 429-5758
Exxon	Fuel Distribution (gas stations)	1315 Lockhart Hwy Union, SC 29379	(864) 427-4577
Valero	Fuel Distribution (gas stations)	1237 Arthur Blvd. Union, SC 29379	(864) 427-5130
Valero	Fuel Distribution (gas stations)	1241 Duncan Bypass Union, SC 29379	(210) 345-2000
Exxon	Fuel Distribution (gas stations)	101 N Duncan Bypass Union, SC 29379	(864) 427-2050
Kelly’s One Stop	Fuel Distribution (gas stations)	1508 Jonesville Lockhart Hwy Union, SC 29379	(864) 674 - 6659
Exxon	Fuel Distribution (gas stations)	2908 Furman L. Fendley Hwy Jonesville, SC 29353	(864) 674-6742

Fuel			
Name	Type	Address	Phone
Circle K	Fuel Distribution (gas stations)	401 S. Main Street Jonesville, Sc 29353	
Troy Shelton Field, Union County	Aviation fuel	198 Airport Road Union, SC 29379	(864) 429-1680 - Mr. Ronnie Wade, Airport Manager
None known	Off-shore Oil Platforms		

Alternative Sources of Fuel			
Name	Type	Address	Phone
Timken Sports Complex (Level 2)	Electric Vehicle Charging Station	725 Rice Avenue Union, SC 29379	(864) 427-0150
City of Union Town Hall (Level 2)	Electric Vehicle Charging Station	101 Sharpe Avenue Union, SC 29379	(864) 429-1700
University of South Carolina-Union (Level 2)	Electric Vehicle Charging Station	310 E. Academy St Union, SC 29379	(803) 777-0169
Lockhart Power (Level 2)	Electric Vehicle Charging Station	420 River Street Lockhart, SC 29364	(864) 545-2211
None exist in Union County	Biodiesel stations		
None exist in Union County	Compressed Natural Gas (CNG) Filling Stations		
None exist in Union County	Ethanol Stations		
None exist in Union County	Hydrogen Filling Stations		
None exist in Union County	Liquefied Natural Gas (LNG) Stations		
None exist in Union County	Propane (LPG) Stations		
None exist in Union County	Renewable Diesel (R20 & above) Stations		
None planned or exist in Union County	Alternative fuel corridors		

Source: Department of Energy, Alternative Fueling Station Locator, 3/22/2023 search, data updated in March 2021 and June 2022.

Communications

Infrastructure			
Name	Type	Address	Phone
Verizon	Wireless	Victra 515 A N. Duncan Bypass Union, SC 29379	(864) 427-6545
Cricket Wireless	Wireless	403 N Duncan Bypass Ste B Union, SC 29379	(864) 466-1699
T Mobile	Wireless	320 N Duncan Bypass Ste D Union, SC 29379	(864) 251-5315
Me electronics – RadioShack Dealer	Wireless	410 N Duncan Bypass G Union, SC 29379	(864) 429-0349
Verizon	Internet	Victra 515 A N. Duncan Bypass Union, SC 29379	(864) 427-6545
AT&T (Fiber, DSL & Television)	Internet	Spartanburg location	
Earthlink (Fiber and DSL)	Cable Systems, Internet and Wireline	Spartanburg location	(844) 592-4610
Spectrum (Fiber, Cable, Television and Phone)	Cable Systems, Internet and Wireline	Spartanburg location	(855) 894-3201
WBCU Radio Station	Broadcast Radio	210 E Main Street, Union, SC 29379	(864) 427-2411
The Union Connection Channel 192	Broadcast TV	P.O. Box 987 101 Sharpe Avenue Union, SC 29379	(864) 429-1702
Quality Satellite – Dish	Satellite	314 N Duncan Bypass Union, SC 29379	(864) 426-3450
HughesNet	Satellite and phone	Spartanburg location	(844) 406-1664
Viasat	Satellite and phone	Spartanburg location	(877) 650-0280
Union County Library (free wireless internet)	Public Internet	300 East South Street Union, SC 29379	(864) 427-7140
None known	Data Centers		

Alerts, Warnings and Messages			
Name	Type	Address	Phone
All Hazards Sirens – Town of Carlisle	Local Alert/Warning Ability		
All Hazards Sirens – Town of Jonesville	Local Alert/Warning Ability		
All Hazards Sirens – Town of Lockhart	Local Alert/Warning Ability		
All Hazards Sirens – City of Union	Local Alert/Warning Ability		
Unknown	Access to IPAWS (WEA, EAS, NWR)		
Unknown	NAWAS Terminals		

911 & Dispatch			
Name	Type	Address	Phone
Emergency Operations Center (Nikia Brannon, Director)	Public Safety Answering Points (911 for all of County)	414 South Pinckney Street Union, SC 29379	(864) 429-1620 nbrannon@countyofunion.com
Emergency Operations Center (Nikia Brannon, Director)	Dispatch (for all of Union County Fire, Police, EMS and Emergency Management)	414 South Pinckney Street Union, SC 29379	(864)429-1620 nbrannon@countyofunion.com

Responder Communications			
Name	Type	Address	Phone
Palmetto 800 (Interop only)	Land Mobile Radio (LMR) Networks	Emergency Service locations	Bob Steadman (803) 896-7091

Finance

Name	Type	Address	Phone
South State Bank	Banking Services	502 N. Duncan Bypass Union, SC 29379	(864) 429-1890
Woodforest Bank	Banking Services	513 N Duncan Bypass B Union, SC 29379	(864) 427-4110
Arthur State Bank	Banking Services	501 N Duncan Bypass Union, SC 29379	(864) 466-4590
Arthur State Bank	Banking Services	100 E Main Street Union, SC 29379	(864) 427-1213
Arthur State Bank	Banking Services	1412 Lockhart Hwy Union, SC 29379	(864) 466-4576
Founders Federal Credit Union	Banking Services	315 Buffalo-West Springs Hwy Union, SC 29379	1 (800) 845-1614
Provident Financial Services	Banking Services	203 W Main Street Union, SC 29379	(864) 427-9000
1 st Franklin Financial	Banking Services	320 N Duncan Bypass Suite B & C Union, SC 29379	(864) 429-5626
provided by banking service providers	Electronic Payment Processing		

Transportation

Mass Transit			
Name	Type	Address	Phone
None	Bus (Fixed- Route)		
Chester Connector (on-demand service – 5 mile radius of the Union County Courthouse with additional options for residents of Carlisle, Jonesville and Lockhart based on 3 round trip requests per day)	Shuttle Bus	1197 Armory Road Chester, SC 29706	864-762-7972
None	Rail		
None	Ferry		

Railway			
Name	Type	Address	Phone
Norfolk-southern Railway	Freight	650 W. Peachtree Street NW Atlanta, Georgia 30308	Main Number - (856) 667-3655 Emergencies - (800)453-2530 Crossing Gates, Signals & Rough Crossings - (800) 453-2530 Environmental Spills (800) 453-2530
CSX Railway	Freight	Corporate headquarters 500 Water Street, 15 th floor Jacksonville, FL 32202 Transportation (same address except remove 15 th floor)	Headquarters 904-359-3200 CSX Transportation 904-359-3100
None in Union County	Passenger		

Aviation				
Name	Type	Responsible Agency	Address	Phone
None	Commercial (e.g. cargo/passenger)			
Troy Shelton Field – Union County Airport (single and multi-engine runway)	General	Union County – Mr. Ronnie Wade, Airport Manager	198 Airport Road Union, SC 29379	(864) 429-1680
None	Military			

Maritime				
Name	Type	Responsible Agency	Address	Phone
N/A	Waterways			
None located in Union County, Greer Inland Port and Charlotte Inland Port utilized by industries	Ports and Port Facilities			

Highway/Roadway/Motor Vehicle				
Name	Type	Responsible Agency	Address	Phone
See Appendix of Report for List of All Roads (4,152 Roads & Road Segments)	Roads	SCDOT & County		
See Appendix of Report for List of All Truck Routes (733 Roads/Road segments)	Truck Routes	SC DOT		
S72 (and S121) 3 segments (Segment IDs/Segment NU: 45015513/77809, 45005659/76654, & 45015210/77506)	Freight Routes	SC DOT		

Bridges				
(Note: Load Restricted and Closed Bridges provided in Appendix of Report)				
FID	Structure	Asset_ID	Type	Address
1	4470035900100	6586	Bridges	Brocks Creek, 6 Miles S Carlisle
2	4420017600100	578	Bridges	S.C.L Railroad, 0.7 MI N Newberry Co LN
3	4490015300200	7413	Bridges	Brock Creek, 4.) MI S Carlisle
4	4470008700100	2096	Bridges	Padgetts Creek, 6.5 MI SW of Carlisle
5	4470008700101	10761	Bridges	Padgetts Creek, 6.5 MI SW Carlisle
6	4440007200100	2860	Bridges	Tyger River, 6.9 MI W of Carlisle
7	4420017600200	148	Bridges	Padgetts Creek, 2.6 MI N of Newberry Co Line
8	4470002200100	2429	Bridges	ENOREE RIVER, 913.5 MI SW UNION

Bridges

(Note: Load Restricted and Closed Bridges provided in Appendix of Report)

FID	Structure	Asset_ID	Type	Address
9	4470003500200	222	Bridges	CSX RR, 2.6 MI W CARLISLE
10	4440007200200	2268	Bridges	CANE CREEK, 1.5 MI W OF CARLISLE
11	4470019600100	2432	Bridges	JOHNS CREEK, 13.4 MI SW UNION
12	4470001600100	9540	Bridges	PADGETTS CREEK, 9.5 MI SW UNION
13	4490017300100	7414	Bridges	HAWKINS CREEK, 5.7MI W OF CARLISLE
14	4420017300100	3994	Bridges	TYGER RIVER, 10.4 MI S OF UNION
15	4440021500100	15	Bridges	S.C.L. RAILROAD, TOWN OF CARLISLE
16	4440007200390	16	Bridges	NORFOLK SOUTHERN RR, TOWN OF CARLISLE
17	4470001800100	17	Bridges	PADGETTS CREEK, 9.4 MI SW UNION
18	4470043800100	18	Bridges	COX CREEK, 1.2 MI E CARLISLE
19	4440007200400	19	Bridges	COX CREEK, 1.0 MI E OF CARLISLE
20	4440005600100	20	Bridges	ENOREE RIVER, LAURENS CO LN
21	4470002400500	21	Bridges	CANE CREEK, 10.5 MI SW UNION
22	4470003600100	22	Bridges	TINKER CREEK, 6.6 MI W OF CARLISLE
23	4470001600200	23	Bridges	TYGER RIVER, 7.3 MI S UNION
24	4470002400400	24	Bridges	SWIFT RUN CREEK, 8.1 MI SW UNION
25	4490017500100	7755	Bridges	TINKER CREEK, 6.6 MI S OF UNION
26	4490025200100	5398	Bridges	BRUSHY CREEK, 6.8MI S OF UNION
27	4470002400300	8045	Bridges	BRUSHY CREEK, 6.1 MI SE UNION
28	4470043400100	6794	Bridges	BUSHY CREEK, 6.5 MI SE UNION
29	4470016300100	8799	Bridges	MORRIS CREEK, 5.3 MI S UNION
30	4470001600300	6383	Bridges	FAIRFOREST CREEK, 5 MI S UNION
31	4470048100100	7412	Bridges	ISAACS CREEK, 7.8 MI SW UNION
32	4470011300100	2632	Bridges	HOBSON CREEK, 4.3 MI N CARLISLE
33	4470002400200	8209	Bridges	TINKER CREEK, 4.7 MI SE UNION
34	4470002400100	8208	Bridges	TINKER CREEK BRANCH, 4 MI SE UNION
35	4470008600100	2630	Bridges	NEALS CREEK, 5 MI N CARLISLE
36	4440004900100	579	Bridges	TYGER RIVER, 8.1 MI SW OF UNION
37	4440004900200	580	Bridges	FAIRFOREST CREEK, 4.3 MI SW OF UNION
38	4470052200100	8216	Bridges	TINKERS CREEK, 3.1 MI SE UNION
39	4470013400100	3135	Bridges	BUFFALO CREEK, 4.1 MI SW UNION
40	4440004900300	581	Bridges	SHOALS CREEK, 3.2 MI SW OF UNION
41	4470038900100	5631	Bridges	BIG BROWN CR, 5.5 MI SE UNION
42	4470004100100	10697	Bridges	SHOALS CREEK, 2 MI SW OF UNION
43	4490089500100	8402	Bridges	BRACCH SHOAL CREEK, 2 MI SW OF UNION
44	4440004900400	582	Bridges	SHOALS CREEK, 1.7 MI SW OF UNION
45	4440004909100	465	Bridges	SOUTHERN RAILROAD, 2.7 MI S OF UNION
46	4470005200100	8047	Bridges	SUGAR CREEK, 5.6 MI W OF UNION
47	4470012700100	10155	Bridges	UNNAMED STREAM, UNION
48	4470003300100	8596	Bridges	SUGAR CREEK, 7.8 MI W OF UNION
49	4470013300100	2865	Bridges	BIG BROWN BRANCH, 5.9 MI E UNION
50	4470006800100	3545	Bridges	DUTCHMANS CREEK, 10.7 MI W UNION
51	4470005000100	9859	Bridges	STREAM, CITY OF UNION

Bridges

(Note: Load Restricted and Closed Bridges provided in Appendix of Report)

FID	Structure	Asset_ID	Type	Address
52	4440021500300	467	Bridges	FAIRFOREST CREEK, 5.3 MI NW OF UNION
53	4470002500100	8212	Bridges	SUGAR CREEK, 8.2 MI W UNION
54	4470008600200	2430	Bridges	LITTLE BROWN CREEK, 8.9 MI N CARLISLE
55	4440001800100	754	Bridges	B.U.C. RAILROAD, CITY OF UNION
56	4440021500200	171	Bridges	BUFFALO CREEK, TOWN OF BUFFALO
57	4470008600300	2631	Bridges	BIG BROWN CREEK, 9.1 MI N CARLISLE
58	4470003900100	2270	Bridges	MILL POND CREEK, 2.9 MI NW UNION
59	4470002300100	9374	Bridges	FAIRFOREST CREEK, 5.1 MI W UNION
60	4470039100100	9098	Bridges	MENG CREEK, 3.9 MI E UNION
61	4440004900600	3132	Bridges	BIG BROWNS CREEK, 3.9 MI NE OF UNION
62	4470006900100	5630	Bridges	MENG CREEK, PEACH ORCHARD RD @ UNION
63	4440004900700	3133	Bridges	LITTLE BROWNS CREEK, 5MI NE OF UNION
64	4470043900100	6796	Bridges	UNNAMED STREAM, CITY OF UNION
65	4470043900200	6797	Bridges	BR BUFFALO CR., CITY OF UNION
66	4470001900100	5868	Bridges	BR. BUFFALO CR., MEANSVILLE RD @ UNION
67	4470038300100	7520	Bridges	MENG CREEK, LAKESIDE DR @ UNION
68	4470006700100	3762	Bridges	SUGAR CREEK, 8.9 MI NW UNION
69	4470014600100	3547	Bridges	LITTLE BROWNS CREEK, 6.1 MI E UNION
70	4470001900200	4222	Bridges	BUFFALO CREEK, UNION CITY LIMITS
71	4470038200100	2634	Bridges	MENG CREEK, BARNDO ST @ UNION
72	4440004900500	3131	Bridges	MENG CREEK, 3.6 MI NE OF UNION
73	4470007100100	8499	Bridges	BROWN CREEK, 3.9 MI NE UNION
74	4470008600400	2431	Bridges	HUGHES CREEK, 10.7 MI N CARLISLE
75	4470022000100	4890	Bridges	MITCHELL CREEK, 6.3 MI W UNION
76	4470022300100	5175	Bridges	SUGAR CREEK, 9.9 MI W UNION
77	4470044000100	7042	Bridges	LITTLE BROWN CK, 5.2 MI NE UNION
78	4470044000200	7043	Bridges	BR LITTLE BROWN CK, 5.8 MI NE UNION
79	4470022100100	8597	Bridges	MITCHELL CREEK, 7.9 MI NW UNION
80	4470003000300	8215	Bridges	BIG BROWNS CREEK, 4.9 MI N UNION
81	4440004900800	2859	Bridges	HUGHES CREEK, 8.2 MI NE OF UNION
82	4470027900100	6198	Bridges	FAIR FOREST CREEK, 6.2 MI NW UNION
83	4470005700100	8401	Bridges	BIG BROWNS CREEK, 4.2 MI N OF UNION
84	4470001900300	1770	Bridges	ROCKY CREEK, 5.6 MI NW UNION
85	4470001000100	9097	Bridges	TRIB - BROAD RIVER, UNION RD @ LOCKHART
86	4470000400100	7041	Bridges	BIG BROWNS CREEK, 4.1 MI N UNION
87	4470017600100	4224	Bridges	BRANCH OF BROWNS CREEK, 4.5 MI N UNION
88	4470003000200	8214	Bridges	BILL GILLIAM CREEK, 4.3 MI N UNION
89	4470040800100	6587	Bridges	ROCKY CREEK, 3.8 MI S JONESVILLE
90	4470001000200	468	Bridges	UNNAMED WATERS, UNION RD @ LOCKHART
91	4470001900400	2428	Bridges	MITCHELL CREEK, 6.7 MI NW UNION
92	4440004900900	3134	Bridges	CITY ST IN LOCKHART, TOWN OF LOCKHART
93	4490014200200	9099	Bridges	MC/CLURES CREEK, 7.3MI NW OF BUFFALO

Bridges

(Note: Load Restricted and Closed Bridges provided in Appendix of Report)

FID	Structure	Asset ID	Type	Address
94	4440000900200	10157	Bridges	S-31, TOWN OF LOCKHART
95	4440000900300	10158	Bridges	S-46, TOWN OF LOCKHART
96	4440000900400	10159	Bridges	BROAD RIVER CANAL, TOWN OF LOCKHART
97	4470003000100	8213	Bridges	BROWNS CREEK, 3.6 MI N UNION
98	4470005700200	8498	Bridges	LITTLE BROWNS CREEK, 5.9MI NE OF UNION
99	4420017620600	8110	Bridges	ROCKY CREEK, 5.7 MI N.W. OF UNION
100	4420017640600	8111	Bridges	ROCKY CREEK, 5.7 MI N.W. OF UNION
101	4470001900500	6792	Bridges	SPEARS CREEK, 7.7 MI NW UNION
102	4470023300100	2633	Bridges	MITCHELL CREEK, 7 MI NW UNION
103	4470001200100	2861	Bridges	MCCLURE CREEK, 9.4 MI NW UNION
104	4440001800200	170	Bridges	ROCKY CREEK, 5.9 MI N OF UNION
105	4470001200200	3995	Bridges	FAIR FOREST CREEK, 9.2 MI NW UNION
106	4470013100100	2863	Bridges	SHARPE CREEK, 8.4 MI NE UNION
107	4470001200300	1406	Bridges	SPEARS CREEK BRANCH, 8.6 MI NW UNION
108	4470001200400	1407	Bridges	SPEARS CREEK, 8.3 MI NW UNION
109	4470013100200	2864	Bridges	FANNING CREEK, 8.6 MI NE UNION
110	4440000900190	753	Bridges	NORFOLK SOUTHERN RR, 2.0 MI SE JONESVILLE
111	4440010500100	1578	Bridges	FANNING CREEK, 5.1 MI N OF LOCKHART
112	4470032800100	5394	Bridges	FANNING CREEK BR, 7.5 MI E JONESVILLE
113	4470027600100	4892	Bridges	PETERS CREEK, 4 MI E JONESVILLE
114	4470005600100	6793	Bridges	BR. FANNING CREEK, 7.00 MI E OF JONESVILLE
115	4490022900100	8217	Bridges	SPEER CREEK, 3.0 MI W OF JONESVILLE
116	4470060200100	7180	Bridges	PINCKNEY CREEK, 11.1 MI NE UNION
117	4440001800300	986	Bridges	SOUTHERN RAILROAD, TOWN OF JONESVILLE
118	4470032400100	5177	Bridges	SANDY RUN CREEK, 1.6 MI NE JONESVILLE
119	4470006500100	9474	Bridges	CUNNINGHAM CREEK, 4.3 MI W JONESVILLE
120	4440010500200	1579	Bridges	REEDY BRANCH, 7.8 MI N OF LOCKHART
121	4470027700100	5176	Bridges	REEDY CREEK, 9.5 MI NE JONESVILLE
122	4470026700100	4891	Bridges	MILL CR BRANCH, 1.9 MI N JONESVILLE
123	4470006600100	2862	Bridges	CUNNINGHAM CREEK, 4.2 MI NW JONESVILLE
124	4470032400200	5869	Bridges	GAULT CREEK, 6.3 MI NE JONESVILLE
125	4440011400100	2095	Bridges	SANDY RUN CREEK, 1.0 MI S OF CHEROKEECO LN
126	4470024100100	2097	Bridges	JUMPING RUN CREEK, 2.3 MI NW JONESVILLE
127	4440010500300	3544	Bridges	PACOLET RIVER, CHEROKEE CO LN
128	4470044600100	6943	Bridges	MILL CREEK, 2.6 MI N JONESVILLE
129	4470007300100	3546	Bridges	MILL CREEK, 3.5 MI NE JONESVILLE
130	4440001800400	640	Bridges	PACOLET RIVER, CHEROKEE CO LN
131	4470060000100	5870	Bridges	MILL CREEK, 3.1 MI N JONESVILLE
132	4470007400100	4223	Bridges	MILL CREEK, 4.3 MI NW JONESVILLE

CHANGES TO THIS SECTION

- ✓ This is a new section. Community facilities were noted under community vulnerabilities in the 2019 Hazard Mitigation Plan. It was taken out and put into its own section and changed to reflect FEMA lifelines.

NATURAL HAZARD IDENTIFICATION AND RISK ASSESSMENT

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))

INTRODUCTION

This section identifies, describes, and analyzes the natural hazards in Union County and its municipalities that can threaten human life and damage property.

For this plan, the Catawba Regional Council of Governments prepared mapping and analysis for hazards for which there was reliable and readily available GIS (Geographic Information System) based data.

Each hazard listed includes sections including a description, a listing of historical occurrences, risk, and frequency. There are no reliable and readily available data sets for some localized hazard occurrences. For hazards without reliable local data, the Catawba Regional Council of Governments provided maps that show the County's risk for that event relative to the state.

POTENTIAL HAZARDS

Due to its geographical setting, Union County is vulnerable to a wide array of natural hazards that threaten life and property. These include:

- 1) Flooding
- 2) Hurricanes and Tropical Storms
- 3) Tornadoes
- 4) Severe Winter Storms
- 5) Severe Thunderstorms, Hail, & Lightning
- 6) Wildfires
- 7) Earthquakes
- 8) Droughts
- 9) Extreme Heat
- 10) Windstorms

Some of these hazards are interrelated (i.e., hurricanes can cause flooding and tornadoes), and some consist of hazardous elements that are not listed separately (i.e., severe thunderstorms can cause lightning). This section provides general descriptions of the above-listed hazards, their impacts, and information on historical occurrences in Union County. Catawba Regional Council of Governments

utilized historical records to identify the level of risk, with the methodological assumption that the data sources cited are reliable and accurate.

In addition to the natural hazards, the following manmade hazards were added:

1. Nuclear Power Stations
2. Hazardous Materials:
 - Trains and Trucks
 - Manufacturing Facilities and Other Hazardous Materials Facilities
3. Aviation Hazards
4. School Shootings and Other School Related Emergencies
5. Power Outages
6. Cyber Security
7. Health Pandemics
8. High Hazard Dams

NONAPPLICABLE NATURAL DISASTER HAZARDS

Union County is in the Piedmont section of South Carolina and is not on the coast. Coastal Flooding, tsunamis, and cold wave hazards are not applicable. Union County has no volcanoes; therefore, volcanic hazards are irrelevant. South Carolina receives very little snow, and Union County has no mountains; therefore, avalanches are not a hazard to Union County.

RISK PROFILE TABLE DATA DEFINITIONS

Data Sources: The main data sources were the National Centers for Environmental Information (NCEI) at the National Oceanic and Atmospheric Administration (NOAA).

Previous Occurrences: The previous occurrence is represented by a range of dates that denote the start date and the end date of the hazard event.

Hazard Type: The hazard type can be represented as a single hazard or a predominate hazard with additional associated hazards. For example, a Severe Thunderstorm can also include winds or flooding could result from Thunderstorm. Predominate hazard types are listed as the first event in the data tables.

Location: When information regarding the jurisdiction within the county was not available the location refers only to Union County. There is limited hazard data available to distinguish between the jurisdictions within Union County.

Extent of Damage: the extent of damage is represented using four data points; number of injuries, number of fatalities, property damage (\$), crop damage (\$), and magnitude. Additional information about each data point is listed below.

Magnitude Note: Where data was available such as storm category, wind speed, rain fall levels, hail size, and other measurable information it was included; however, this type of data was rarely available for Union County.

Injuries & Fatalities: casualties and damage information are listed without sufficient spatial reference. For instance, the damage caused by a singular natural hazard could be listed as:

South Carolina (statewide) - January 20, 1988 - Snow Storm - 1 fatalities - 6 injuries - \$100,000 property damage

In order to assign the damage amount to a specific county, the fatalities, injuries and dollar losses need to be divided by the number of counties affected from this event. In the snow storm example provided above, the losses would be split between South Carolina's three counties as the hazard had affected the whole state. Thus, the event would enter the database as:

York - January 20, 1988 - Snow Storm - 0.33 fatality - 2 injuries - \$33,333.33 property damage
Chester - January 20, 1988 - Snow Storm - 0.33 fatality - 2 injuries - \$33,333.33 property damage

Union - January 20, 1988 - Snow Storm - 0.33 fatality - 2 injuries - \$33,333.33 property damage

Property & Crop Damage: The National Climate Data Center (NCDC) changed its reporting procedures in 1995. During this year both categorical as well as exact dollar losses have been reported by NCDC. Thus, the majority of the records from 1995 onwards are exact damage figures that have been reported as such by NCDC and that have not undergone any processing (exemption: events affecting multiple counties).

In addition, NCDC has also improved its spatial reporting system. Instead of reporting affected regions and an associated damage figure that would have been distributed across the affected counties, NCDC has moved on to reporting every single county and its associated damage separately.

Thus from 1995-2000, EVERY event that caused property or crop damage has been included. This change in methodology was necessary due to NCDC's change in reporting. Consequently, you will find many small damage figures like \$500, \$1000, etc. in 1995-2000 events. From 1960 - 1995 we have only selected events with property or crop damage higher than \$50,000 (equals NCDC's logarithmic category 5=\$50,000 to \$500,000), whereas from 1995 onwards we have included all property or crop damage-causing events reported in NCDC's Storm Data publications.

Magnitude (Mag.): Refers to the severity of the hazard itself as it impacts the planning area and could refer to temperature, category rating, rainfall levels, etc. There is very little data regarding the magnitude and is therefore used in conjunction with Injuries, fatalities, property damage, and crop damage to determine the overall extent of damage.

Data Incorporated into the Plan: Sources such as NCDC were very valuable in compiling data for the plan. The historical data provided a framework for analyzing the historic weather events that have

occurred in Union County. These conclusions helped guide the committee in identifying projects that were both practical and cost-feasible.

CHANGES TO THIS SECTION

- ✓ Added FEMA Requirement 44 CFR 201.6(c)(2)(i) description.
- ✓ Added a paragraph for non-applicable natural hazards.
- ✓ Added subsection for non-applicable hazards.

FLOODING

DESCRIPTION

Flooding is the most frequent and costly natural hazard in the United States. Floods are generally the result of excessive precipitation. Two categories classify flooding events: *flash floods*, the product of heavy localized precipitation in a short time over a given location, and *general floods*, caused by precipitation over a more extended time and a given river basin. A combination of stream and river basin topography, precipitation and weather patterns, recent soil moisture conditions, and the degree of vegetative clearing determines the severity of a flooding event.

Flash flooding usually occurs within minutes or hours of heavy rainfall, from a dam or levee failure, or from a sudden release of water held by an ice jam. Slow-moving thunderstorms and heavy rains associated with hurricanes and tropical storms can cause flash flooding in a local area. Although flash flooding often occurs along mountain streams, it is common in urbanized areas where much of the ground cover is impervious surfaces. General floods are usually longer-term events and may last for several days.

The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surges, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, nor'easters, and other large coastal storms. Urban flooding occurs when man-made development has obstructed the natural flow of water or decreased the ability of natural ground cover to absorb and retain surface water runoff.

Periodic flooding of lands adjacent to rivers, streams, and shorelines is a natural and inevitable occurrence with established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or more significant flood. Flood magnitude increases with increasing recurrence interval.

A "floodplain" is a lowland area adjacent to a river, lake, or ocean. The flood frequency large enough to cover the low-lying area determines the size of the floodplain. For example, the 10-year flood will cover the 10-year floodplain, and the 100-year flood will cover the 100-year floodplain.

Flood frequencies, such as the "100-year flood," are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1% chance of occurring in any given year.

FLASH FLOOD WATCHES AND WARNINGS

A flash flood is a sudden, violent flood after heavy rain or occasionally after a dam breaks. Rainfall intensity, duration, topography, soil conditions, and ground cover contribute to flash flooding.

Most flash floods occur when heavy precipitation falls in an area and water channels through streams or narrow gullies. Flash floods may take minutes or hours to develop. It is possible to experience a flash flood without witnessing any rain. In this case, there would be heavy rain in areas upstream of your location.

A “FLASH FLOOD WATCH” is issued by the National Oceanic and Atmospheric Administration’s (NOAA) Storm Prediction Center when conditions are favorable for rapidly rising water to pose an immediate hazard to life and property. It does not mean that flash flooding will occur, but it is possible.

A “FLASH FLOOD WARNING” is issued by local offices of the National Weather Service when rapidly rising water poses an immediate hazard to life and property.

HAZARD PROFILE

The Broad River, the Tiger River and Enoree River, bound Union County with a significant number of creeks. Most areas along these rivers, determined to be in the 100-year floodplain, are undeveloped or lie within National Forest areas. Low lying roads, bridges, and sewer infrastructure in floodplain areas are known to flood throughout Union County (City of Union, areas around Carlisle, Jonesville and non-incorporated areas of Union County).

The low-lying area in Lockhart called the "Flats" is known to flood. This area is low and is protected by a 9' to 10' high Canal wall on one side. The rest of the Town is significantly higher and drains into the "Flats."

Water becomes trapped and can lead to significant flooding in the "Flats." The "Flats" area is not in a flood zone according to FEMA 2011 mapping.

HISTORICAL OCCURENCES

Union County has been impacted by twelve significant flood events from 1996 to 2013, according to the National Centers for Environmental Information (NCEI) at the National Oceanic and Atmospheric Administration (NOAA) search performed on March 23, 2023.

The NOAA National Centers for Environmental Information identified sixteen (16) Historical Flood Events on twelve (12) different dates, as identified in the tables below.

Union County, SC Flood Events

Event ID	Begin Location	Begin Date	Begin Time	Event Type	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Numb	Injuries Indirect	Deaths Indirect	Source	Flood Cause
5574307		9/30/1996	2030	Flood	0	0	0	0	0	0		
Narrative: None												
5574308		9/30/1996	2200	Flood	0	0	0	0	0	0		
Episode Narrative: Moderate to heavy rain began in the morning and became heavy late in the afternoon. Slow moving intense convection dumped 4 to 6 inches of rain in a couple of hours over each area, while progressively moving northeast. The most serious flooding occurred around Greenwood where one car was swept into a creek. Several creeks flooded suburban areas and some apartments were flooded. Roads and bridges were covered in Laurens County. A trailer park in Union flooded, water spilled over a dam into a highway at Buffalo and the "Flat" in Lockhart flooded from heavy rain falling into the canal area.												
5635607	Portion	2/3/1998	1600	Flash Flood	0	0	0	0	0	0		
Episode Narrative: A strong storm system moved slowly north from the Gulf of Mexico into the Carolina on the 3 rd and 4 th . A tight pressure gradient between high pressure in the upper Midwest and the approaching strong low produced damaging high winds which blew down hundreds of trees, many on houses, during the afternoon of the 3 rd . Numerous power outages were also reported. Heavy rain during the day prompted flooding by afternoon. Several counties across the Upstate reported bridges and roads flooded. The Broad River, Pacolet River and the Reedy River all rose out of their banks and flooded nearby roads and land.												
5174313	Lockhart	9/3/2000	1345	Flash Flood	0	0	0	0	0	0	Law Enforcement	
Episode Narrative: Thunderstorms and heavy rain occurring throughout the weekend caused some flooding in flood-prone areas. A drain system in the flat area of Lockhart clogged and caused flooding to porches of houses. Fire trucks were summoned to pump the water out. Several low-lying neighborhoods in Rock Hill were flooded and at least one street was closed for a while.												
5254887	Buffalo	6/25/2001	315	Flash Flood	0	0	0	0	0	0	Newspaper	
Event Narrative: Overflowing creeks flooded roads in the western half of Union County, between Buffalo and Union												
5319729		9/15/2002	1830	Flood	0	0	0	0	0	0	Law Enforcement	
Event Narrative: Some roads and small streams flooded in the City of Union. In addition, numerous trees fell as heavy rains washed away soil.												
5348522		3/20/2003	800	Flood	0	0	0	0	0	0	Law Enforcement	
Episode Narrative: Persistent moderate rainfall combined with heavy upstream rainfall to produce slow rises along creeks and streams across the country, culminating in flooding that began during the mid-morning and persisted into the early evening. In the northwest part of the county, flooding developed along Fainforest and Lawson Fork Creeks, and along tributaries of the Pacolet River. Meanwhile, the Enoree River flooded in areas from just south of Cross Anchor to Whitmire. The Broad River flooded several locations in the eastern part of the County and threatened to top the levee at Lockhart.												
5355146		4/18/2003	600	Flood	0	0	100000	0	0	0	Law Enforcement	
Episode Narrative: An extended period of moderate to heavy rainfall resulted in slow rises along creeks and streams, culminating in flooding which developed during the morning hours. Some roads and bridges were flooded, including Meansville Road near Jonesville. Some homes and businesses were flooded in Lockhart. The Broad River flooded some fields and roads in locations from Lockhart to Carlisle.												
5358877		5/22/2003	200	Flood	0	0	0	0	0	0	Law Enforcement	
Event Narrative: A creek flooded a bridge on the West Springs Highway. Some tributaries of the Broad River flooded eastern portions of the County.												
5374450	Jonesville	8/5/2003	200	Flash Flood	0	0	0	0	0	0	Fire Dept/ Rescue Squad	
Event Narrative: Very heavy rainfall resulted in flooding along several creeks across the county												
5423157	Union	9/7/2004	2100	Flash Flood	0	0	250000	0	0	0	Emergency Manager	
Episode Narrative: After an extended period of moderate to occasionally heavy rainfall, intensifying rain dates led to rapid rises and flash flooding along some small creeks and streams in eastern portion of the Upstate. Several roads were covered with water in areas from Gaffney to Backsburg due to flooding of Cherokee Creek and other small streams. However, flooding was most severe near the City of Union, where there was extensive damage to roads and bridges, including 2 bridges that were washed away. Several homes were also damaged.												
5477651		10/7/2005	1700	Flood	0	0	0	0	0	0	Emergency Manager	
Event Narrative: Flooding began near Jonesville, When McClure Creek flooded part of highway 9, as well as West Springs Highway.												

Union County, SC Flood Events

Event ID	Begin Location	Begin Date	Begin Time	Event Type	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Numb	Injuries Indirect	Deaths Indirect	Source	Flood Cause
236968	Johns	5/31/2010	1400	Flash Flood	0	0	0	0	0	0	Fire Dept / Rescue Squad	Heavy Rain
	Event Narrative: Mill Creek overflowed its banks and flooded Tinsley Rd Just north of town. Episode Narrative: A large area of rain and embedded thunderstorms caused a small area of flash flooding right as the precipitation was ending over the Upstate.											
470788	ADA	7/11/2013	1825	Flash Flood	0	0	0	0	0	0	911 Call Center	Heavy Rain
	Event Narrative: Eaves Road was reportedly flooded and closed by a creek. Episode Narrative: Slow moving thunderstorms dropped very heavy rain over the northeast piedmont of South Carolina, resulting in flash flooding											
470789	Buffalo	7/11/2013	1840	Flash Flood	0	0	0	0	0	0	911 Call Center	Heavy Rain
	Event Narrative: Times Drive was flooded and closed as was a portion of the Rice Avenue Extension on the west side of Union. Episode Narrative: Slow moving thunderstorms dropped very heavy rain over the northeast piedmont of South Carolina, resulting in flash flooding.											
470790	Mean XRDS	7/11/2013	1900	Flash Flood	0	0	0	0	0	0	911 Call Center	Heavy Rain
	Event Narrative: Mount Lebanon Road between Hully Bridge Road and Putnam Road was closed due to flooding. A road closure was reported at the intersection of West Springs Highway and Sulphur Springs Road (4 WSW Jonesville). Dillard Road from Wildcat Road to the Spartanburg County line was closed due to flooding. Episode Narrative: Slow moving thunderstorms dropped very heavy rain over the northeast piedmont of South Carolina, resulting in flash flooding.											

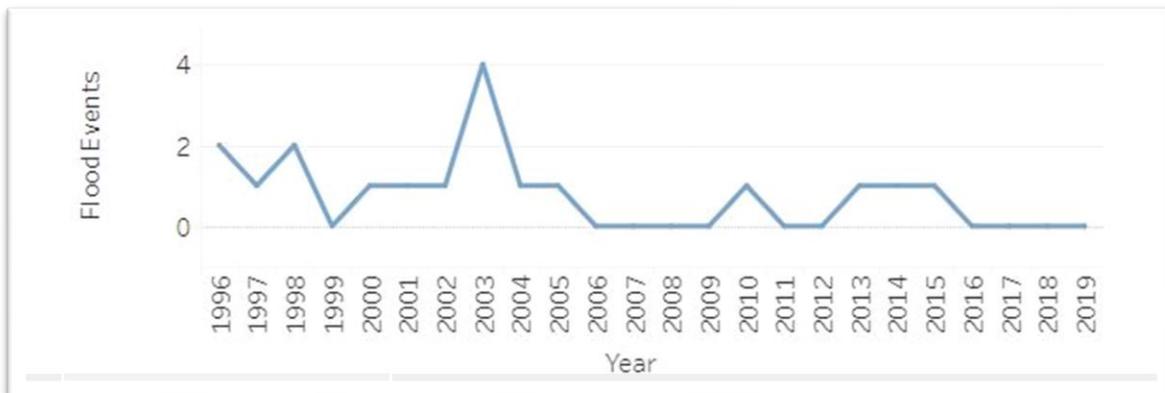
Source: NOAA, National Centers for Environmental Information, Storm Events Database, search performed on 3/23/2023

According to FEMA historical flood data events, Union County had 18 flood events from 1996 to 2019. The FEMA data only provides a county or state-level count, not detailed information per municipal level.

The FEMA data does provide an average claims payment and average Individuals and Households Program (IHP) payment.

For Union County, the average claims payment was \$29,047.84.

For Union County, the average IHP payment was \$3,624.00.



Source: FEMA Historical Flood Data Events

FEMA Historical Flood Events

County	State	Number of Floods	Year
UNION	SOUTH CAROLINA	0	2019
UNION	SOUTH CAROLINA	0	2018
UNION	SOUTH CAROLINA	0	2017
UNION	SOUTH CAROLINA	0	2016
UNION	SOUTH CAROLINA	1	2015
UNION	SOUTH CAROLINA	1	2014
UNION	SOUTH CAROLINA	1	2013
UNION	SOUTH CAROLINA	0	2012
UNION	SOUTH CAROLINA	0	2011
UNION	SOUTH CAROLINA	1	2010
UNION	SOUTH CAROLINA	0	2009
UNION	SOUTH CAROLINA	0	2008
UNION	SOUTH CAROLINA	0	2007
UNION	SOUTH CAROLINA	0	2006
UNION	SOUTH CAROLINA	1	2005
UNION	SOUTH CAROLINA	1	2004
UNION	SOUTH CAROLINA	4	2003
UNION	SOUTH CAROLINA	1	2002
UNION	SOUTH CAROLINA	1	2001
UNION	SOUTH CAROLINA	1	2000

FEMA Historical Flood Events

County	State	Number of Floods	Year
UNION	SOUTH CAROLINA	0	1999
UNION	SOUTH CAROLINA	2	1998
UNION	SOUTH CAROLINA	1	1997
UNION	SOUTH CAROLINA	2	1996

Source: FEMA Historical Flood Data Events

Lockhart Flood of August 20, 1986

“Floodwaters rushed through South Carolina homes and streets for the second time in three days. Officials said about 75 people fled their Lockhart homes in boats early Wednesday after 6 inches of rain fell in two hours.

“Some of the people had to be moved in boats while still in their nightclothes,” said Lucille Meadows, Union County disaster preparedness spokeswoman. “There was water everywhere, in homes and cars. One car was almost swept away, and a man almost didn’t make it out, but he did.”

“About 40 homes, the post office, three churches, and a few businesses were damaged in Lockhart”, Meadows said. (UPI Archives, Aug. 20, 1986 “Floodwaters that force pajama-clad residents of the Carolina to...)

According to Channel 7 local news from 1986, an individual interviewed stated that they had nine (9) feet of water in their home, while others said waist-deep water. Footage shows mud having to be removed from roads once the flood waters receded.



Picture Source: Union County

NATIONAL FLOOD INSURANCE PROGRAM

The National Flood Insurance Program (NFIP) provides insurance to help reduce the socio-economic impacts of flooding. The NFIP provides insurance to homeowners, renters, and businesses. Policyholders can also acquire further insurance for contents covering furniture and other dwelling possessions damaged from flooding.

Flood Insurance can be bought even by individuals not living in a flood-hazard area. Many homeowner's policies do not cover flooding events. Flooding can impact areas outside of flood hazard areas.

The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP). The NFIP is delivered to the public by a network of more than 50 insurance companies and the NFIP Direct.

Floods can happen anywhere — just one inch of floodwater can cause up to \$25,000 in damage. Most homeowners' insurance does not cover flood damage. Flood insurance is a separate policy that can cover buildings, the contents in a building, or both, so it is crucial to protect your most important financial assets — your home, business, and possessions.

The NFIP provides flood insurance to property owners, renters, and businesses, and having this coverage helps them recover faster when floodwaters recede. The NFIP works with communities required to adopt and enforce floodplain management regulations that help mitigate flooding effects.

Flood insurance is available to anyone living in one of the 23,000 participating NFIP communities. Homes and businesses in high-risk flood areas with mortgages from government-backed lenders must have flood insurance.

How to Purchase Flood Insurance

To purchase flood insurance, call your insurance company or insurance agent, the same person who sells your home or auto insurance. If you need help finding a provider, go to [FloodSmart.gov/flood-insurance-provider](https://www.floodsmart.gov/flood-insurance-provider) or call the NFIP at **877-336-2627**.

Plan ahead, as there is typically a 30-day waiting period for an NFIP policy to go into effect unless the coverage is mandated. It is purchased as required by a federally backed lender or is related to a community flood map change.

Source: National Flood Insurance Program

NFIP Community Status						
Community Number	Community Name	Community Status	Suspended Date	Latest Map Panel	Map Panel Effective Date	Program Type
450241	Town of Lockhart	Participating		150	8/2/2011	2
450288	Town of Carlisle	Participating		350	8/2/2011	2
450289	Town of Jonesville	Not Participating				
450186	City of Union	Participating	7/16/1981	185	5/4/2021	2
450185	Union County	Participating	3/18/1991	185	5/4/2021	2

Source: 7/31/2023 NFIP Community Status Information

Union County adopted a Flood Damage Prevention Ordinance on July 12, 2011, and participates in the National Flood Insurance Program (NFIP). Flood Development Permit Applications are available at the Building Safety and Floodplain Management Department. The floodplain manager reviews the permits to ensure compliance with the local flood ordinance and building codes.

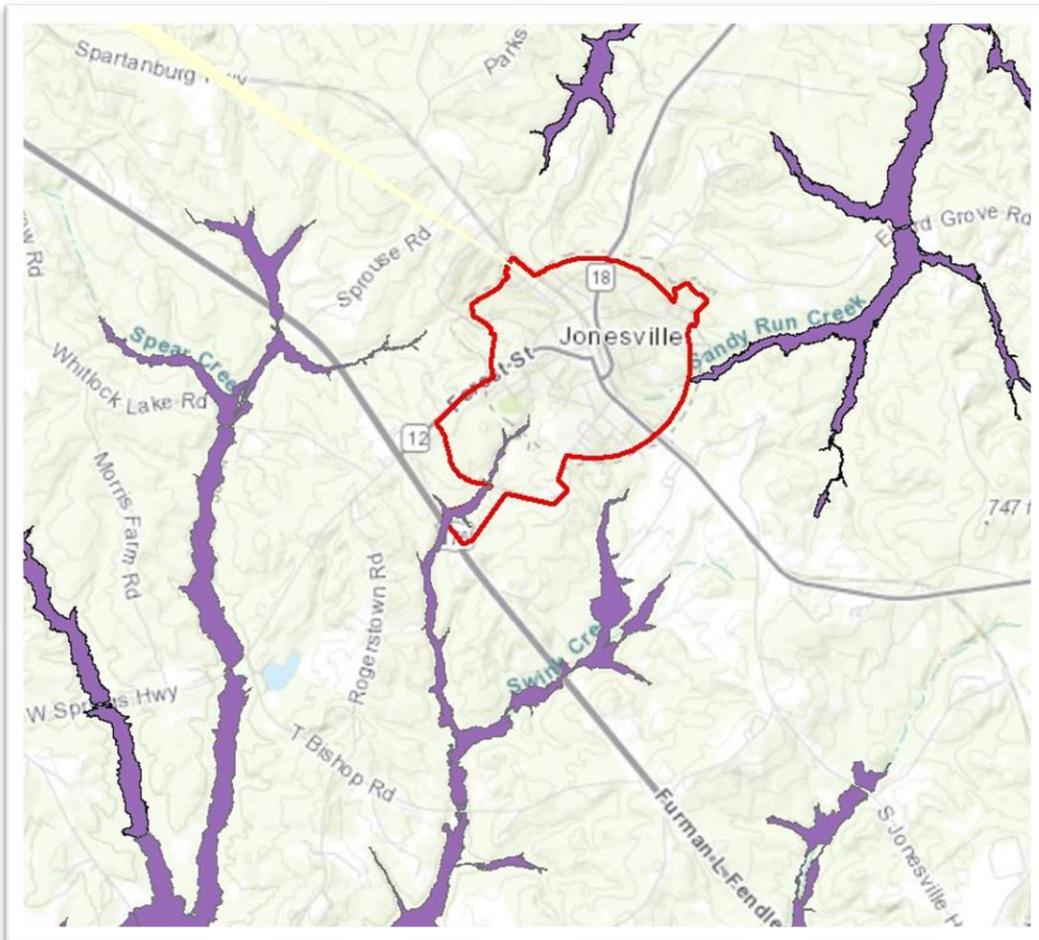
Union County does not have any repetitive loss properties. According to the Federal Emergency Management Agency (FEMA), “A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling ten-year period, since 1978. The NFIP may or may not be currently insuring the RL property.”

Union County, the City of Union, and the Towns of Carlisle and Lockhart are participants of the NFIP. Union County, the City of Union, and the Town of Carlisle have adopted Floodplain Prevention Ordinances. The Town of Carlisle and Lockhart have shared service agreements with Union County for flood and building permit reviews. All active communities have designated a floodplain manager.

Flood Plain Managers for Each Community					
Community	Title	Name	Phone	email	Flood Manager Certified
Town of Carlisle	Building Official	Tim Roseborough	(803) 317-7555	troseborough@cityofunion.org	No
Town of Lockhart	Town Clerk	Shannon Perry	(864) 545-2103		No
City of Union	Building Official	Tim Roseborough	(803) 317-7555	troseborough@cityofunion.org	No
County of Union	Building Official	Tim Roseborough	(803) 317-7555	troseborough@cityofunion.org	No

Source: 7/31/2023 NFIP Community Status Information

The Town of Jonesville does not participate in NFIP due to limited proximity to flood sources or resources to maintain the program requirements. Jonesville has some sewer and water facilities near creeks, which may benefit from participation in the National Flood Insurance Program. Vacant parcels with owners interested in future development have some flood-prone areas and areas located along Furman L. Fendley Highway in Union County that may seek annexation into Jonesville for sewer and water infrastructure usage. Should Jonesville decide to join the NFIP, the community must adopt a Flood Prevention Ordinance and designate a floodplain manager. The Town of Jonesville already has a shared service agreement with Union County for building code enforcement. The Town of Jonesville should consider developing a shared service agreement for floodplain management with the County.



Map Source: Union County Flood Hazard Zone Map zoomed into Jonesville, data source: Union County and FEMA firm data.

SUBSTANTIAL DAMAGE/SUBSTANTIAL IMPROVEMENT

The Town of Carlisle and Town of Lockhart have limited resources to fulfill the requirements of the Flood Damage Prevention Ordinance. They have contracted through an Intergovernmental Agreement with Union County to perform floodplain management services within the municipality. The designee is still responsible for ensuring all activities are completed by the entity they have contracted including Substantial Damage Assessments.

Union County and the City of Union fulfill the requirements of the Flood Damage Prevention Ordinance through enforcement. The County Building Inspector or the City Building inspector for the City of Union must inspect flood-damaged dwellings and buildings. Existing Building Code requirements require substantially damaged or substantially improved buildings to comply with the latest flood requirements.

Union County's Flood Damage Prevention Ordinance (Chapter 9 Article II Flood Damage Prevention) designates the Building Official as the floodplain manager and the responsibility for administration and enforcement of the ordinance. The building official leads the Substantial Damage Assessment team within their community. If the community is overwhelmed additional resources will be requested through the State Coordinating Office or through an agreement entered into with another community. County damage assessment is done by team members in the field and the information is gathered using the FEMA PDA IA Street form and/or entered in SCEMD Palmetto Mobile Damage Assessment Tool if network service and devices are available. The County uses the FEMA Preliminary Assessment Guide as the basis for evaluating damages.

Union County's ordinance defines Substantial damage and improvements:

Substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred. Such repairs may be undertaken successively and their costs counted cumulatively. Please refer to the definition of "substantial improvement".

Substantial improvement means any repair, reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent of the market value of the structure before the start of construction of the improvement. This term includes structures that have incurred repetitive loss or substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

- (1) Any project of improvement to a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or
- (2) Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.
- (3) Permits shall be cumulative for a period of five (5) years. If the improvement project is conducted in phases, the total of all costs associated with each phase, beginning with the issuance of the first permit, shall be utilized to determine whether "substantial improvement" will occur.

Substantially improved existing manufactured home park or subdivision means where the repair, reconstruction, rehabilitation or improvement of the streets, utilities and pads equals

or exceeds fifty (50) percent of the value of the streets, utilities and pads before the repair, reconstruction, or improvement commenced.

The City of Union's Flood Damage Prevention Ordinance (Sec. 9.5-3.1-designation of local floodplain manager) designates the building code official as the floodplain manager and the responsibility for the administration and enforcement of the ordinance. The building code official leads the Substantial Damage Assessment team within their community. If the community is overwhelmed additional resources will be requested through the State Coordinating Office or through an agreement entered into with another community. City damage assessment is done by team members in the field and the information is gathered using the FEMA PDA IA Street form and/or entered in SCEMD Palmetto Mobile Damage Assessment Tool if network service and devices are available. The City of Union uses the FEMA Preliminary Assessment Guide as the basis for evaluating damages.

The City of Union defines substantial damage and improvement as:

Substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to it's before damaged condition would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred. Such repairs may be undertaken successively and their costs counted cumulatively. Please refer to the definition of "substantial improvement".

Substantial improvement means any repair, reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent of the market value of the structure before the start of construction of the improvement. This term includes structures that have incurred repetitive loss or substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

- (1) Any project of improvement to a structure to correct existing violations of State or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or,
- (2) Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

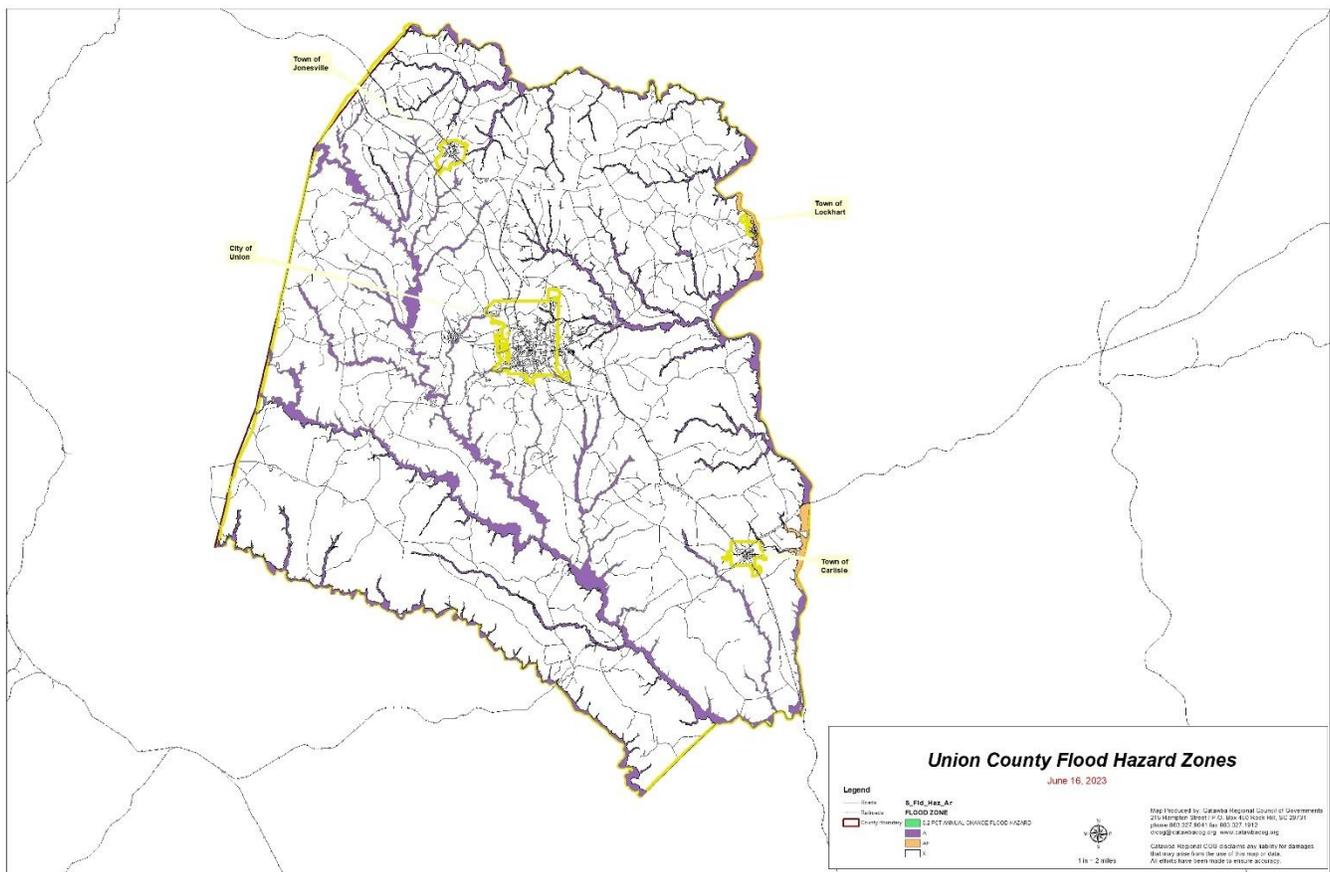
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Substantially improved existing manufactured home park or subdivision means where the repair, reconstruction, rehabilitation or improvement of the streets, utilities and pads equals or exceeds fifty (50) percent of the value of the streets, utilities and pads before the repair, reconstruction, or improvement commenced

LOCATION

Union County has many areas that are in flood zones; however, most of these areas are undeveloped. The Town of Lockhart is located near the Broad River and frequently floods. Only a small portion is in a flood zone. The “Flats” of Lockhart are not located in a flood zone and will flood. The flats are located downhill of the higher ground of Lockhart and below the Lockhart Canal wall. The water becomes trapped and has no way to flow out. Hydrology improvements since the 1986 flood have improved the situation, but the low level of the grounds still makes this area vulnerable to flooding.

Other vulnerable areas known to flood include portions of Union County in flood zones or near flood zones and low-lying roads in flood zones.



Source: Union County GIS Data and FEMA FIRM map GIS data

COMMUNITY RATING SYSTEM (CRS)

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP). Over 1,500 communities participate nationwide.

In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community’s efforts that address the three goals of the program:

1. Reduce and avoid flood damage to insurable property.
2. Strengthen and support the insurance aspects of the National Flood Insurance Program
3. Foster comprehensive floodplain management

The Community Rating System (CRS) is an incentive voluntary program that encourages communities to exceed the minimum flood requirements. The incentive provided is a reduction of community flood insurance rates. The scores range from ten (10) to one (1), with ten being the lowest score with no insurance rate reduction and one being the highest possible score with an insurance rate reduction of 45% for Flood Hazard Areas.

Table 1.
How much discount property owners in your community can get

Rate Class	Discount for SFHA*	Discount for Non-SFHA**	Credit Points Required
1	45%	10%	4,500 +
2	40%	10%	4,000–4,499
3	35%	10%	3,500–3,999
4	30%	10%	3,500–3,499
5	25%	10%	3,000–2,999
6	20%	10%	2,500–2,499
7	15%	5%	1,500–1,999
8	10%	5%	1,000–1,499
9	5%	5%	500–999
10	0	0	0–499

* Special Flood Hazard Area
 ** Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. Although they are in SFHAs, Zones AR and A99 are limited to a 5% discount. Premium reductions are subject to change.

Source: FEMA Community Rating System

Union County has no communities eligible to participate in the Community Rating System (CRS) effective April 1, 2023, or currently participating in the program.

Community responsibilities to participate in the CRS, a community must:

- ✓ Be in the Regular Phase of the NFIP for at least one year;
- ✓ Be in full compliance with the minimum requirements of the NFIP. This is documented by a "letter of full compliance" from the FEMA Regional Office;
- ✓ Keep Elevation Certificates, Flood Insurance Rate Maps, and Flood Insurance Studies for as long as the community is in the CRS;
- ✓ Maintain flood insurance on all buildings owned by the community that are required to have flood insurance;
- ✓ Designate a CRS Coordinator;
- ✓ Cooperate with the ISO/CRS Specialist and the verification procedures;
- ✓ Submit a recertification each year attesting that all credited activities are still being implemented;
- ✓ Track the area of the regulated floodplain and the number of buildings in the regulated floodplain each year; and
- ✓ Maintain other records of activities until they are reviewed at the next verification visit. These responsibilities are spelled out in more detail in the CRS Coordinator's Manual (see Section 114.b and Section 211.a). Communities with repetitive loss properties have additional requirements. FEMA or the ISO/CRS Specialist can provide repetitive loss information to local officials.

CLIMATE CHANGE IMPACTS TO FLOODING

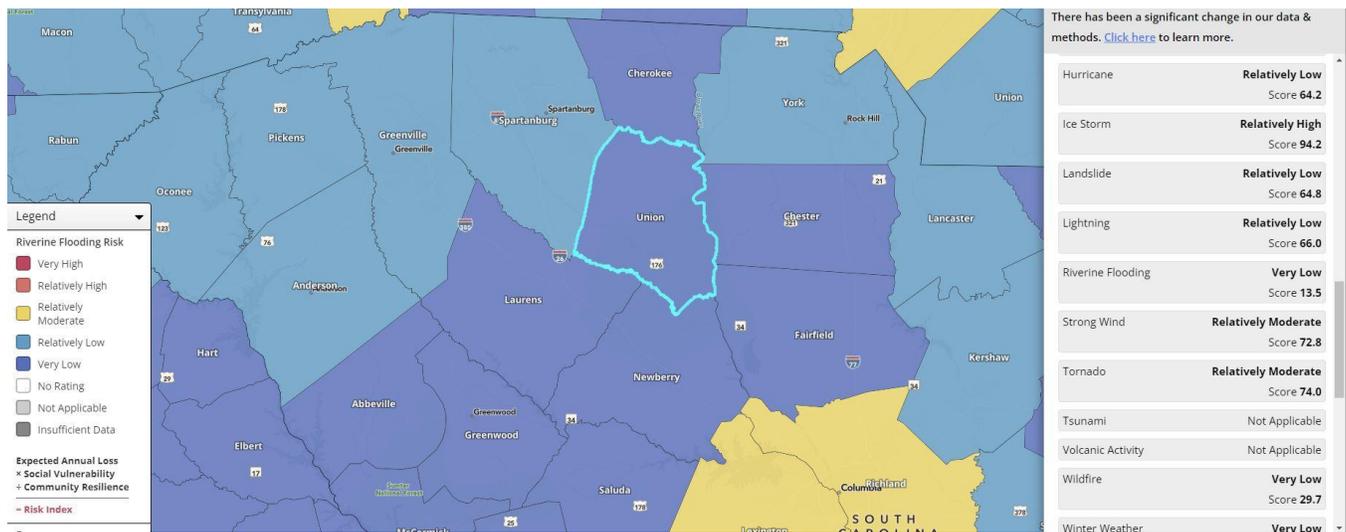
According to the U.S. Environmental Protection Agency Climate Change Impacts, climate changes are projected for the Southeast: "Heavy downpours have also increased in the Southeast. There has also been a substantial increase in the intensity, frequency, duration, and strength of Atlantic hurricane activity since the 1980s, with further increases projected. However, in addition to some very wet periods, the region has also experienced periods of extreme drying. Projecting future precipitation for the Southeast is challenging because the region lies in the transition between an increasingly wet northern region and a drying southwest. Areas in the southwestern portion of the Southeast region may experience drier conditions. In comparison, the northeastern areas may experience wetter conditions, with natural variability strongly influencing patterns across the entire region." In addition, US EPA predicts a temperature increase of 4-8 degrees Fahrenheit by the end of the century for the Southeast region.

Michele Ritchie, assistant professor at the Institute for Disaster Management College of Public Health at the University of Georgia, states, "All of our rains come down as part of the hydrologic cycle. So, anywhere in that process, whether water has just landed on the earth's surface or it's saturated down through the soils, all of the places where water is, it's part of the hydrologic cycle. And that cycle has sped up under the influence of climate change.

A warmer atmosphere means that the atmosphere can hold more water, and that's what's helping to speed up that cycle. So, more evaporation is occurring, which is why there are also more droughts and more flooding. It seems counterintuitive, but because that cycle has sped up, the atmosphere can dump that much more rain down." (Institute for Disaster Management College of Public Health, University of Georgia, September 12, 2022). According to the National Centers for Environmental Information at the National Oceanic and Atmospheric Administration, "precipitation amounts are increasing as temperatures rise because warm air holds more water vapor: a 1°F rise in temperature equals as much as a 4% increase in atmospheric water vapor."

RISK

According to the Federal Emergency Management Agency (FEMA), the overall riverine flooding risk in Union County is very low. The risk index score for Riverine Flooding is 13.5, whereas the national average score is 52.91. Areas in Union County with a history of flooding are the Town of Lockhart, portions of the City of Union, and bridges and streets in various sections of the county. The annualized frequency of flooding is 0.5 events per year (13 events in 24 years, 1996 to 2019). The Town of Lockhart has a history of major flooding (due to trapped water in low-lying areas near canal walls), while the remainder of Union County has minor to moderate levels of flooding in floodplain areas (road/bridge flooding).



Source: FEMA National Risk Index for Natural Hazards

IMPACTS

According to FEMA the expected annual loss for Riverine Flooding for Union County is very low, with an expected annual loss of 28 thousand out of an exposure of \$1.1 Billion.

A significant flooding event is expected to impact Community Lifelines as noted in the table below.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	Telecommunications and broadband equipment could be damaged if located in areas inundated by floodwater, which could result in disruption of communications	Regional
Energy	Medium	Fuel stations and energy transmission equipment/substations in inundated areas may be damaged or inoperable. Energy disruptions could affect supply chains and have cascading impacts in other lifeline sectors.	Regional
Food, Water & Shelter	High	Evacuations and displacement because of high water and/or residential damage from floodwaters could require emergency shelter. Water treatment infrastructure could be negatively impacted by intrusion of stormwater or contaminated water, resulting in disruption of water supplies and/or wastewater systems. Food supplies may be depleted in areas isolated by floodwater for an extended period. Crops and animal stock could see damage from high water and extended duration flooding.	Localized, Regional
Hazardous Materials	Medium	Floodwater inundation may result in the release of hazardous materials because of damage to storage equipment or accidents in transport causing public health and environmental risks. Damage could result in loss of material, causing economic loss.	Localized
Health and Medical	High	Medical facilities in the hazard area may see flood damage to structures and equipment as well as reduced accessibility. Access issues and transportation disruptions may result in delays in deliveries of supplies, in staffing shortages, and in patient movement. Injuries associated with flooding could result in increased patient numbers.	Regional
Safety and Security	High	Response personnel in the affected area will have challenges accessing inundated areas and may see increased safety risks from high-water conditions and water-borne debris. Need for search and rescue operations may stress available resources and increase risk to responders. Operational facilities may be damaged or inaccessible because of floodwaters	Regional, possibly Statewide

Transportation	High	Roadways, bridges, railroads, and port/airport facilities in and near flooded areas may see hazardous conditions, damage, and disruptions in service. Damage and inaccessibility may create broader disruptions in transportation and supply chains.	Localized or Regional
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RECOMMENDATIONS

1. Update Union County Flood Prevention Ordinance last updated on July 12, 2011. The Ordinance should reflect the latest flood maps. Union County should modify the language to reflect new FIRM maps effective May 4, 2021 (5/4/2021) and 8/2/2011, and a broad statement covering future land use map updates. Some maps in Union City, SC, were updated.

Section 9-2.4- Lands to which this ordinance applies.

“This article shall apply to all areas of special flood hazard within the jurisdiction of Union County, South Carolina, as identified by the Federal Emergency Management Agency (FEMA) in its flood insurance study, **dated August 2, 2011**, with accompanying maps and other supporting data that are hereby adopted by reference and declared to be a part of this article.” (Ord. No. 259, Art. I, § D, 7-12-11)

2. Continue to enforce local Flood Prevention Ordinances and South Carolina wetlands protection regulations. Encourage the Town of Jonesville to approve a flood prevention ordinance.
3. Continue to enforce the International Building Code.
4. The most flood-prone area in Union County (Town of Lockhart) does not have updated maps. The County or Town of Lockhart should consider contacting FEMA to determine if future maps for this area will be released.
5. Encourage houses, churches, and businesses between Lockhart Drive and Canal Road to elevate houses and flood proof churches and businesses with Hazard Mitigation Grant funding. This program is 100% voluntary. The FEMA Hazard Mitigation Grant Program provides 75% funding with a 25% required match. In some instances, FEMA increases the funding and decreases the match. For example, FEMA increased the grant program funding to 90% and reduced the match to 10% during the COVID-19 Pandemic Disaster funding.
6. Encourage houses on Lockhart’s Island section to relocate and sell land. The Town of Lockhart, Union County or State could use the Hazard Mitigation acquisition and demolition program to

acquire the properties and transform the area into green space. The Hazard Mitigation acquisition and demolition program can be utilized to acquire the properties and transform the area into green space. This program is 100% voluntary.

7. Mitigating hazards during infrastructure planning. For example, jurisdictions could avoid making decisions to extend roads, water or sewer infrastructure to areas located in flood zones.
8. County, City, and towns should adopt a post disaster recovery ordinance based on a plan to regulate activity, generally depending on property location. For instance, the jurisdictions could allow rebuilding of damaged structures in flood zones if the property owner agrees to elevate to comply or exceed new flood standards or high-water mark, etc.
9. Encourage the development of a Post Disaster Recovery Plan for the Town of Lockhart based on the 1986 storm event. The Town of Lockhart should develop a Post Disaster Recovery Plan to mitigate future rain events. Ideas such as filling in the depressed area of Lockhart to make it level with berm should be considered as well as other potential solutions. Pursue Emergency Management Performance Grant (EMPG) funding through FEMA to implement the Post Disaster Recovery Plan.
10. For continuity purposes it is recommended that Union County revise Chapter 11 – Emergency Preparedness section of their ordinance to create an office of deputy coordinator. Emergency Management requires a lot of expertise and relationship building. It is a challenging role to step into. Catawba Regional Council of Governments advises Union County to create a deputy emergency manager position so that at least one trained individual is always present to address emergencies in the County.

CHANGES TO THIS SECTION

- ✓ All new data tables and charts
- ✓ New Mapping based on the current available FEMA FIRM Data
- ✓ Description about the NFIP and CRS programs
- ✓ Information about the 1986 Lockhart Flood
- ✓ Added NFIP Community status and Flood Plain Manager Table
- ✓ Added more information about Jonesville NFIP and Flood Prevention participation and considerations
- ✓ Information about Substantial Damage / Substantial Improvement in NFIP subsection
- ✓ Added Climate Change Impacts Subsection
- ✓ Added Vulnerability Subsection
- ✓ Added Recommendations Subsections to mitigate flooding hazards.

TORNADO

DESCRIPTION

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. It is most often generated by a thunderstorm (but sometimes results from hurricanes) and produced when cool, dry air intersects and overrides a layer of warm, moist air, forcing the warm air to rise rapidly. The damaging effects of a tornado result from the high wind velocity and wind-blown debris, although large hail can be destructive and commonly accompany tornados. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction.

Most tornadoes are just a few dozen yards wide and touch down only briefly, but highly destructive tornadoes may carve out a path over a mile wide and several miles long. The destruction caused by tornadoes may range from light to inconceivable, depending on the storm's intensity, size, and duration. Tornadoes cause localized impacts with the most significant damage to structures of light construction, such as residential homes.

Each year, nationwide reporting identifies, on average, 800-1000 tornadoes. Tornados have the ideal weather conditions for formation during the spring and early summer months of March through June. Tornadoes can occur at any time of day but are mostly likely to form in late afternoons and early evenings.

TORNADO WATCHES, WARNINGS AND SCALE

A "TORNADO WATCH" is issued by the National Oceanic and Atmospheric Administration's (NOAA) Storm Prediction Center and indicates to the public that conditions are conducive to developing tornadoes in and close to the watch area.

A "TORNADO WARNING" is issued by local offices of the National Weather Service and indicates that a tornado has been sighted by spotters or indicated on radar and is occurring or imminent in the warning area.

Dr. T. Theodore Fujita developed the Enhanced Fujita Scale for Tornadoes to define tornado strength, as shown in Table T-1.

Table T-1 The Enhanced Fujita Scale		
F-Scale Number	Wind Speed (MPH)	Type of Damage Done
EF0	65-85	Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are supposed to be rated EF0 as a matter of policy; however, some NWS local offices have adopted an "EFU" (for "unknown") rating for such tornadoes.
EF1	86-110	Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	Roofs torn off from 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.
EF3	136-165	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 are badly damaged.
EF4	166-200	Well-constructed and whole frame houses completely leveled; some frame homes may be swept away; cars and other large objects thrown, and small missiles generated.
EF5	Over 200	Strong-framed, well-built houses leveled off foundations and swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; cars, trucks, and trains can be thrown approximately 1 mile (1.6 km).

Source: National Weather Service

HISTORICAL OCCURRENCES

South Carolina has averaged 11 tornadoes each year since 1950, resulting in 47 fatalities and 1,057 injuries. South Carolina ranks twenty-sixth in the United States in the number of tornado strikes and eighteenth in the number of tornadoes per square mile. The most common type of tornado, the relatively weak and short-lived type, occurs between March and May. However, tornadoes can occur almost anywhere at any time.

Source: SC Emergency Management Division

Union County has a history of 19 tornados from 1950 to 2022, ranging from an EF0 to an EF3. Neighboring Counties of Spartanburg and Fairfield each have an account of an EF4 Tornado strike, and Union County should not rule out the possibility of an EF4 tornado strike.

The EF3 Tornado that hit Union County in 1994 traveled from Pacolet through the City of Union. It did not directly hit the populated portion of the Town of Jonesville or the City of Union. The tornado track touched the outskirts of the two communities, which were less populated in 1994. Had the tornado directly hit the occupied portion of the Town of Jonesville or the City of Union, there would have been more property damage and potential injuries and fatalities. Union County's low population and luck have prevented severe outcomes.

There are All Hazards Warning Sirens located in the towns and cities of Union County, SC. However, many are not functional due to the inability of the emergency community system (transmitter system portion) to send signals to the All Hazards warning sirens. Many dwellings do not have basements due to the area's prevalence of wet clay soil. Education on Tornado safety should focus on finding shelter on the first floor of buildings and vacating mobile homes for more substantial buildings.

The NOAA National Centers for Environmental Information Storm Events Database has identified 19 Tornado events observed between 1950 and 2022. An F3 tornado has been the strongest tornado observed in Union County.

Union County, SC 1950-2022 Tornado History										
EVENT_ID	CZ_NAME_STR	BEGIN_LOCATION	BEGIN_DATE	EVENT_TYPE	TOR_F_SCALE	DEATHS DIRECT	INJURIES DIRECT	DAMAGE_PROPERTY_NUM	SOURCE	END_LOCATION
10117724	UNION CO.		4/8/1957	Tornado	F2	0	2	25000		
	Event Narrative:									
10111799	UNION CO.		8/17/1985	Tornado	F0	0	0	25000		
	Event Narrative:									
10113197	UNION CO.		6/4/1992	Tornado	F0	0	0	25000		
	Event Narrative:									
10113198	UNION CO.		6/4/1992	Tornado	F0	0	0	2500		
	Event Narrative:									

Union County, SC 1950-2022 Tornado History

EVENT_ID	CZ_NAME_STR	BEGIN_LOCATION	BEGIN_DATE	EVENT_TYPE	TOR_F_SCALE	DEATHS_DIRECT	INJURIES_DIRECT	DAMAGE_PROPERTY_NUM	SOURCE	END_LOCATION
10346272	UNION CO.	Southside to	4/15/1993	Tornado	F2	0	2	500000		Monarch
<p>Event Narrative: Exactly an hour after producing the first severe weather in the upstate, the supercell produced its strongest tornado in South Carolina. A high F1/low F2 tornado struck Union. Property damage resulting from the tornado's winds was estimated to be about \$500,000. More hail damage is likely as the hail accumulated to great depths very quickly and near the tornado track was quite large. Winds were estimated from 60 to 90 mph in downtown sections where plate glass windows were blown out. There was also considerable damage to trees and power lines along with damage from the wind-driven hail. Nearer the tornado track damage was more severe with large trees crushing some homes. Mobile homes were damaged or destroyed, and a couple of houses lost roofs from the wind. The large hail quickly clogged storm drains and an estimated 2 to 3 inches of rain fell causing \$50,000 in water damage to equipment in the hospital. Highest winds from south of Union to near Monarch were estimated at 115 mph in a small area. Two people were slightly injured when a falling tree crushed their car.</p>										
10346400	UNION AND SPARTANBURG CO.	Santuck to	8/16/1994	Tornado	F3	0	0	500000		
<p>Event Narrative: Tornado began near Santuc as a large multi-vortex F3 tornado. Spotters engaged the storm almost immediately and followed it as it curved north to northwest through the County. The storm had intermittent ground contact of about 30 to 40 percent but there was not a great deal of separation between areas of damage. The path width gradually diminished to about 50 yards from 0.75 mile initially, and the storm intensity gradually weakened to F2 and then to F1 at Pauline. The tornado crossed into Spartanburg County near Pacolet Mills at 1545EST. A well-constructed home near Santuc was destroyed, a stationary vehicle was thrown about 150 yds, and other homes and structures received severe damage along its path.</p>										
10346401	UNION, SPARTANBURG AND CHEROKEE CO.	Carlisle to	8/16/1994	Tornado	F1	0	0	500000		
<p>Event Narrative: This tornado was nearly parallel to the Santuc tornado described above. It moved along a track 2 to 3 miles east of the first storm and just a few minutes later. This tornado was not as large nor intense as the first tornado and was on the ground about 20 to 30 percent of the time. The most damage occurred around Carlisle where the roof of a restaurant was removed, and homes and mobile homes were damaged - and at the end of its track at Cowpens where nearly \$80,000 damage was done to homes and mobile homes. At Cowpens, one resident watched the tornado become stationary for a minute or so in an open field just before it dissipated. The tornado crossed into Cherokee County at 1600EST and into Spartanburg County at 1620EST. Spotters were able to follow both the above tornadoes for most of their paths through Union County.</p>										
10346352	UNION AND CHEROKEE CO.	Lockhart to	8/16/1994	Tornado	F2	0	1	500000		
<p>Event Narrative: The tornado struck near Lockhart where a woman was injured when a mobile home was destroyed. The mobile home was picked up with a woman and son inside and tossed about 100 yards. Two brick homes were virtually destroyed in the same area. The tornado crossed into Cherokee County at 1810EST and moved to Gowdeysville where a church was destroyed and some homes severely damaged.</p> <p>Damage from the above tornadoes exceeded \$800,000 in Cherokee County, about \$600,000 in Union County, near \$90,000 in Spartanburg County, and less than \$10,000 in Greenwood County.</p>										
5575975	UNION CO.	UNION	7/26/1996	Tornado	F0	0	0	0		UNION
<p>Episode Narrative: An unusual steady state severe thunderstorm developed north of Greer and became stronger as it moves into increasingly unstable air. The storm began to produce a consistent damage path around Poplar Springs with the most intense damage near Walnut Grove. At Poplar Springs a mobile home was blown off its foundation. At Walnut Grove numerous large pecan trees were destroyed and homes damaged by the wind and falling trees. The tornado tracks were intermittent especially in Union County where the storm was much weaker. The funnels from both tornados were visible to several observers including trained spotters.</p>										
5652019	UNION CO.	CARLISLE	6/6/1998	Tornado	F1	0	0	0	TRAINED SPOTTER	CARLISLE
<p>Episode Narrative: A large severe and tornadic thunderstorm brought two tornadoes, baseball hail, and damaging straight-line winds to a small portion of the Upstate during the late afternoon. A mile long swath of tree damage in a wooded area occurred as the result of a weak tornado near Pacolet Mills. There was also a swath of damage, 2 miles long, in the vicinity of Carlisle as the result of another weak tornado. Trees fell on 4 or 5 houses, across several roads, and some railroad tracks.</p>										

Union County, SC 1950-2022 Tornado History

EVENT_ID	CZ_NAME_STR	BEGIN_LOCATION	BEGIN_DATE	EVENT_TYPE	TOR_F_SCALE	DEATHS_DIRECT	INJURIES_DIRECT	DAMAGE_PROPERTY_NUM	SOURCE	END_LOCATION
5145401	UNION CO.	ADAMSBURG	5/25/2000	Tornado	F1	0	0	0	LAW ENFORCEMENT	ADAMSBURG
<p>Episode Narrative: Training multi-cell thunderstorms, some of which became supercells, tracked east across the Upstate during the afternoon and evening. A couple of the storms were particularly intense, producing long swaths of golf ball size hail and widespread wind damage. Trees were downed in Calhoun Falls. Golf ball size hail covered the ground for some time in northern Union County. Trees and power lines were blown down in the Travelers Rest area - some falling on houses and a sport utility vehicle. On the eastern shore of Lake Hartwell in Anderson County, 44 trees were uprooted or snapped off and several docks were blown onto the shore. Scattered trees were downed from Taylors to near the GSP Airport. Two people were slightly injured, and equipment was damaged when a tent blew down at an outdoor church function in Taylors. Trees and power lines were downed from Reidville to Pacolet, across northern Union County and much of Chester County. Extensive damage to homes and businesses occurred due to falling trees and power poles near Roebuck, Whitestone, and Pacolet. More than 12,000 people were left without power in these areas. Northwest of Union a roof was blown off a trailer, 25 trees were downed - some on cars, and a billboard was blown down. A tornado was embedded in a large downburst in Adamsburg which damaged a camper, blew a large pontoon boat 75 yards, and produced extensive damage to trees and power lines. The downburst covered several square miles. Cars were damaged by falling trees in Baton Rouge and a roof was blown off a barn in Chester.</p>										
5254664	UNION CO.	CARLISLE	6/9/2001	Tornado	F0	0	0	0	GENERAL PUBLIC	CARLISLE
<p>Event Narrative: Several eyewitnesses reported a tornado touching down during a thunderstorm that was effectively stationary for at least 15 minutes. The path of the tornado was mostly through the woods. Fire department found 2 large oak trees with broken limbs. NWS storm survey team received 5 images of the tornado.</p> <p>The tornado was a well-defined vortex descending from an apparent small wall cloud. Radar presentation displayed a small thunderstorm, or moderate to heavy rain shower, with only a 30,000-foot top.</p>										
5422867	UNION CO.	UNION	9/7/2004	Tornado	F1	0	0	50000	NWS STORM SURVEY	UNION
<p>Event Narrative: This tornado touched down east of the city of Union, then tracked north/northwest, blowing down and uprooting numerous trees, and rolling one mobile home. Other structural damage was limited to shingles and gutters.</p>										
5428702	UNION CO.	SANTUC	11/24/2004	Tornado	F0	0	0	0	NWS STORM SURVEY	SANTUC
<p>Event Narrative: Storm survey found apparent tornado northwest of Santuck with some light wind damage extending to the southeast from around Carlisle to the Chester line.</p>										
164537	UNION CO.	MEAN XRDS	4/10/2009	Tornado	EF1	0	0	400000	NWS Storm Survey	LOCKHART JCT
<p>Event Narrative: NWS survey found an area of tornado damage that began about 3 miles southwest of Jonesville in the Proctor/Zig Zag Rd area. Several trees were snapped off or uprooted in this area and some outdoor objects blown around. The tornado moved almost due east to T Bishop Rd, where a mobile home was destroyed and another heavily damaged. Dozens of trees were also uprooted and snapped off in this area. The tornado continued along an intermittent path to the east before uprooting numerous pine and cedar trees on Jonesville Highway about 3 miles southeast of Jonesville. A 3-ton trailer was moved about 100 feet, and a home received minor roof damage at this location. The tornado continued on to Bob Little Rd, where a plant building received major roof damage. The tornado then damaged two mobile homes before lifting 3.5 SE of Jonesville.</p>										
354819	UNION CO.	CAREM	11/16/2011	Tornado	EF0	0	0	1000000	NWS Storm Survey	CAREM
<p>Event Narrative: An area of weak tornado damage was surveyed near the intersection of Neal Shoals Rd and Fairview Church Circle. Part of the roof was blown off a barn and shingles were removed from a house. Numerous trees were uprooted or snapped in the area as well.</p> <p>Event Episode: An environment of strong wind shear and weak to moderate instability supported the development of a mini-supercell thunderstorm over the eastern Upstate of South Carolina. The storm produced an EF2 tornado in Chester County, along with a couple of weaker tornadoes.</p>										

Union County, SC 1950-2022 Tornado History

EVENT_ID	CZ_NAME_STR	BEGIN_LOCATION	BEGIN_DATE	EVENT_TYPE	TOR_F_SCALE	DEATHS_DIRE CT	INJURIES_DIREC T	DAMAGE_PROPERTY_NUM	SOURCE	END_LOCATION
690887	UNION CO.	ADA	4/3/2017	Tornado	EF1	1	0	50000	NWS Storm Survey	ADA
<p>Event Narrative: NWS Storm survey found the path of an EF1 tornado that began around healing springs Church Road and Eaves Road, moving northeast between these two roads, then lifting near the intersection of Eaves Rd and old highway 176. A mobile home on Eaves Rd was overturned off its frame and flipped multiple times. A 65-year-old male occupant of the home was killed.</p> <p>Event Episode: A line of showers and thunderstorms developing ahead of a cold front push across Upstate South Carolina during the afternoon. In addition to locally damaging winds, several brief, weak tornadoes touched down, including a fatal tornado in Union County.</p>										
696529	UNION CO.	CARLISLE	4/3/2017	Tornado	EFO	0	0	0	NWS Storm Survey	CARLISLE
<p>Event Narrative: NWS survey team reported a weak tornado touched down briefly, knocking down a few trees.</p> <p>Event Episode: A line of showers and thunderstorms developing ahead of a cold front push across Upstate South Carolina during the afternoon. In addition to locally damaging winds, several brief, weak tornadoes touched down, including a fatal tornado in Union County.</p>										
723114	UNION CO.	WEST SPGS	10/8/2017	Tornado	EFO	0	0	10000	NWS Storm Survey	WEST SPGS
<p>Event Narrative: NWS storm survey found a short tornado path in Union County along Haney Rd near the intersection of Mount Lebanon Rd. Damage was primarily limited to downed trees, although a couple of houses received minor exterior damage, while some under skirting was removed from a mobile home.</p> <p>Episode Narrative: As the remnants of Tropical Cyclone Nate moved north across Alabama and into Middle Tennessee, outer rain bands associated with the cyclone and scattered thunderstorms developing ahead of the bands impacted Upstate South Carolina during the afternoon and evening. Multiple tornadoes, with a couple of strong tornadoes developed in association with some of these storms.</p>										

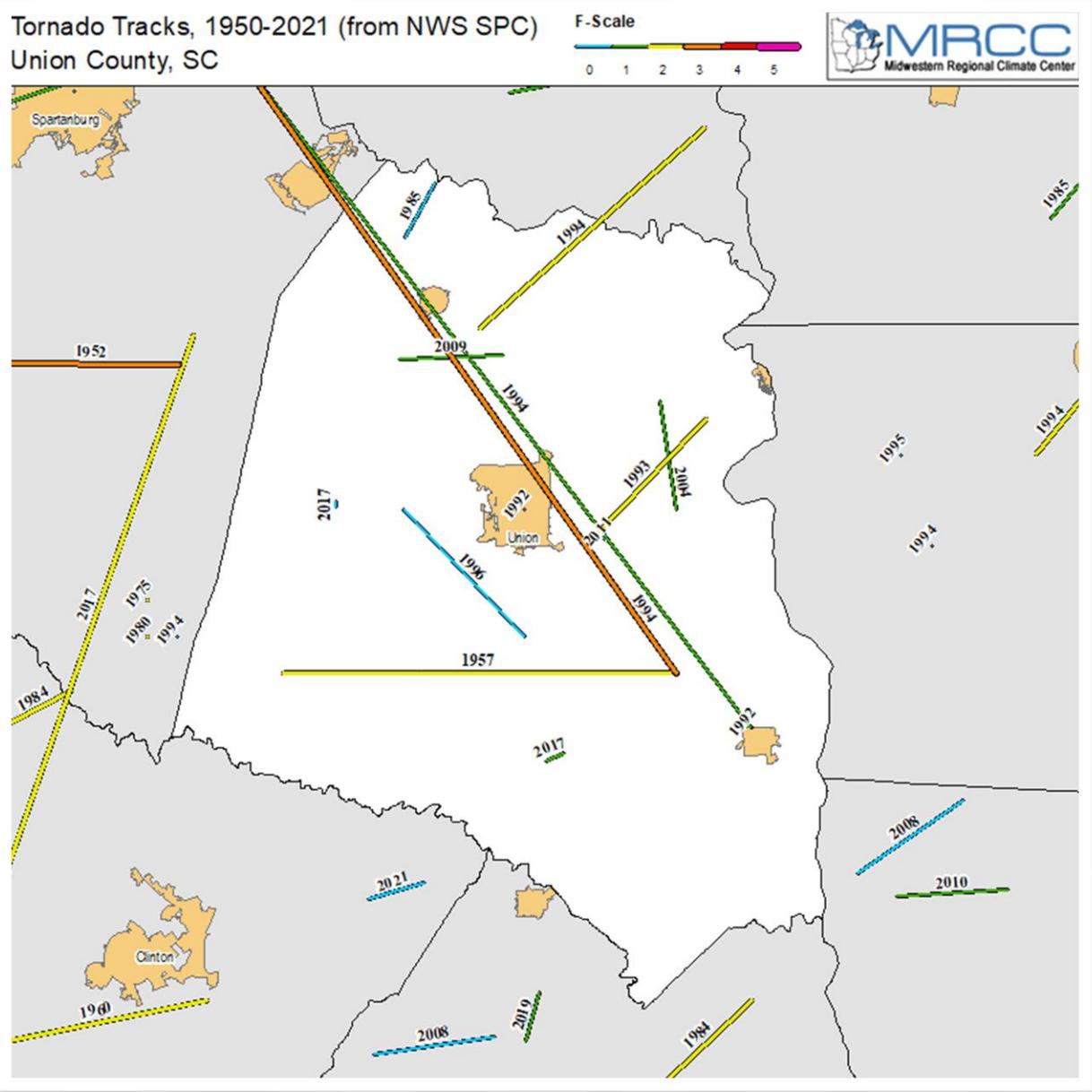
Source: NOAA, National Centers for Environmental Information, Storm Events Database, search performed on 4/11/2023 for tornados

Tornados in Union County have historically caused damage to trees and powerlines, overturned mobile homes, and caused building damage. They have also been fatal to some residents.

The City of Union and the Towns of Carlisle, Jonesville, and Lockhart have all-hazard warning sirens. Union County Emergency responders test the sirens monthly.

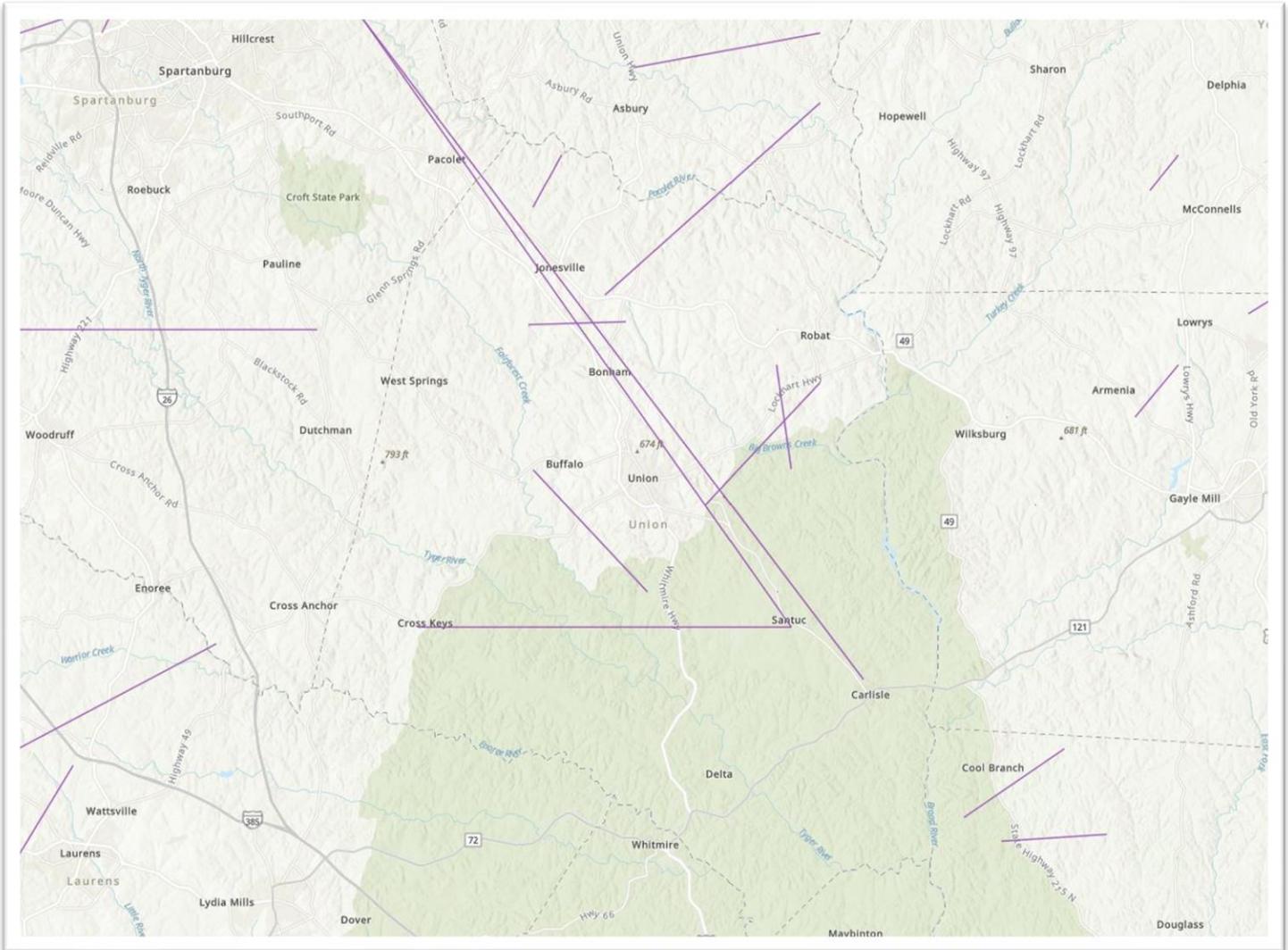
LOCATION OF TORNADOS

The map prepared by the Midwestern Regional Climate Center shows Tornado Tracks from 1950-2021 for Union County, SC, with the tornado year color-coded to indicate the F-scale ranking of the tornado (provided below). Tornados in Union County have a history of touching down close to populated centers (particularly the City of Union and the Towns of Carlisle, Jonesville, and Lockhart).



Tornado data from the National Weather Service Storm Prediction Center: <http://www.spc.noaa.gov/qis/svrqis>

The map provided below shows the tornado tracks with the names of the towns visible.



Source: SC GIS Data

The public should note that prior tornado tracks do not indicate the future location of tornados. All of Union County is vulnerable to tornado activity.

COMMUNICATION

According to Proviso 93.7: First Responder Interoperability 2021-2022 Report on Agency Compliance prepared by the South Carolina Department of Administration, Union County has limited interoperability.

“Sheriff’s Office, police, and EMS have some 800 MHz radios for interoperability. Cost, fees, and the need for better coverage are given as reasons for not fully participating. If funding becomes available, the County would like to switch to the Palmetto 800.”

During meetings with community stakeholders, stakeholders informed the committee that the All-Hazards sirens were not operational. The sirens require signals and communication from the 800 MHz radio systems, which the jurisdictions, except for the City of Union, lack. The critical issue is that the firehouses/departments throughout the County lack 800 MHz radio systems. The fire departments cannot communicate with police or emergency management. Communication between jurisdictions, County, and state emergency management officials is a problem that the County must address for tornados and other hazards.

The Town of Carlisle also has communication concerns related to dropped cell service and sometimes inoperable landlines.

The Emergency Management Office is an all-block one-story building. There are conflicting reports on how much wind gusts the building can manage. Some sources indicate up to 50 to 60 mph, while others suggest a much higher wind load. If the building were to sustain winds exceeding 60 mph for a long time, the building would sustain some damage should the lower range be accurate. The County Emergency Manager and 911 Dispatch are in this facility. The County Administrator has identified a nearby facility in a basement that emergency officials could relocate to if warranted.

LOSS OF ELECTRICITY

Many electric wires in Union County are located above ground and are vulnerable to disruption due to tornados, other high windstorms, and car accidents. Union County Jurisdictions should install backup generators at critical facilities, such as but not limited to town halls, hospitals, police/fire, and other first responder locations, shelters, fuel storage for first responders and government officials, water and sewer infrastructure, and dangerous signalized road intersections. Backup generators exist at Union Hospital and the City of Union police station, town hall, and sewer facilities. The Town of Jonesville has one mobile backup generator. When the Town of Jonesville connects to the City of Union sewer system, its sewer pump stations will have backup power generators installed.

STORM SHELTERS AND SAFE ROOMS

TABLE 2-1: SAFE ROOM RISK BASED ON LOCATION

TORNADO ZONE OR COASTAL REGION	RISK	GUIDANCE
I	Low Risk	The need for an extreme-wind safe room is a matter of homeowner preference.
II	Moderate Risk	A safe room should be considered for protection from extreme winds.
III and IV	High Risk	A safe room is the preferred method of protection from extreme winds.
Hurricane-Prone Regions and Coastal High Wind Region	High Risk	A safe room is the preferred method of protection from extreme winds. FEMA recommends that all potential safe room occupants comply with local jurisdictional directions and evacuation orders during an emergency event, even if they have constructed a safe room.

Source: FEMA, "Taking Shelter from the Storm Building or Installing a Safe Room for Your Home" FEMA P-320, Fifth Edition, March 2021

Union County, SC, falls in the 200 MPH Zone III Wind Region. Wind Zone III is a high-risk zone for tornados, as noted in Table 2:1 Safe Room Risk Based Location provided by FEMA. Union County communities are not mandated to construct safe rooms or storm shelters; however, safe rooms and storm shelters are recommended to protect life and protect from extreme winds.

When are storm shelters required?



The International Building Code (IBC) requires schools and facilities that house critical emergency operations (911 call stations, emergency operation centers, fire, rescue, ambulance, and police stations) in the 250 mph zone to include storm shelters during construction.

What type of shelters are there?

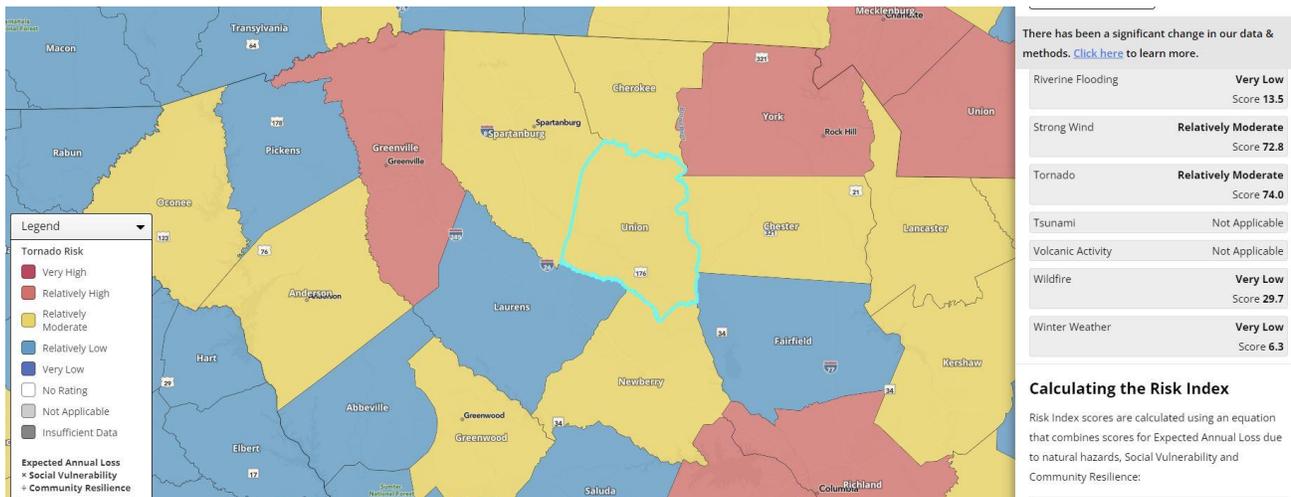
The National Storm Shelter Association (NSSA) and the International Code Council (ICC) work together to develop the ICC 500 Standard for the Design and Construction of Storm Shelters. Editions are 2008, 2014, and 2020. The standard sets forth criteria for storm shelters that resist winds generated by hurricanes or tornadoes. There are also two designations for storm shelters – community and residential storm shelters. Residential storm shelters serve dwelling units – typically single-family homes – with a maximum design occupant capacity of 16. A storm shelter could serve more than one dwelling unit – like a group of houses, trailers, or an apartment building. Still, if the design occupant capacity exceeds 16, the storm shelter is considered a community storm shelter. Storm shelters that serve facilities other than dwelling units are community storm shelters, regardless of the design occupant capacity of the shelter.

CLIMATE CHANGE

Future storm events are projected to occur less frequently and for shorter periods of time but may be more intense placing a higher risk to those directly affected.

RISK

According to the FEMA National Risk Index, the overall risk for tornados is Relatively Moderate for Union County. The National Risk Index score for tornados in Union County is 74; the median score is 52.91 for all hazards.



Source: FEMA National Risk Index for Natural Hazards

FEMA National Risk Index indicates Union County has an expected annual loss of \$2,061,022 for tornados and a frequency of 0.4 events per year. The South Carolina 2023 Hazard Mitigation Plan identifies a total of 24 events with a frequency interval of 4.18 years.

IMPACTS

According to FEMA the expected annual loss for tornados for Union County is relatively moderate (score of 70.9), with an expected annual loss of \$2,061,022 out of \$0.32 trillion exposure.

A significant tornado event can have major consequences in the areas in or near a tornado's path. Impacts on community lifelines in those locations can be severe; however, direct impacts in most cases do not extend beyond locations in proximity to the tornado path(s). This effects estimates of the levels of impacts on the lifelines, keeping them at medium or lower.

A significant tornado event is expected to impact Community Lifelines as noted in the table below.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	A significant tornado could damage telecommunications and broadband equipment and systems in its path(s), creating service outages.	Localized or Regional
Energy	Medium	A significant tornado may cause damage to power generation, transmission, or distribution equipment and systems in its path, resulting in outages. Fuel stations or pipelines may be damaged.	Localized or Regional
Food, Water & Shelter	Medium	Locations in the tornado path(s) may see significant damage to residential structures, making homes uninhabitable. Residents may need emergency shelter and temporary housing. Water systems and food production and processing facilities in the tornado's path may be damaged, reducing locally available supplies and causing economic losses.	Localized or Regional
Hazardous Materials	Medium	Hazardous materials storage or transportation may be damaged if in a tornado's path, potentially resulting in a release. Severity of impact would be determined by type and volume of material released.	Localized or Regional
Health and Medical	Medium	Healthcare facilities in a tornado's path may see direct structural damage and disruption to operations and services. Hospitals serving affected areas may see an influx of patients seeking emergency care. Hospital operations in the immediate area may be overwhelmed.	Localized or Regional
Safety and Security	Medium	Facilities in a tornado's path may see damage and disruption of operations and critical services. Response personnel serving the area would see an increase in emergency calls and requests for response assistance, including search and rescue. Local resources may need to be augmented by personnel and equipment from other areas.	Localized or Regional
Transportation	High	Roadways, bridges, railroads, and other transportation infrastructure may be blocked or damaged if in a tornado's path, resulting in temporary transportation delays or rerouting.	Localized

RECOMMENDATIONS

1. Upgrade all emergency communication systems in the County, including its jurisdictions, to the 800 MHz systems. Communication between agencies, sirens, and the state would significantly improve for all Hazards.
2. Continue to test and monitor All Hazards warning sirens throughout the County.
3. Educate the public about tornado emergencies and how to stay safe, focusing on finding secure locations on the 1st floor of their home or buildings and vacating mobile homes. Encourage residents of mobile homes to evacuate to shelters.
4. Ensure that emergency shelters are easily accessible to mobile homes and mobile home parks. There have been incidences of mobile homes being moved and damaged during tornados, with injuries and fatalities to residents.
5. Install backup generators at shelters and other critical facilities.
6. Educate the public about the tornado siren sound and what the noise means.
7. Ensure Emergency responders know about the chemicals present at the numerous manufacturing facilities in Union County, especially when responding to storm damage at manufacturing facilities.
8. Encourage mobile home parks to provide safe shelter for residents of mobile home parks. Shelters must serve those within a 5-minute walk or half-mile car ride and comply with FEMA P-320.
9. Promote the construction and use of safe rooms by:
 - Encourage the construction of safe rooms in new schools, daycares, and nursing homes.
 - Encourage the construction and use of safe rooms in homes and shelter areas of manufactured home parks, fairgrounds, shopping malls, or other vulnerable public structures.
 - Encourage builders and homeowners to locate tornado-safe rooms inside or directly adjacent to houses to prevent injuries due to flying debris or hail.
 - Consult guidance from FEMA P-320 – Taking Shelter from the Storm: Building a Safe Room for your Home or Small Business and International Code Council (ICC) -500 Standard for the Design and Construction of Storm Shelters.

10. Implement recommendations under the severe winds section of this report.

11. Conduct outreach activities to increase awareness of tornado risk. Activities could include the following:

- Educate citizens through media outlets (such as local news, articles in local newspapers, and social media posts and blogs)
- Conduct tornado drills in schools and public buildings.
- Teach school children about the dangers of tornadoes and how to take safety precautions.
- Distribute tornado shelter location information.
- Support Severe Weather Awareness Week.
- Promote use of National Oceanic and Atmospheric Administration (NOAA) weather radios.

CHANGES TO THIS SECTION

- ✓ Added Location subsection
- ✓ Updated data for historical occurrences
- ✓ Added discussion of F3 tornado, discussion about past tracks and impacts to community
- ✓ Added subsection on communication to address task force comment about communication
- ✓ Added subsection on loss of electricity to address task force comment
- ✓ Added subsection on storm shelters
- ✓ Added subsection on risk
- ✓ Added subsection on Climate Change
- ✓ Added recommendations subsection

STRONG WINDS AND OTHER WIND WEATHER RELATED INCIDENTS

DESCRIPTION

Windstorms are powerful winds; they can occur as sharp gusts or sustained winds. Hurricanes and tornados (twisters or funnel clouds) are commonly associated with windstorms. However, windstorms can occur without such noticeable visual displays.

A strong windstorm leaves behind a distinctive trail when it strikes a community. Trees toppled over on buildings and cars, downed power lines crisscrossing the roads, and widespread power outages are a few of the signs that a windstorm has struck. After such an event, it can take communities days, weeks, or longer to return to normal activities. In addition to costly structural damages, windstorms can cause injury or even death.

Windstorms can cause damage over 100 miles from the center of storm activity. Wind impacting walls, doors, windows, and roofs may cause structural components to fail. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward.

Conversely, passing currents can create lift and suction forces that pull building components and surfaces outward. The upper levels of multi-story buildings feel the magnified effects of the strong winds. Positive and negative forces impact the building's protective envelope (doors, windows, and walls), resulting in roof or building component failures and considerable structural damage.

Debris carried along by extreme winds can directly contribute to loss of life and indirectly to the failure of protective building envelopes, siding, or walls of buildings. When severe windstorms strike a community, downed trees, power lines, and damaged property can be significant hindrances to emergency response and disaster recovery.

Storm winds can damage buildings, power lines, and other property and infrastructure due to falling trees and branches. During wet winters, saturated soil causes trees to become less stable and more vulnerable to uprooting from high winds.

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among others. Roads blocked by fallen trees during a windstorm may severely affect people who need access to emergency services. Emergency response operations can be complicated when interrupted by modified road traffic patterns or power supply loss. Industry and commerce can suffer losses from interruptions in electric service and extended road closures. They can also sustain direct losses to buildings, personnel, and other vital equipment. There are also consequences to the local economy resulting from windstorms related to physical damage and interrupted services.

Windstorms can cause flying debris and downed utility lines. For example, 45 mph winds can break and throw tree limbs 75 feet. As such, overhead power lines can be damaged even in relatively minor windstorm events. Windstorms during summer thunderstorms can bring down utility lines, which can cause fires, which start in dry roadside vegetation. Falling trees can bring electric power lines down to the pavement, creating the possibility of lethal electric shock. Rising population growth and new infrastructure in the County increase the probability of damage from windstorms and expose more life and property to risk.

LOCATION

Based on the above potential windstorm effects and a review of historical events, the following areas are likely to be more vulnerable to the impact of high winds:

- Areas with large trees
- Areas dependent upon aboveground power distribution systems
- Areas with older homes or other structures
- Areas with large open agricultural fields or rangeland

WIND ADVISORIES AND BEAUFORT SCALE

National Oceanic and Atmospheric Administration Wind Advisories

The National Oceanic and Atmospheric Administration (NOAA) defines high winds as sustained wind speeds of 40 mph or greater lasting for 1 hour or longer or winds of 58 mph or greater for any duration. The National Weather Service (NWS) will issue high wind watches, warnings or advisories:

High Wind Watches are issued when the risk of a high wind event (≥ 40 mph), sustained for 1 hour or more or ≥ 58 mph of any duration, is significant in the 12 to 48-hour time frame *but occurrence, location, severity, or timing is uncertain*.

High Wind Warnings are issued when winds of ≥ 40 mph, sustained for 1 hour or more, or ≥ 58 mph of any duration, *are occurring, imminent, or have a significant probability of occurrence within 36 hours*.

Advisories are issued for wind events not quite as strong as the high wind thresholds and have a significant probability of occurrence in the first 36 hours. Wind advisory criteria is 31-39 mph sustained for 1 hour or more or 46-57 mph of any duration. NOAA classifies Wind Advisories as non-life-threatening, but they could become life-threatening if people do not exercise caution.

In the U.S., the Beaufort Scale is commonly used to categorize the effects of wind speed.

Beaufort Wind Scale Specifications for Use on Land				
Force	Speed		Description	Specifications
	(MPH)	(knots)		
0	0-1	0-1	Calm	Calm; smoke rises vertically
1	1-3	1-3	Light Air	Direction of wind shown by smoke drift; but not by wind vanes
2	4-7	4-6	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind
3	8-12	7-10	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag.
4	13-18	11-16	Moderate Breeze	Raises dust and loose paper; small branches are moved.
5	19-24	17-21	Fresh Breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	25-31	22-27	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	32-38	28-33	Near Gale	Whole trees in motion; inconvenience felt when walking against the wind.
8	39-46	34-40	Gale	Breaks twigs off trees; generally, impedes progress.
9	47-54	41-47	Severe Gale	Slight structural damage occurs (chimney pots and slates removed)
10	55-63	48-55	Storm	Seldom experienced inland; trees uprooted; considerable structural damage
11	64-72	56-63	Violent Storm	Very rarely experienced; accompanied by widespread damage
12	72-83	64-71	Hurricane	See Saffir-Simpson Hurricane Scale

Source: National Oceanic and Atmospheric Administration

HISTORICAL OCCURRENCES

Windstorms are relatively common in South Carolina, but only a small percentage causes damage.

According to the SHELDUS Data, there were 120 significant wind events in Union County from 1960 to March 2023 (63 years). The wind events caused \$ 26,721,088.25 in crop damages and \$ 1,342,316.413 in property damage in 2021 inflation-adjusted dollars. These events do not include tornadoes; however, they do include thunderstorm wind. There have been no wind non-thunderstorm events in Union County since 2011. The Thunderstorm section provides information about thunderstorm wind events.

There were 6 High Wind events from 1996 to 2007 and 3 Strong Wind events from 2000 to 2019. Most of the damage was due to falling trees.

Union County, SC 1950-2022 High Winds

EVENT_ID	CZ_NAME_STR	BEGIN_LOCATION	BEGIN_DATE	EVENT_T YPE	Magnitude	DEATHS DIRECT	INJURIES DIRECT	DAMAGE_PROPERTY_NUM	SOURCE
5540693	UNION CO.		3/19/1996	High Wind		0	0	0	
Event Narrative: High winds along and behind a very strong cold front caused widespread damage. Shallow rooted trees fell causing some damage to structures and power lines. A few outbuildings were damaged. Gusts were reported as high as 60 mph in a few spots with 30 to 40 mph sustained winds gusting to 50 mph common.									
5635604	UNION CO.		2/3/1998	High Wind		0	0	7,690	
Event Narrative: A strong storm system moved slowly north from the Gulf of Mexico into the Carolinas on the 3rd and 4th. A tight pressure gradient between high pressure in the upper Midwest and the approaching strong low, produced damaging high winds which blew down hundreds of trees, many on houses, during the afternoon of the 3rd. Numerous power outages were also reported. Heavy rain during the day prompted flooding by afternoon. Several counties across the Upstate reported bridges and roads flooded. The Broad River, Pacolet River and Reedy River all rose out of their banks and flooded nearby roads and land.									
5237822	UNION CO.		3/20/2001	High Wind	55	0	0	0	General Public
Event Narrative:									
5283277	UNION CO.		2/4/2002	High Wind	50	0	0	0	News paper
Event Narrative: High winds, mostly in the form of peak gusts rather than sustained wind, blew down a number of trees and power lines. In northern Spartanburg, the siding was blown off a building at a university. In Rock Hill, a 45 foot wall at a construction site was blown down. One worker died and 4 others were injured. Wind gusts, as measured by ASOS, did not reach more than 37 mph, and there was little other damage reported in York County.									
5389130	UNION CO.		3/7/2004	High Wind	60	0	0	20,000	Emergency Manager
Event Narrative: As the cold front moved rapidly to the east, strong winds developed across the remainder of the Upstate. Numerous trees and power lines were blown down. In Laurens County, a 13-year-old boy drowned when his boat capsized as the strong winds moved over Lake Greenwood.									
29423	UNION CO.		4/16/2007	High Wind	60	0	0	500,000	County Official
Event Narrative: After an intense, but relatively brief high wind event affected the mountains and foothills on the evening of the 15th, another widespread damaging high wind event developed during the day of the 16th. However, this event included much of the piedmont. Thousands of trees fell across the area, resulting in widespread power outages. Numerous trees fell on roads, homes, and vehicles. A 90-year-old man in Walhalla, SC was killed when a tree fell on and crushed the outbuilding, he was in.									

Union County, SC 1950-2022 Strong Winds

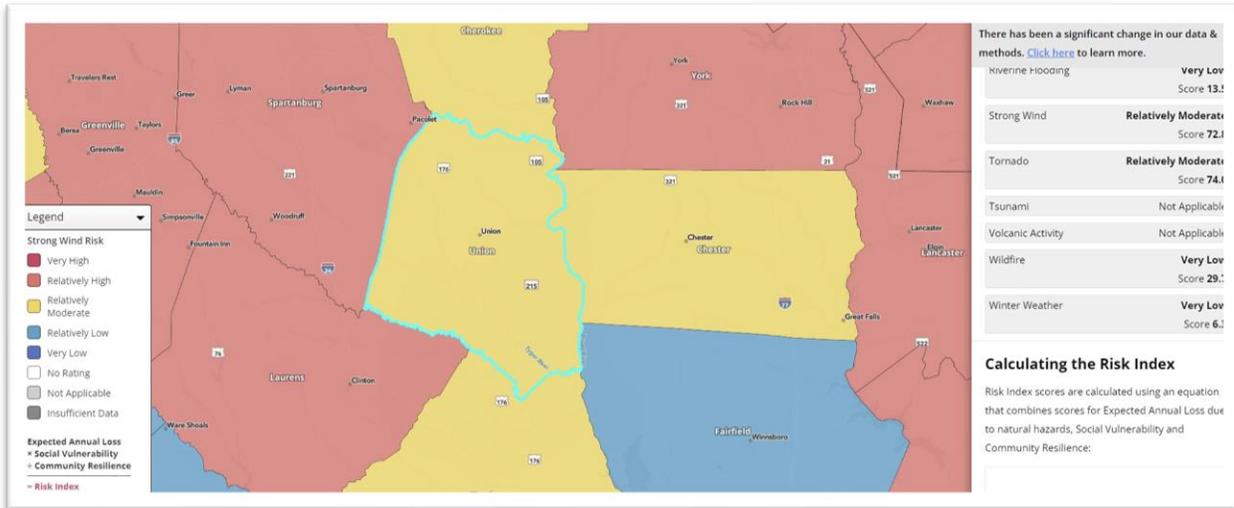
EVENT_ID	CZ_NAME_STR	BEGIN_LOCATION	BEGIN_DATE	EVENT_TYPE	Magnitude	DEATHS_DIRECT	INJURIES_DIRECT	DAMAGE_PROPERTY_NUM	SOURCE
5160425	UNION CO.		11/9/2000	Strong Wind		0	0	0	Law Enforcement
Episode Narrative: Gusty winds, between 30 and 40 mph at times, caused scattered trees to fall through the day. Winds were generally below advisory criteria, but many rotted trees and limbs fell because of the overall windy and rainy conditions.									
787816	UNION CO.		9/15/2018	Strong Wind	40	0	0	5,000	Broadcast Media
Episode Narrative: A strong storm system moved slowly north from the Gulf of Mexico into the Carolinas on the 3rd and 4th. A tight pressure gradient between high pressure in the upper Midwest and the approaching strong low, produced damaging high winds which blew down hundreds of trees, many on houses, during the afternoon of the 3rd. Numerous power outages were also reported. Heavy rain during the day prompted flooding by afternoon. Several counties across the Upstate reported bridges and roads flooded. The Broad River, Pacolet River and Reedy River all rose out of their banks and flooded nearby roads and land.									
822099	UNION CO.		4/26/2019	Strong Wind	40	0	0	10,000	Law Enforcement
Episode Narrative: Very gusty northwest winds developed across the foothills and Piedmont in the wake of an unseasonably strong cold front. Scattered trees were blown down across the area, with at least a couple of trees falling on structures.									

CLIMATE CHANGE

Based on a warming climate, conditions conducive to increased occurrences and intensified extent of damaging winds may develop. Strong winds may have a heightened impact on people and property. Union County's population will remain rural, so the wind impacts will not be as severe as other parts of South Carolina.

RISK

According to the FEMA National Risk Index, the overall risk for Strong Winds is Relatively Moderate for Union County. The National Risk Index score for Strong Winds in Union County is 72.8; the median score is 52.91 for all hazards. There have been 148 strong wind events between 1986 and 2021 (34 years), with an annualized frequency of 4.3 events per year.



Source: FEMA National Risk Index for Natural Hazards

IMPACTS

Impacts of wind events are typically calculated in terms of lives lost, injuries incurred, and property damage sustained in dollars. FEMA’s National Risk Index identifies Union County’s impact from strong winds as Relatively Moderate, with an expected annual loss of \$562,000 out of an exposure of \$323 Billion.

High wind can cause significant impacts to critical community lifelines, though these are local or regional to the area of the event.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	Telecommunications and broadband equipment and lines may be damaged by strong wind gusts and falling debris.	Localized or Regional
Energy	Medium	Power lines may be damaged by high winds and wind-borne or falling debris, resulting in power outages. Generators could also be damaged from falling debris during a large-scale wind event.	Localized or Regional
Food, Water & Shelter	Medium	Residential, food storage/retail, and water/wastewater treatment structures may be damaged by high winds. Significant damage could result in displacement of residents to emergency shelter and temporary housing and spoilage of food inventory. High winds may damage or destroy	Localized

		crops. Significant impacts to water systems and supplies are not anticipated.	
Hazardous Materials	Low	Significant impacts are not anticipated. Hazardous materials storage and transport equipment may be dislodged or damaged by high winds, which may result in a release and loss of material.	Localized
Health and Medical	Low	Significant impacts are not anticipated other than potential structural damage and potential for power outages at critical facilities without generators.	Localized
Safety and Security	Low	Significant impacts are not anticipated other than potential structural damage and potential for power outages at critical facilities without generators. Significant impacts	Localized
Transportation	Low	Significant impacts are not anticipated other than potential structural and vehicle damage and potential for power outages at critical facilities such as airports without generators. Transportation routes may be blocked or rerouted because of debris or downed power lines.	Localized

RECOMMENDATIONS

1. Coordinate with Electric companies to trim and assess the health of trees next to power lines to minimize down-wired hazards and power loss.
2. If Union County adopts a Zoning Ordinance, consider adopting an ordinance that requires the installation of electric wires underground for new developments.
3. The City of Union should consider modifying existing zoning to require the installation of electric wires underground for new developments.
4. Ensure critical facilities such as emergency shelter locations, hospitals, schools, frequently utilized and dangerous traffic intersections, and other critical facilities have generators for backup power.
5. Continue to enforce the International Building Code (IBC) and International Residential Code (IRC).
6. Consider adopting standards from the International Code Council (ICC) – 600 Standard for Residential Construction in High-Wind Regions.

7. Consider Requiring or encouraging wind engineering measures and construction techniques that may include structural bracing, straps, and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles.
8. Consider requiring tie-downs with anchors and ground anchors appropriate for the soil type for manufactured homes.
9. Prohibit the use of carports and open coverings attached to manufactured homes.
10. Require structures on temporary foundations to be securely anchored to permanent foundations.
11. Consider retrofitting public buildings and Critical Facilities to reduce future wind damage with the following:
 - Improving roof coverings (e.g., no pebbles, remove ballast roof systems).
 - Anchoring roof-mounted heating, ventilation, and air conditioning units
 - Retrofitting buildings with load-path connectors to strengthen the structural frames.
 - Retrofitting or constructing the emergency operations center to FEMA 361 standards.
 - Avoid placing flag poles or antennas near buildings.
 - Upgrading and maintaining existing lightning protection systems to prevent roof cover damage.
 - Requiring upgrading of reused buildings that will house critical facilities.
 - Protecting traffic lights and other traffic controls from high winds
 - Converting traffic lights to mast arms.
12. Improve public awareness of severe wind through outreach activities such as:
 - Informing residents of shelter locations.
 - Educating homeowners on the benefits of wind retrofits such as shutters, hurricane clips, etc.
 - Ensuring that school officials know the best area of refuge in school buildings.
 - Instruct property owners on properly installing temporary window covering before a storm.
 - Educating design professionals to include wind mitigation during building design.

CHANGES TO THIS SECTION

- ✓ Updated historical data subsection to include the latest data
- ✓ Added Climate Change subsection
- ✓ Added Risk subsection
- ✓ Added Impacts subsection
- ✓ Added Recommendation subsection

Hurricanes and Tropical Storms

DESCRIPTION

Hurricanes and tropical storms, classified as *tropical cyclones*, are low-pressure storm systems that originate over warm ocean waters but can cause immense destruction when crossing the coastline into land.

The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are also vulnerable to the additional force from storm surges, wind-driven waves, and tidal flooding. The critical 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, sufficiently warm sea surface temperature, rotational force from the earth's spinning, and the absence of wind shear in the lowest 50,000 feet of the atmosphere.

Hurricanes and tropical storms can form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico from June to November. The peak of the Atlantic hurricane season is early to mid-September. The average number of storms that reach hurricane intensity annually in the Atlantic basin is about six.

TROPICAL STORM AND HURRICANE WATCHES, WARNINGS AND SCALE

A “TROPICAL STORM WATCH” indicates that tropical storm conditions (sustained winds of 39 to 73 mph) are possible within the specified coastal area within 48 hours.

A “TROPICAL STORM WARNING” indicates that tropical storm conditions (sustained winds of 39 to 73 mph) are expected within the specified coastal area within 36 hours. As a hurricane develops, barometric pressure at its center falls, and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. The National Hurricane Center in Miami, Florida, will designate the system a tropical storm, name it, and closely monitor it when maximum sustained winds reach or exceed 39 miles per hour. The National Hurricane Center will deem the storm a hurricane when sustained winds reach or exceed 74 miles per hour.

A “HURRICANE WATCH” indicates hurricane conditions (sustained winds of 74 mph or higher) are possible within the specified coastal area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, The National Hurricane Center will issue the hurricane watch 48 hours in advance of the anticipated onset of tropical storm-force winds.

A “HURRICANE WARNING” announces that hurricane conditions (sustained winds of 74 mph or higher) are expected within the specified coastal area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, The National Hurricane Center will issue the hurricane warning 36 hours before the anticipated onset of tropical-storm-force winds.

Hurricane intensity is further classified by the Saffir-Simpson Scale, which rates hurricane intensity on a scale of 1 to 5, with five being the most intense. Table H-1 shows the Saffir-Simpson scale.

Table H-1

Category	Maximum Sustained Wind Speed (MPH)	Minimum Surface Pressure (millibars)	Storm Surge (feet)
1	74-95	Greater than 980	3-5
2	96-110	979-965	6-8
3	111-130	964-945	9-12
4	131-155	944-920	13-18
5	155+	Less than 920	19+

Source: National Hurricane Center

The Saffir-Simpson scale categorizes hurricane intensity linearly based on maximum sustained winds, barometric pressure, and storm surge potential to estimate potential damage. The Saffir-Simpson scale classifies "Major" Hurricanes as Categories 3, 4, and 5. While hurricanes within this range comprise only 20% of tropical cyclone landfalls, they account for over 70% of the damage in the U.S.

Table H-2 describes the damage that could be expected for each category of hurricane.

Table H-2

Category	Damage Level	Category Damage Level Description
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 curtain wall 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 curtain wall 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

Damage during hurricanes may also result from spawned tornadoes and inland flooding associated with heavy rainfall that usually accompanies these storms. Hurricane Hugo in 1989, for example, caused massive inland flooding when it made landfall in Charleston County, proceeded inland towards Columbia, and continued North through Union and York Counties.

HISTORICAL OCCURRENCE

According to South Carolina hurricane and tropical storm data, South Carolina has had 260 Hurricanes/Tropical storms from 1852 to the present. (<https://www.dnr.sc.gov/climate/sco/hurricanes/>)

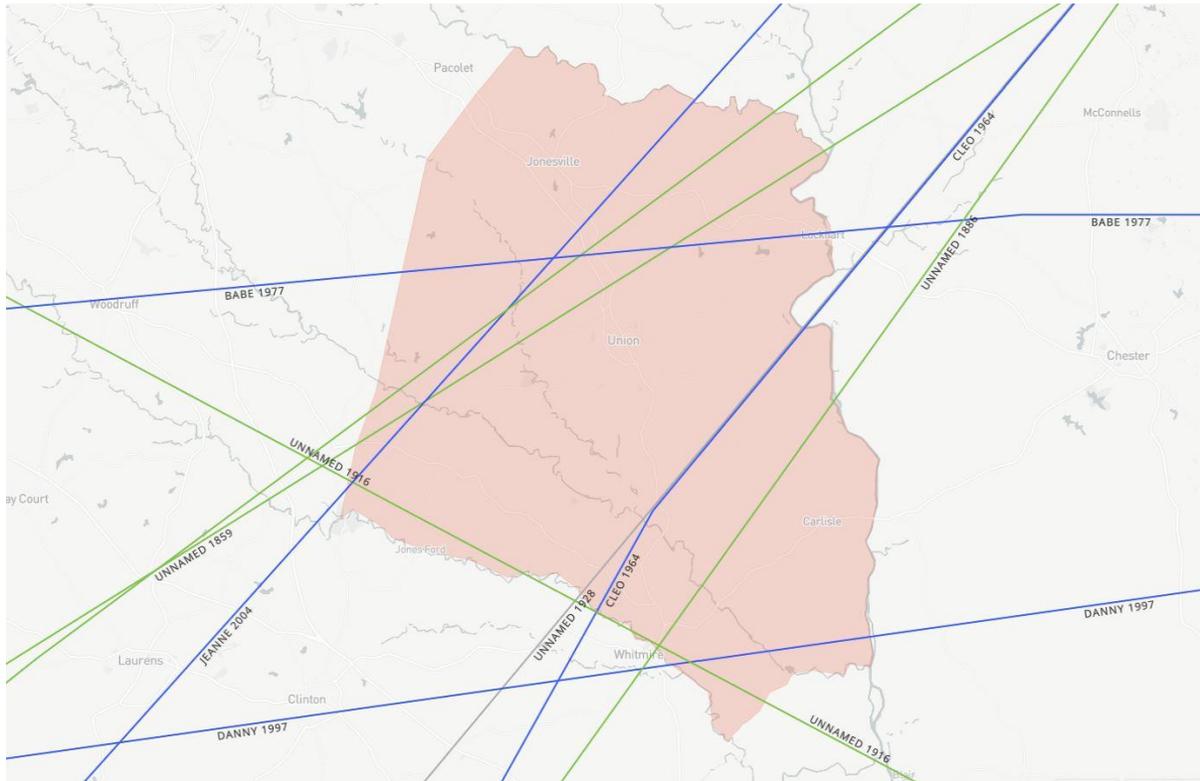
According to SHELUS data, Union County has had seven (7) hurricanes and tropical storms that have impacted the County. Tropical Storm Jerry in 1995 had the most property damage, with an impact of \$375,491.61 in 2021 adjusted dollars. Due to the location of Union County, most Hurricanes and Tropical Storms that hit South Carolina have little to no impact on Union County.

Union County Hurricane/Tropical Storm SHELUS Data													
Hazard	Event Name	Remarks	Start Date	End Date	Crop Dmg	Crop Dmg (ADJ)	Crop Dmg Per Capita	Fatalities	Injuries	Location	Property Dmg	Property Dmg (ADJ)	Property Dmg Per Capita
Hurricane/ Tropical Storm		Tropical Storm	8/29/1964	8/31/1964	1086.96	9229.86	0.31	0	0	Statewide	1086.96	9229.86	0.31
Hurricane/ Tropical Storm	Hurricane 1972 Agnes	Tropical Depression Agnes	6/20/1972	6/21/1972	1086.96	6845.11	0.22	0	0	Statewide	108.7	684.54	0.02
Hurricane/ Tropical Storm		Tropical Storm	6/7/1968	6/8/1968	10.87	82.22	0	0	0	Statewide	108.7	822.23	0.03
Hurricane/ Tropical Storm		Tropical Storm Dora	9/12/1964	9/13/1964	108.7	923.02	0.03	0	0	South Carolina	108.7	822.23	0.03
Hurricane/ Tropical Storm	Hurricane 1989 Hugo	Hurricane Hugo	9/22/1989	9/22/1989	5000	10614.3	0.35	0	0	Union County	5000	10614.3	0.35
Hurricane/ Tropical Storm		Tropical Storm Jerry	8/24/1995	8/29/1995	2173.91	3745.91	0.12	0	0	SCZ001 – SCZ051/ Statewide	217391.3	375491.61	12.21
Hurricane/ Tropical Storm		Tropical Storm	8/28/1988	8/28/1988	1515.15	3371.43	0.11	0	0	SCZ003 – 005-006 - 007-008 Eastern and Central SC	1515.15	3371.43	0.11

Source: SHELUS data

Nine (9) hurricane tracks have traveled over Union County. Hurricane Babe, 1977, traveled directly over the Town of Lockhart. Four (4) hurricanes traveled in Union County, between Jonesville and the City of Union. Three (3) Hurricanes have traveled between the City of Union and the Town of Carlisle.

LOCATION OF HURRICANES



Year	Hurricane Name	Dates of Hurricane	Maximum Category	Category Over Union	Wind Speed Over Union
2004	Jeane	9/13/2004 - 9/29/2004	H3	Tropical Depression (TD)	20 KT
1997	Danny	7/16/1997- 7/27/1997	H1	Tropical Depression (TD)	20 KT
1977	Babe	9/3/1977- 9/9/1977	H1	Tropical Depression (TD)	25KT
1964	Cleo	8/20/1964- 9/11/1964	H4	Tropical Depression (TD)	25 KT
1928	Unnamed	8/3/1928- 8/13/1928	H2	Extratropical (ET)	30 KT
1916	Unnamed	7/11/1916- 7/15/1916	H3	Tropical Storm (TS)	45 KT
1886	Unnamed	6/17/1886- 6/24/1886	H2	Tropical Storm (TS)	35-40 KT
1882	Unnamed	9/2/1882- 9/13/1882	H3	Tropical Storm (TS)	40 KT
1859	Unnamed	9/15/1859- 9/18/1859	H1	Tropical Storm (TS)	40 KT

Source for map and table: Historic Hurricane Tracks, National Oceanic and Atmospheric Administration

Hurricanes and tropical storms in South Carolina travel near or along the coast and have minimal impact on upland areas such as Union County. Union County is more likely to be impacted by riverine flooding when the hurricane travels over Florida and along the Appalachian Mountains. Water drains from the North Carolina mountains into rivers that flow in South Carolina, which can cause flooding.

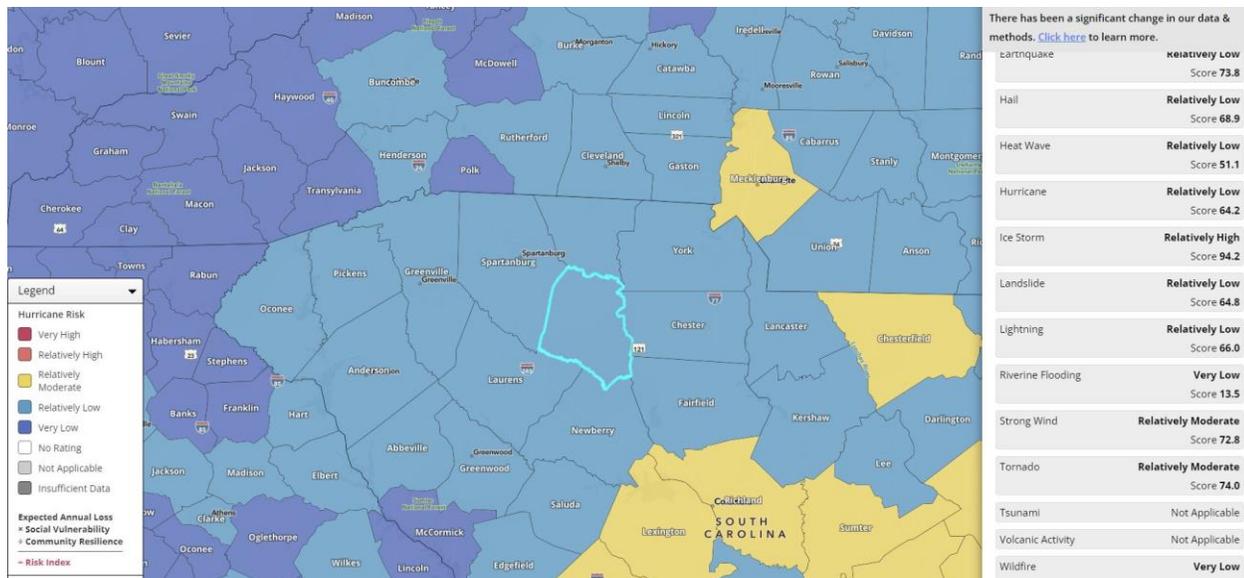
Tornados are another impact of Hurricane / Tropical Storms. Union County is again most impacted when the storm path travels over Florida and up the Appalachian Mountains. Hurricane / Tropical Storm winds can also be damaging. Strong winds can damage electric utility lines, transformers, and other equipment. If damage is widespread throughout the state, electric power can take days to weeks to be restored.

Other Hurricane/Tropical impacts can happen to Union County even when a storm does not travel over South Carolina. South Carolina has a portion of the Colonial Pipeline that travels from Louisiana to North Carolina and Virginia and carries petrol fuel. Louisiana has oil production facilities that send petrol fuel through the Colonial Pipeline. Hurricanes and tropical storms that hit Louisiana can impact the flow of petrol fuel, affecting fuel stations, heating, and business operations. Emergency managers must monitor hurricanes and tropical storms when they can target Louisiana. Hurricane Ike in 2008 and Hurricane Katrina in 2005 impacted fuel supply due to damage to refineries in Louisiana.

Hurricanes can affect the entire Union County planning area.

RISK

According to the FEMA National Risk Index, the overall risk for Hurricanes is Relatively Low for Union County. The National Risk Index score for Hurricanes in Union County is 64.2, and the median score is 52.91 for all hazards. The expected frequency is 0.1 events per year.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

CLIMATE CHANGE

According to the NOAA National Centers for Environmental Information 2022 State Climate Summary for South Carolina, “climate models project not only an increase in the number of Category 4 and 5 hurricanes but also an increase of 20% more rainfall associated with these storms by the end of this century.” This indicates that Union County should prepare for high wind, flooding (flash and riverine flooding), and tornado events associated with hurricanes.

IMPACTS

Hurricane winds can cause widespread destruction; even tropical storm-force winds can be dangerous. High winds from a tropical cyclone can pick up debris and turn items into hazardous projectiles, knock down trees and buildings, and destroy mobile homes. The Saffir-Simpson Scale categorizes hurricane intensity based on sustained wind speeds and correlated potential property damage (NOAA, 2019).

Hurricanes can generate significant rainfall. Slower moving and large storms tend to produce more rain. The size of the storm event, time, weather conditions, and forward speed upon arrival can all play a significant part in flooding events associated with tropical storm events.

Hurricanes and tropical storms may spawn tornadoes, typically away from the system's center and embedded in rain bands that circle the eye. Hurricane-spawned tornadoes have a shorter lifespan than non-tropical tornadoes but can still cause significant damage (Tibbetts, 2002)

In Union County Hurricanes have a very low expected annual loss with \$54,126 out of an exposure of \$3.2 billion.

A significant tropical cyclone would cause major impacts to all community lifelines, as seen in the table below.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	High	Telecommunications and broadband equipment and systems may be damaged by high wind, storm surges, and/or flooding, which would cause communication disruptions or outages. Additional disruption may occur because of power outages. Outages could impact public sector information sharing platforms, dispatch centers, media transmissions, and the financial sector.	Regional
Energy	High	High wind, storm surge, and flooding may damage power generation, transmission, or distribution facilities, equipment, or systems. Fuel stations may	Regional

		be damaged, inaccessible, or without power as a result. Pipelines may be damaged. Control systems may be affected by power or communication outages.	
Food, Water & Shelter	High	Residential structures, particularly near the coast or low-lying areas may be damaged by high wind, storm surge, and/or flooding, resulting in the need for emergency shelter and possibly temporary housing. Local water systems and retailers that supply food may be damaged, without power, or inaccessible. Flooding from tropical cyclones may damage crops. Extended power outages could disrupt food processing and distribution operations.	Regional
Hazardous Materials	High	Hazardous materials storage and transportation equipment and systems may be damaged by high wind, storm surge, and flooding, potentially resulting in release of hazardous materials. Damage to storage containers and transportation infrastructure could cause environmental, human, and animal health risks.	Localized or Regional
Health and Medical	High	Healthcare facilities, particularly in or near coastal or low-lying areas, may be damaged by high winds, storm surge, or flooding and may be affected by power or communication outages. Facilities may be inaccessible because of high water. Hospitals may see an influx of patients and shortages of supplies. Relief staff may be unable to reach medical facilities in heavily impacted areas. Mandatory evacuation of medical facilities pre-storm may be required depending on storm forecast.	Regional or Statewide
Safety and Security	High	Evacuation of low-lying communities may be required for community safety. Response personnel may need to support evacuation and search and rescue activities. Responders may see increased calls for assistance. Response and emergency management agencies may see extended operating/shift periods, and specialized equipment or training may be required.	Regional
Transportation	High	Transportation routes may be altered because of lane reversal to support evacuations, road closures or damage, bridge closures or damage, and/or railway closures or damage. Port and airport operations may be disrupted, and infrastructure may be damaged or destroyed. Disrupted transportation routes may affect supply chains.	Regional

RECOMMENDATIONS

1. Implement recommendations found under flooding, tornado, and high wind.
2. Warn the public through media and other channels about securing fuel for travel, heating, and other needs before a hurricane/ tropical storm hits Louisiana. Encourage businesses to implement work-from-home policies during such events to limit the use of fuel by emergency personnel and companies that require in-person operations.
3. Be prepared for loss of power for days and up to two weeks. FEMA recommends backup generators for critical facilities, as well as critical signalized intersections on truck routes, freight routes, and other highly utilized signalized intersections. Priority for backup generators at critical facilities should start with hospitals, emergency shelters, government emergency (aka 911, fire, police, EMS, etc.), nursing homes, assisted living facilities, critical intersections, gas stations (select one per region, with the remainder of gas stations classified as second-tier critical facilities), and utilities. Second-tier critical facilities include banks, food stores, town halls, schools, and all other remaining critical facilities. Privately owned facilities should be encouraged to secure backup generators at their own expense. Union County and jurisdictions should seek funding to purchase backup generators for publicly owned or nonprofit-owned critical facilities.

CHANGES TO THIS SECTION

- ✓ Added Historical Occurrence subsection
- ✓ Added Location subsection
- ✓ Added Risk Subsection
- ✓ Added Climate Change Subsection
- ✓ Added Impact Subsection
- ✓ Added Recommendation Subsection
- ✓ Added Changes to This Section Subsection

Severe Winter Storms

DESCRIPTION

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, freezing rain and ice pellets, high winds, and extreme cold. Severe winter storms are usually extra-tropical cyclones (storms that form outside of the warm tropics) fueled by strong temperature gradients and an active upper-level cold jet stream. Winter storms can paralyze a community by shutting down normal day-to-day operations, as accumulating snow and ice result in downed trees, power outages, and blocked or hazardous transportation routes. Heavy snow can also lead to the collapse of weak roofs or unstable structures. Frequently, the loss of electric power means loss of heat for residents, which poses a significant threat to human life, particularly older adults.

The level of impact severe winter weather will have upon the community greatly depends on its ability to manage and control its effects, such as the rapid mobilization of snow removal equipment. Many communities are not prepared for severe winter weather due to the rare occurrence of severe winter weather in South Carolina, coupled with the expensive costs to acquire and maintain the necessary resources to combat their effects.

Winter Storm Watches, Warnings, and Advisories

Local National Weather Service Forecast offices issue winter storm watches, warnings, and advisories. A "winter weather advisory" indicates when a significant winter storm or hazardous winter weather is occurring, imminent, and is an inconvenience.

A "WINTER STORM WATCH" indicates significant winter weather (i.e., heavy snow, heavy sleet, significant freezing rain, or a combination of events) is expected, but not imminent, for the watch area and generally provides 12 to 36 hours' notice of the possibility of severe winter weather.

A "WINTER STORM WARNING" indicates a significant winter storm or hazardous winter weather is occurring, imminent, or likely and is a threat to life and property.

A "BLIZZARD WATCH" indicates winds that are at least 35 mph or greater, blowing snow that will frequently reduce visibility to 1/4 mile or less for at least three hours, and dangerous wind chills are expected in the warning area.

The "WIND CHILL INDEX" is a calculation of temperature that takes into consideration the effects of wind and temperature on the human body. The Wind Chill index is not the actual air temperature but what it feels like to the average person.

HISTORICAL OCCURRENCES

Although severe winter storms are typically associated with much colder climates, it is not uncommon

for South Carolina to experience significant, even disastrous, winter weather events. Presidential disasters for winter storms were declared in South Carolina in January 2000, January 2003, February 2004, and February 2014.

There are five (5) winter storms documented between 1996 and 2022.

Union County, SC 1950-2022 Winter Storms										
Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Source
5536746	Union (Zone)		1/7/1996	Winter Storm		0	0	0	0	
Episode Narrative: Rain and freezing rain changed over to snow during the early morning hours with accumulations generally 1 to 3 inches. The snow persisted well into the afternoon. Roads were very hazardous with numerous accidents reported.										
5344824	Union (Zone)		2/16/2003	Winter Storm		0	0	0	0	Law Enforcement
Episode Narrative: A light freezing rain developed across a portion of the upstate South Carolina during the morning hours and began to intensify during the afternoon. By mid-afternoon, a quarter of an inch of glaze had accumulated across much of the area. The precipitation transitioned to mainly sleet during the late afternoon, and by mid evening, up to an inch of sleet had accumulated on top of the glaze of ice. Fallen trees and power lines resulted in widespread power outages across northern Greenville and Pickens Counties. Numerous traffic accidents and road closures resulted from the precipitation, including portions of I-77 in Chester County.										
18711	Union (Zone)		2/1/2007	Winter Storm		0	0	0	0	County Official
Episode Narrative: Precipitation began during the pre-dawn hours as light snow across much of the Upstate. The precipitation became heavy at times around sunrise and began to mix with sleet and freezing rain. By mid-morning, as much as 2 inches of snow had fallen, with light accumulations of sleet reported in some areas. A mix of sleet and freezing rain continued across the Upstate through much of the morning. By mid-morning, up to a quarter inch of ice and as much as half inch of sleet had accumulated on top of the 1-3 inches of snow. By late morning, most of the precipitation had transitioned to rain.										
501136	Union (Zone)		1/12/2014	Winter Storm		0	0	0	0	County Official
Episode Narrative: A Miller type-a low pressure system moved up along the South Carolina coast, bringing widespread snow, which began to change to sleet and freezing rain by late morning. Precipitation eventually changed back to snow before ending during the late morning of the 13 th . Most areas saw 3-6 inches of snow and sleet.										
994414	Union (Zone)		1/16/2002	Winter Storm		0	0	0	0	CoCoRaHS
Episode Narrative: Moisture overspread the South Carolina Piedmont late on the 15 th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied apple cold air for the precipitation to begin as light snow across much of the area, resulting in light snow accumulation of up to a couple of inches during the pre-dawn hours. Slight warming of the air aloft resulted in snow changing to sleet across much of this area by sunrise. By late morning, total snow and sleet accumulations of 2 to 5 inches were reported with locations south of I-85 seeing more sleet. Further warming aloft resulted in precipitation briefly changing to freezing rain before tapering off by early afternoon, with light ice accretion reported on top of the sleet and snow. However, scattered snow showers redeveloped during the afternoon and evening, producing spotty additional light accumulations.										

There are six (6) documented Ice Storm events between 2000 and 2015. None are recorded before 2000 or after 2015.

Union County, SC 1950-2022 Ice Storm Events

Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Source
5680785	Union (Zone)		1/2/1999	Ice Storm		0	0	1,540,000	Law Enforcement
<p>Episode Narrative: A shallow cold arctic airmass in place ahead of a developing storm system in the southern Plains set the stage for a significant ice storm for most of the Upstate during the evening of the 2nd. Patchy sleet began during the late morning and became more widespread and heavier during the afternoon – mixing at times with freezing rain. Sleet accumulated to nearly one inch across the foothills before changing to freezing rain in the early evening. Freezing rain continued through the evening, heavy at times and accumulating to damaging levels. Downed trees and power lines caused widespread power outages, totaling 160,000 across the Upstate. Much of the damage to homes was due to ice damming, and to a lesser extent, fallen trees.</p>									
5129354	Union (Zone)		1/23/2000	Ice Storm		0	0	0	Law Enforcement
<p>Episode Narrative: A cold dome of arctic high pressure centered over the Mid-Atlantic States provided very cold and dry air to Upstate South Carolina. Meanwhile, weak low pressure moved east along a frontal boundary stalled across the Gulf Coast States to the Georgia coast. Abundant moisture flowed north into the sub-freezing air over the Upstate, resulting in light snow as early as the afternoon on the 22nd. Snow became heavy around 6pm, with total accumulations between 4 and 7 inches, across the northern halves of Greenville and Spartanburg counties, Cherokee County, and extreme northern Union County. Across the southern half of the Upstate sleet mixed with the snow toward the evening hours. A gradual mix with and eventual change over to freezing rain occurred between 8pm and midnight. One to 3 inches of snow and sleet fell across the southern half of the Upstate, freezing rain occurred between 8pm and midnight. One to 3 inches of snow and sleet fell across the southern half of the Upstate, before the changeover to freezing rain. Freezing rain lasted all night and through much of the morning on the 23rd. Ice accumulations reached damaging levels around 3 am, causing a large number of trees and power lines to fall throughout the morning. This in turn, resulted in widespread power outages.</p>									
5129511	Union (Zone)		1/29/2000	Ice Storm		0	0	0	Law Enforcement
<p>Episode Narrative: Weakening low pressure in the Ohio River Valley, developing low pressure along the Gulf Coast and cold arctic air in place across the Carolinas resulted in an icy mess across Upstate South Carolina. Precipitation, which briefly began as a light mixture of sleet and snow, quickly turned to freezing rain. By 9pm on the 29th, freezing rain resulted in a glaze of ¼ to ½ inch thick on exposed surfaces. Power outages were common across the region, especially in the Lower Piedmont from Abbeville to Greenwood, where many trees fell and the storm was described as the “worst in 20 years”. Greenville and Pickens Counties did not experience the damaging ice accumulation.</p>									
5326485	Union (Zone)		12/4/2002	Ice Storm		0	0	7,000,000	Law Enforcement
<p>Episode Narrative: Freezing rain began across upstate South Carolina during the early afternoon of the 4th and had spread into the eastern piedmont by midafternoon. Resultant damage due to ice accumulation began during the mid-to-late afternoon. The intensity of the freezing rain increased after midnight, and by dawn on the 5th, devastating ice accumulations of ½ to 1 ½ inches were observed, with the hardest hit areas being along the I-85 corridor, from Anderson, to Greenville-Spartanburg, to Gaffney. Hundreds of thousands lost power, and the outages lasted for as long as 2 weeks in some areas.</p>									
5488730	Union (Zone)		12/15/2005	Ice Storm		0	0	50,000	Emergency Manager
<p>Episode Narrative: Ice Accretion began to cause damage across northern portions of upstate South Carolina just prior to sunrise. By late morning, the ice storm had become quite serious, as thousands of trees fell across the area, and power outages were widespread. Numerous trees and large limbs fell on and damaged homes and vehicles. In Greenville and Spartanburg counties along, around 200,000 customers lost power. Cherokee county reported that ice accumulated to a depth of one half to three quarters of an inch, with the weight of the ice bringing down many power lines. In some areas, it took as much as 5 days to restore electricity. Duke Power estimated costs for overtime and line repair at 72 million dollars for the event in the western Carolinas, though these costs are not reflected in the property damage values for the event above. Despite the devastation, road problems were few and far between, as temperatures hovered right around freezing for most of the event.</p>									
561574	Union (Zone)		2/16/2005	Ice Storm		0	0	1000	Emergency Manager
<p>Episode Narrative: Precipitation that initially began as a mixture of rain and sleet transitioned to freezing rain as temperatures cooled to freezing and below across the southern South Carolina Piedmont. Freezing rain continued through the afternoon and evening, with accumulations primarily confined to elevated surfaces, including trees and power lines. Damaging Ice accumulations were reported by late evening. Widespread ice accretion of one quarter to one half inch was reported, resulting in many trees and power lines falling and numerous to widespread power outages.</p>									

There are ten (10) documented heavy snow events between 2000 and 2011. There are no heavy snow events recorded between 2012 to 2021.

Union County, SC 1950-2022 Snow Events										
Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Source
5129466	Union (Zone)		1/22/2000	Heavy Snow		0	0	0	0	Law Enforcement
<p>Episode Narrative: A cold dome of arctic high pressure centered over the Mid-Atlantic States provided very cold and dry air to Upstate South Carolina. Meanwhile, weak low pressure moved east along a frontal boundary stalled across the Gulf Coast States to the Georgia coast. Abundant moisture flowed north into the sub-freezing air over the Upstate, resulting in light snow as early as the afternoon on the 22nd. Snow became heavy around 6pm, with total accumulations between 4 and 7 inches, across the northern halves of Greenville and Spartanburg Counties, Cherokee County, and extreme northern Union County. Across the southern half of the Upstate sleet mixed with the snow toward the evening hours. A gradual mix with and eventual changeover to freezing rain occurred between 8pm and midnight. One to 3 inches of snow and sleet fell across the southern half of the Upstate, before the changeover to freezing rain. Freezing rain lasted all night and through much of the morning, on the 23rd. Ice accumulations reached damaging levels around 3am, causing a large number of trees and power lines to fall throughout the morning. This in turn, resulted in widespread power outages.</p>										
5130564	Union (Zone)		1/24/2000	Heavy Snow		0	0	0	0	Law Enforcement
<p>Episode Narrative: Low pressure rapidly deepened near the Carolina coast, wrapping abundant moisture back across the piedmont of the Carolinas. Snow fell all day and into the night, heavy at times south and east of a line from Abbeville to Spartanburg to Gaffney. By the time snow ended, accumulation ranged from 4 to 12 inches in a corridor no more than 100 miles wide. A swath of snowfall around 1 foot covered the area from Laurens to Union, including southern Spartanburg County, and portions of York and Chester Counties. Due to the heavy wet snow, numerous power outages occurred. In the City of Clinton along there were 200 to 300 trees downed. Flat roofs and metal buildings collapsed as well. Damage figures were not available at the time of the writing but are estimated to be in the millions of dollars. Light snow fell all day across Anderson and Greenville Counties, with accumulations ranging from a trace to as much as 3 inches in extreme southeastern parts. This storm followed no more than 36 hours after the area received a few inches of snow and damaging ice from a previous storm over the weekend.</p>										
5166406	Union (Zone)		11/19/2000	Heavy Snow		0	0	0	0	Law Enforcement
<p>Episode Narrative: Light to moderate snow started in the mountains and spread southeast, lasting through the day. Generally, 1 to 3 inches of snow fell with the heaviest amounts falling north of Interstate 85.</p>										
5278948	Union (Zone)		1/3/2002	Heavy Snow		0	0	0	0	Newspaper
<p>Episode Narrative: Flurries and light snow began in the early evening on the 2nd and became moderate to heavy by late evening. Heavy snowfall accumulations were reached beginning in total snow accumulations of 3 to 8 inches by mid-morning.</p>										
5340987	Union (Zone)		1/23/2003	Heavy Snow		0	0	0	0	Law Enforcement
<p>Episode Narrative: Light snow began around midnight across upstate South Carolina and continued through the early morning hours. A burst of heavy snow around sunrise resulted in total snow accumulations of 3 to 8 inches by mid-morning.</p>										
5388275	Union (Zone)		2/26/2004	Heavy Snow		0	0	2000	0	Emergency Manager
<p>Episode Narrative: Heavy snow began to fall across much of the Upstate during the late morning. Although snowfall intensity decreased dramatically during the early-to-middle portion of the afternoon, heavy snow redeveloped during the late afternoon, and continued into the evening and overnight hours. Scattered thunderstorms contributed to intense snowfall rates of 2 to 3 inches per hour from time to time, especially in the eastern piedmont, where total snowfall of 12-22 inches occurred, with the axis of heaviest snowfall extending from Rock Hill northeast to the North Carolina border. Thousands of people were stranded on I-77 during the early afternoon, and some required rescue. The weight of this snowfall caused damage to numerous roofs, while some roofs completely collapsed. West of I-26, accumulations were considerably lighter, generally in the 4-8 inch range.</p>										

Union County, SC 1950-2022 Snow Events

Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Source
161412	Union (Zone)		3/1/2009	Heavy Snow		0	0	0	0	County Official
<p>Episode Narrative: Rain changed to snow during the early evening across the northwest Piedmont of South Carolina. Snow became heavy at times throughout the evening, and up to 4 inches had accumulated across the area by 10pm. Snow, heavy at times and accompanied by occasional lightning, continued into the late evening and early overnight. By the time the snow tapered off, accumulation of 3 to 6 inches were common across the area. The heavy wet snow, combined with gusty winds, caused quite a few trees and power lines to fall, resulting in numerous power outages. Some structures received minor to moderate roof damage due to the weight of the snow. Some customers were without power for several days. Numerous traffic accidents also occurred.</p>										
218059	Union (Zone)		2/12/2010	Heavy Snow		0	0	0	0	County Official
<p>Episode Narrative: As low pressure tracked across the northern Gulf of Mexico, light snow developed during the late afternoon across the western half of the Upstate. The snow gradually spread across the rest of the Upstate and northwest Piedmont and became heavier during the early evening hours. By mid-evening, accumulations ranged from around 1 to 4 inches across the area. Numerous traffic accidents occurred during the evening rush. The snow tapered off from southwest to northeast across the region a few hours either side of midnight. Total accumulations ranged from around 3 inches across northern portions of the Upstate, to as much as 5 inches across lower portions of the Upstate.</p>										
272022	Union (Zone)		12/25/2010	Heavy Snow		0	0	0	0	County Official
<p>Episode Narrative: A developing coastal storm brought a mix of light rain and snow to portions of the upstate and northwest piedmont of South Carolina during the Christmas afternoon. By early evening, precipitation had changed to all snow over the Upstate and most areas had experienced a rare white Christmas by late evening. At the Greenville-Spartanburg Airport it was the first whit Christmas since 1962. Over the northwest piedmont precipitation didn't change over to all snow until shortly over midnight. Snow continued to fall steadily throughout Christmas evening, and upstate locations reported heavy snowfall totals by midnight. The northwest piedmont didn't see heavy snow totals until shortly before sunrise. By the time the snow tapered off to flurries and light snow showers on the 26th, 2 to 5 inches had fallen across the area.</p>										
276784	Union (Zone)		1/20/2011	Heavy Snow		0	0	0	0	County Official
<p>Episode Narrative: Moderate to heavy snow associated with a Gulf Coast Storm system spread from south to north across the upstate and northwest piedmont of South Carolina between midnight and 3 am. By sunrise, most areas had received 4 to 6 inches of snow. The snow became lighter after sunrise but continued into the afternoon hours. This added as much as a tenth of an inch of ice to the heavy snowfall totals. Persistent cold temperatures ensured that many roads remained snow-packed, or ice covered for several days. Some schools and businesses remained closed for as much as 5 days.</p>										

There are two documented frost/freeze events. The April 8, 2007, frost/freeze event caused \$1,000,000 worth of crop damage.

Union County, SC 1950-2022 Frost / Freeze Events

Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Source
5389146	Union (Zone)		3/27/2004	Frost/Freeze		0	0	0	0	AWOS
<p>Episode Narrative:</p>										
29665	Union (Zone)		4/8/2007	Frost/Freeze		0	0	0	1,000,000	County Official
<p>Episode Narrative: An early spring hard freeze saw temperatures fall to the upper teens and lower 20s across much of the Western Carolinas and northeastern Georgia on the morning of the 8th. This resulted in massive agricultural losses across the region. It was estimated that 90 percent of the apple and peach crop across the area was destroyed. As much as 50 percent of the berry crop was lost, while more than 50 percent of the grape crop across western North Carolina was damaged.</p>										

There are four (4) documented cold/wind chill events. The March 16, 2017, event had \$50,000,000 worth of crop damage.

Union County, SC 1950-2022 Cold / Wind Chill Events										
Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Source
5541187	Union (Zone)		3/8/1996	Cold/Wind Chill		0	0	0	0	
Episode Narrative: Record cold severely damaged the Upstate peach crop										
5592966	Union (Zone)		4/1/1997	Cold/Wind Chill		0	0	0	0	
Episode Narrative: Several cold snaps following the relatively mild later winter caused low temperatures to dip into the 20s and 30s, likely causing some damage to area crops										
493719	Union (Zone)		1/6/2014	Cold/Wind Chill		0	0	0	0	Official NWS Observations
Episode Narrative: An arctic cold front blasted through the western Carolinas during the morning of the 6 th , bringing gusty winds and the coldest air mass to have affected the regions since 1994. By early evening, winds of 10 to 20 mph, with stronger gusts combined with temperatures falling into the 20s and teens to produce wind chill values below 0 across the South Carolina mountains. Wind chills across the higher elevations likely reached -15 or lower briefly on the night of the 6 th . Although wind gradually diminished overnight, low temperatures on the 7 th ranged from a little below zero above 3000 feet to the single digits across the Piedmont and foothills.										
686195	Union (Zone)		3/16/2017	Cold/Wind Chill		0	0	0	50,000,000	Newspaper
Episode Narrative: The 2017 growing season began early across Upstate South Carolina, due to an unusually warm February and early March that saw average temperatures of almost 10 degrees above normal. An episode of cold arctic high pressure in the middle of March led to a hard freeze on the morning of the 16 th , when low temperatures in the lower to mid-20s were reported. This devastated the peach crop across the Upstate, with crop losses estimated at 80 to 90%. Other crops were damaged as well. While subsequent days of freezing temperatures caused further damage, the vast majority of the damage occurred on the 16 th .										

There are 24 documented winter weather events between 1996 and 2022, with a winter event occurring between 1-2 years on average.

Union County, SC 1950-2022 Winter Weather

Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Source
5535653	Union (Zone)		2/3/1996	Winter Weather		0	0	0	
Episode Narrative: Freezing rain spread into Abbeville, Greenwood, Union and Chester Counties. Some road became icy.									
5536380	Union (Zone)		2/16/1996	Winter Weather		0	0	0	
Episode Narrative: Snow fell for much of the morning accumulating to several inches in some locations.									
5578042	Union (Zone)		12/6/1996	Winter Weather		0	0	0	
Episode Narrative: Icy Roads developed early in the morning following rain the previous day and evening resulting in numerous wrecks with some injuries (indirect)									
5586085	Union (Zone)		1/9/1997	Winter Weather		0	0	0	
Episode Narrative: A light mix of wintry precipitation began during the day near the mountains and gradually increased in intensity. Most precipitation was originally moderate to heavy rain in the piedmont and foothills but changed over to freezing rain, primarily along and north of Interstate 85, as the night wore on. Ice storm conditions developed during the night with a number of downed trees and power lines causing power outages which lasted into the next day. The greatest accumulations of ice were in and near the mountains with significant damage also noted around Anderson, Greenville, and in northern Spartanburg County. Numerous trees continued to fall after the precipitation ended causing enormous work for road crews in Oconee, Pickens, and Greenville counties. Damage could be considerably higher than the amount listed.									
5624689	Union (Zone)		12/29/1997	Winter Weather		0	0	0	
Episode Narrative: Snow spread across the Upstate during the day, accumulating 1-2 inches in the mountains and 1-3 inches across the foothills and piedmont. The one exception being, the northern half of Spartanburg County where up to 6 inches of snow fell. Hundreds of traffic accidents occurred as roads became very slick, resulting in numerous injuries. One woman died (indirect) in a weather-related car accident in Rock Hill. Scattered power outages occurred as well.									
5628797	Union (Zone)		1/19/1998	Winter Weather		0	0	0	
Episode Narrative: A wet snow fell at a pretty good clip for a few hours in the morning. Accumulations were between 1 and 3 inches, but temperatures just above freezing precluded the development of any serious travel problems.									
5241418	Union (Zone)		4/17/2001	Winter Weather		0	0	0	Newspaper
Episode Narrative: A strong Arctic high pressure system built over the deep South at mid-month, producing not only record cold temperatures for this time of year, but also contributing to records for late season snowfall at some locations as a potent upper-level disturbance affected the region later in the day. With a tight pressure gradient in place, winds gusted as high as 55 mph at some foothill and piedmont locations.									
5383305	Union (Zone)		1/27/2004	Winter Weather		0	0	0	Law Enforcement
Episode Narrative: A light freezing rain developed during the early morning hours of the 27th across much of the Upstate. This added another layer of glaze to the mixture of sleet and ice that was already present. Hundreds of traffic accidents occurred overnight and into the morning rush hour. Many of the accidents involved injuries and some fatalities. The ice was slow to melt, and traffic accidents continued for another 2 days.									
5436285	Union (Zone)		1/29/2005	Winter Weather		0	0	0	Emergency Manager
Episode Narrative: Light precipitation, mainly in the form of sleet, developed during the pre-dawn hours across eastern portions of the Upstate, and continued through the morning hours, before changing to freezing rain and rain during the afternoon. Total accumulations of ice and sleet were generally around 1/4 inch across the area. This resulted in slick roads and several accidents.									
5488253	Union (Zone)		12/15/2005	Winter Weather		0	0	0	Emergency Manager
Episode Narrative:									
13533	Union (Zone)		1/18/2007	Winter Weather		0	0	0	Emergency Manager
Episode Narrative: Widespread light precipitation, mainly in the form of freezing rain, produced light ice accretion, mainly across the foothills and piedmont during the morning hours. Accretion was mainly confined to elevated surfaces, although some slick spots developed on bridges and overpasses.									

Union County, SC 1950-2022 Winter Weather

Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Source
151810	Union (Zone)		1/20/2009	Winter Weather		0	0	0	County Official
<p>Episode Narrative: Snow developed across Upstate South Carolina, generally in areas along and east of highway 25. The snow continued through the overnight hours before tapering off during the morning. Total snowfall accumulations ranged from trace amounts across central portions of the Upstate to 3 inches near Rock Hill.</p>									
213348	Union (Zone)		1/29/2010	Winter Weather		0	0	0	County Official
<p>Episode Narrative: Precipitation began as light snow early in the evening across northern portions of the Upstate. By late evening, snow had mostly changed to sleet, except in areas along the North Carolina border. By the pre-dawn hours, total accumulations ranged from trace amounts of sleet near the I-85 corridor, to as much as 4 inches of snow along the North Carolina border. The wintry mix persisted across northern portions of the Upstate overnight. In most areas, accumulations of 1-2 inches of sleet and snow (mainly sleet) occurred, with a tenth to a quarter inch glaze of ice occurring on top of the sleet and snow. However, a small area of northern Spartanburg County saw more in the way of snow, generally 4-6 inches. Also, a small area of heavy ice accumulation occurred over the mountains of Greenville County, resulting in numerous downed trees and power outages. Farther to the south, mixture of rain, snow, and sleet developed over the southern part of the Upstate and the northwest Piedmont of South Carolina. The precipitation continued off and on through the overnight, before changing to light rain or freezing rain during the morning of the 30th. Total sleet and snowfall accumulation ranged from trace amounts over the lower piedmont to a half inch closer to I-85. Light ice accretion occurred on the 30th, mainly on elevated surfaces.</p>									
220775	Union (Zone)		3/2/2010	Winter Weather		0	0	0	County Official
<p>Episode Narrative: Snow, mixed with rain at times, developed over the piedmont and foothills of South Carolina around sunrise. Despite bursts of moderate to heavy snow, a warm ground and above freezing temperatures caused much of the snow to melt upon impact. As a result, accumulations were light, ranging from trace amounts across southern piedmont areas, to an inch or so along the I-85 corridor.</p>									
429318	Union (Zone)		1/25/2013	Winter Weather		0	0	0	County Official
<p>Episode Narrative: Light sleet developed across much of the western Carolinas and northeast Georgia during the morning. The intermittent sleet eventually changed to light freezing rain in most areas by late afternoon. Most areas north of the I-85 corridor saw measurable sleet, generally less than a quarter inch. A light glaze then fell on top of that, making for treacherous driving conditions during the afternoon. Most areas south of the I-85 corridor saw only trace accumulations, but that was enough to cause plenty of slick spots. Hundreds of accidents were reported across the area, especially along the I-85 corridor.</p>									
436091	Union (Zone)		2/16/2013	Winter Weather		0	0	0	Public
<p>Episode Narrative: Snow showers increased in coverage and intensity as they moved out of the foothills into the Piedmont during mid-afternoon. Snowfall rates of 1 to 2 inches per hour were common, especially near the North Carolina/South Carolina border. Occasional thunder and lightning were also observed in these areas. Despite the brief nature of the snowfall, widespread accumulations of 2 to 3 inches were seen across the area.</p>									
493806	Union (Zone)		1/28/2014	Winter Weather		0	0	0	County Official
<p>Episode Narrative: Light snow developed over the Piedmont and foothills of the Western Carolinas during the afternoon and continued into the evening before tapering off. The snow initially melted on roads. However, air temperatures rapidly cooling into the 20s caused many roads to subsequently freeze. Although snowfall totals were light (1 to 2 inches or less in most areas), the slick roads caused hundreds of traffic accidents.</p>									
501118	Union (Zone)		2/11/2014	Winter Weather		0	0	0	County Official
<p>Episode Narrative: Light to occasionally moderate snow began to overspread the Upstate South Carolina around daybreak and continued off and on through the day. By mid-evening, total accumulations ranged from 1 to 3 inches across much of the area, although isolated 4-inch amounts were reported. Warm road temperatures yielded little in the way of travel problems.</p>									
561789	Union (Zone)		2/23/2015	Winter Weather		0	0	0	COOP Observer
<p>Episode Narrative: Light snow associated with a wave of low pressure overspread the foothills and Piedmont of the Carolinas by late evening of the 23rd, and continued through the overnight before tapering off during the morning of the 24th. Accumulations ranged from a dusting to 2 inches, with the highest amounts generally occurring closer to the mountains. Temperatures right around freezing and warm roads resulted in minimal travel issues.</p>									

Union County, SC 1950-2022 Winter Weather

Event ID	CZ Name STR	Begin Location	Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Source
675139	Union (Zone)		1/7/2017	Winter Weather		0	0	0	CoCoRAHS
Episode Narrative: As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread the Piedmont throughout the 6th. Most of the precipitation fell as rain south of the I-85 corridor. However, as cold air gradually spilled in from the north, a transition to mainly sleet with some pockets of freezing rain occurred. By mid-morning on the 7th, locations close to the I-85 corridor had up to a half inch of mainly sleet, while some locations saw a light glaze of ice, mainly on elevated surfaces.									
684890	Union (Zone)		3/12/2017	Winter Weather		0	0	0	CoCoRaHS
Episode Narrative: An upper-level disturbance interacting with an unseasonably cold air mass resulted in an area of snow that moved quickly across portions of Upstate South Carolina during the morning of the 12th. Precipitation began as rain in many areas, but quickly changed to snow. Most locations saw total snowfall accumulation from a dusting to less than two inches. However, some locations across the eastern Piedmont saw up to 3 inches.									
728298	Union (Zone)		1/17/2018	Winter Weather		0	0	0	CoCoRAHS
Episode Narrative: As a strengthening upper-level disturbance and associated cold front approached the region from the Tennessee Valley, light precipitation developed across the Piedmont of South Carolina during the early morning hours. While the precipitation started as rain or a rain/snow mix in most areas, a transition to snow had occurred in most locations by mid-morning. By the time the snow tapered off during the afternoon, total accumulations generally ranged from around a half inch to near 2 inches, with some locally higher amounts reported near the North Carolina border.									
816794	Union (Zone)		4/2/2019	Winter Weather		0	0	0	CoCoRAHS
Episode Narrative: Moisture associated with an area of low pressure developing off the southeast coast overspread an unseasonably cool air mass over the Piedmont during the morning hours. Precipitation initially fell as a mix of rain and snow. However, pockets of snow developed in association with heavier precipitation rates. This resulted in some areas of accumulation, mainly from trace amounts up to 1 inch. Despite warm pavement, snowfall rates were such that snow accumulated on some roadways, resulting in slick spots.									
1002162	Union (Zone)		1/21/2022	Winter Weather		0	0	0	CoCoRAHS
Episode Narrative: Moisture overspread the South Carolina Piedmont during the evening of the 21st as low pressure developed off the Southeast Coast. Light precipitation developed as a result, with enough cold air in place to allow much of the precipitation to fall as light snow. By the time the snow tapered off around midnight, 1 to 2 inches had accumulated across much of the area, with locally higher amounts of a round 3 inches closer to I-77.									

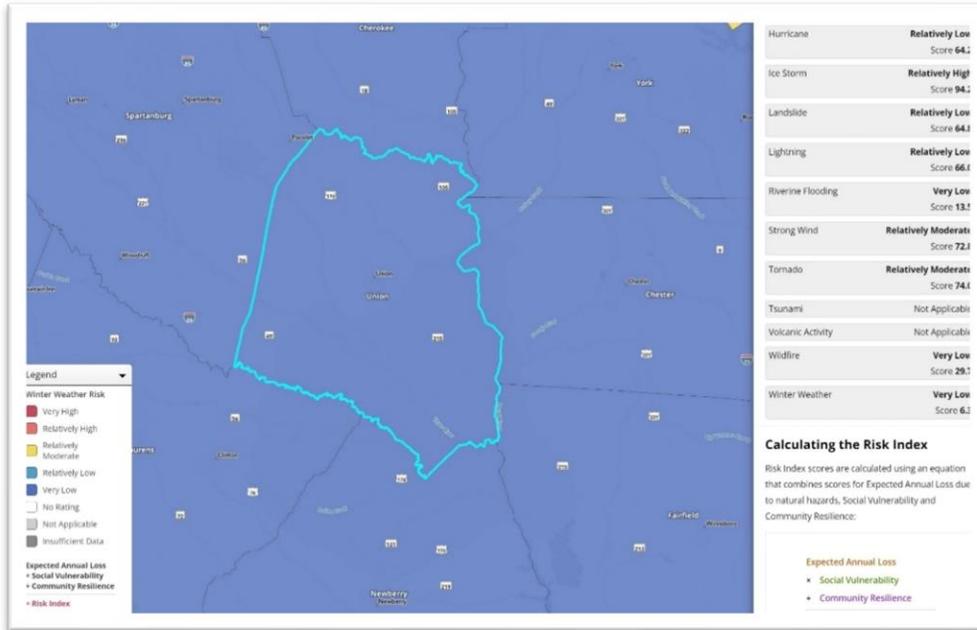
LOCATION

The Upstate Region of South Carolina has the highest number of winter storm occurrences. Union County is in the Upstate region. Winter storm events can affect the entire Union County planning area. Winter storm events affect relatively large areas and can last hours to days.

RISK

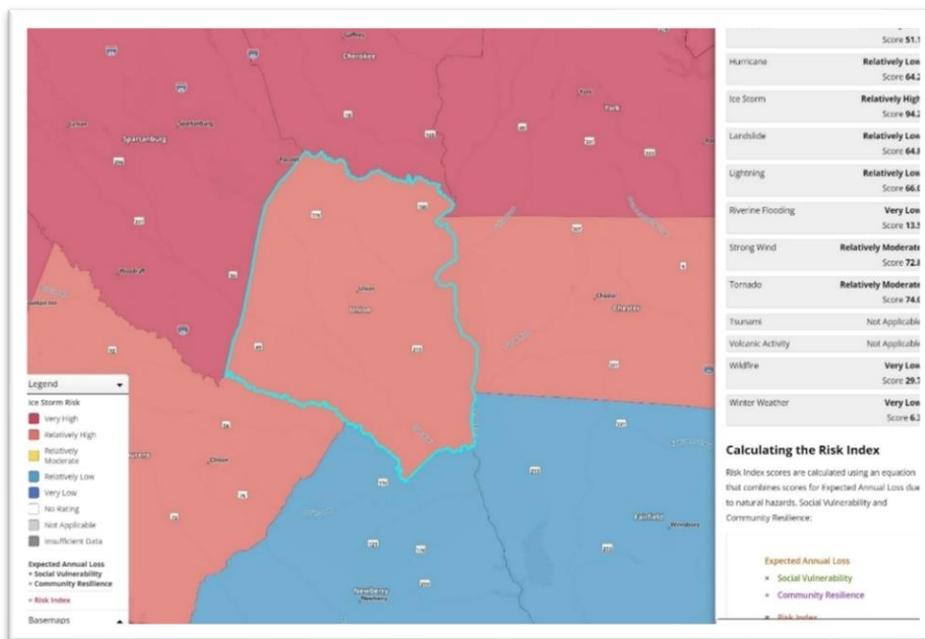
According to the FEMA National Risk Index, the overall risk for Winter Weather is very low for Union County. The National Risk Index score for Winter Weather in Union County is 6.3, where the median score is 52.91 for all hazards.

The expected frequency of Winter Weather is 1.7 events per year. The expected annual loss is \$9.2 thousand out of an exposure of \$97 Billion.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

The FEMA National Risk Index identifies Ice Storms as a separate natural disaster. According to the FEMA National Risk Index, the overall risk for Ice Storms is Relatively High for Union County. The National Risk Index score for Ice Storms in Union County is 94.2, and the median score is 52.91 for all hazards. The expected frequency for Ice Storms is 2 events per year. The expected annual loss is \$0.82 Million out of an exposure of \$0.32 Trillion.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

CLIMATE CHANGE

According to the South Carolina 2023 Hazard Mitigation Plan, future trends for winter weather point to warmer temperatures and a decrease in cold weather extremes. The average annual temperature has increased between 1.2°-1.8° F since 1901 (the variance is because of the temperature analysis computed method used). Since the early 1900s, recorded cold waves have decreased for the contiguous United States. Future climate projections indicate an increase of around 2.5°F over 30 years. As a result of warming conditions, the annual number of days below freezing will continue to decline. The frequency and intensity trends in winter storms remain uncertain because of conflicting climate model outputs. With the uncertainty surrounding the near- and long-term climate, SC climatologists have determined that current projections will change over time.

IMPACTS

Winter weather can have significant impacts on community lifelines, particularly infrastructure that is not hardened or protected or otherwise prepared. The table below identifies the community lifeline areas of high impact.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	Telecommunications and broadband equipment, lines, and systems may be damaged by ice or snow accumulations or other storm-related conditions, resulting in disruption of service. Extended power outages may lead to additional communications disruptions.	Regional
Energy	High	Power transmission and distribution equipment, lines, and systems may be damaged by ice or snow accumulations or other storm-related conditions, resulting in power outages. Fuel stations may be inaccessible or inoperable.	Regional
Food, Water & Shelter	High	Winter weather conditions may damage water systems and residential and food storage/retail structures. Residents in homes with damage or inadequate heat may require emergency shelter. Food suppliers/retailers may be closed or inaccessible because of snow or ice accumulations on roadways or because of power outages, which may result in food spoilage. Freezing temperatures and winter weather conditions may damage crops or livestock. Extreme cold may lead to loss of water supply due to broken pipes.	Regional or Statewide

Hazardous Materials	Low	Significant impacts are not anticipated other than potential structural or equipment damage from freezing temperatures or ice/ snow accumulation. Freezing temperatures and winter weather conditions can damage fittings and valves associated with hazardous material storage and transport, which could cause a release.	Localized
Health and Medical	High	Winter weather conditions may damage healthcare facilities or make them inaccessible via roadway. Power outages may cause disruptions in critical services and require backup/alternate systems or resources. Conditions may create challenges for medical staff travel to facilities or locations where medical assistance is needed. Road and sidewalk conditions, freezing temperatures, and snow accumulations may cause an increase in the number of patients seeking emergency care.	Localized or Regional
Safety and Security	Medium	Winter weather conditions may damage response agency facilities and equipment or make them inaccessible. Communication and power outages may cause disruptions in critical services and require backup/alternate systems or resources. Personnel may experience increased risk in responding to emergency calls for assistance because of weather conditions, and conditions may create challenges for responders trying to reach locations where assistance is needed.	Localized or Regional
Transportation	High	Winter weather conditions may make paved surfaces impassable or unsafe, resulting in inaccessibility or closures, which will cause transportation and supply chain disruptions. Frozen precipitation may disable or damage transportation infrastructure and equipment or require operational delays for human safety and/or property or system protection.	Regional

RECOMMENDATIONS:

1. Educate and encourage farmers to purchase Crop Insurance.
2. Educate the public about staying safe during a winter storm and preparing beforehand.
3. Provide shelters with backup generators to provide a place to warm up during power losses.
4. Educate the public about preventing water pipe breaks during winter storm events through radio and other media sources, social media posts, and emergency management email blasts. Extreme cold may cause water pipes to freeze and burst, which can cause flooding inside a building.

- Educate homeowners and builders on how to protect their pipes, including locating water pipes on the inside of building insulation or keeping them out of attics, crawl spaces, and vulnerable outside walls. For pipes in garages, crawl spaces, attics, and outdoor utility closets/sheds, educate the public to insulate water pipes with foam insulation or pipe jacketing.
 - Educate the public about winterizing outdoor facets and insulating with insulated facet covers.
 - Informing homeowners about letting a faucet drip during extreme cold weather can prevent the buildup of excessive pipeline pressure and bursting pipes.
5. Educate the public about utility assistance programs such as the South Carolina Low Income Home Energy Assistance Program (LIHEAP) and the South Carolina Weatherization Assistance Program (WAP). The South Carolina Energy Saver program informs the public about incentive programs offered by the federal government and utility companies to upgrade equipment to be more energy efficient. The following utility companies have Energy Assistance programs: Duke Energy and Dominion Energy.
6. Assist vulnerable populations by providing a voluntary Emergency Management Registration form for older adults, individuals with special medical needs, people experiencing homelessness, and other vulnerable populations that require special assistance during a winter storm event and other hazards. Update this list on an annual basis.

CHANGES TO THIS SECTION

- ✓ Updated Historic Occurrences subsection to include the latest data
- ✓ Added Location Subsection
- ✓ Added Risk Subsection
- ✓ Added Climate Change Subsection
- ✓ Added Impact Subsection
- ✓ Added Recommendation Subsection

SEVERE THUNDERSTORMS, HAIL, & LIGHTNING

DESCRIPTION

Severe thunderstorms are defined by the National Weather Service as storms that have wind speeds of 58 miles per hour or higher produce hail at least three-quarters of an inch in diameter or produce tornadoes. Thunderstorms require moisture to form clouds and rain, coupled with an unstable mass of warm air that can rise rapidly.

Thunderstorms affect relatively small areas compared to hurricanes and winter storms, as the average storm is 15 miles in diameter and lasts an average of 30 minutes. Nearly 1,800 thunderstorms are occurring at any moment around the world. However, of the estimated 100,000 thunderstorms that occur each year in the United States, only 10 percent are classified as severe.

Thunderstorms are most likely to happen in the spring and summer months and during the afternoon and evening hours but can occur year-round and at all hours. Despite their small size, all thunderstorms are dangerous and can threaten life and property in localized areas. Every thunderstorm produces lightning, which results from the buildup and discharge of electrical energy between positively and negatively charged areas. Annually, lightning is responsible for an average of 93 deaths (more than tornadoes), 300 injuries, and several hundred million dollars in damage to property and forests.

Thunderstorms can also produce large, damaging hail, which causes nearly \$1 billion in damage to property and crops annually. Straight-line winds, which can potentially exceed 100 miles per hour in extreme cases, are responsible for most thunderstorm wind damage. One type of straight-line wind, the downburst, can cause damage equivalent to a strong tornado and is extremely dangerous to aviation. Thunderstorms can also produce tornadoes and heavy rain that can lead to flash flooding.

Severe Thunderstorm Warnings and Watches

Severe refers to hail that is dime size, 0.75 inches in diameter or larger and/or wind gusts of 58 mph or more. Although lightning can be deadly, it is not a criterion for what the National Weather Service defines as severe since any ordinary thunderstorm can produce a lot of lightning. Also, excessive rainfall may lead to flash flooding, but heavy rain is not a criterion for the term severe. Severe strictly refers to hail at least 3/4 of an inch in diameter or wind gusts of at least 58 mph.

A “SEVERE THUNDERSTORM WATCH” is issued by the National Oceanic and Atmospheric Administration’s (NOAA) Storm Prediction Center and indicates to the public that the potential exists for the development of thunderstorms which may produce large hail or damaging winds.

A “SEVERE THUNDERSTORM WARNING” is issued by local offices of the National Weather Service and indicates that a severe thunderstorm is occurring or is imminent based on Doppler radar information.

HISTORICAL OCCURRENCES

Severe thunderstorms are relatively common in South Carolina, but only a small percentage cause damage. Thunderstorms can produce lightning, hail, and powerful thunderstorm winds.

NOAA’s National Weather Service defines lightning as a visible electrical discharge produced by a thunderstorm. Electrical discharge may occur within or between clouds, between the cloud and air, between a cloud and ground, or between the ground and a cloud.

According to the Federal Emergency Management Agency (FEMA), lightning is a discharge of electrical energy that results from the buildup of positive and negative charges in a thunderstorm, which creates a “bolt” when the buildup of charges becomes strong enough. Lightning strikes in the United States, on average, kill 55 people and injure hundreds. Lightning can strike communication equipment (e.g., radio and cell towers, antennae, satellite dishes, etc.) and hamper communication and emergency response. Lightning strikes can also cause significant damage to buildings, critical facilities, and infrastructure, mainly by igniting a fire. Lightning can also ignite wildfires.

According to the National Centers for Environmental Information National Oceanic and Atmospheric Administration Storm Events Database, there were a total of 8 Lightning events recorded from 1960 to 2022, resulting in \$135,000 in property damages, with one (1) injured and one (1) death.

Union County Lightning Events								
Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
7/23/1997	Lightning		0	0	10,000	0	Union	
4/3/1998	Lightning		0	0	20,000	0	Union	
6/10/1999	Lightning		0	0	5000	0	Buffalo	Newspaper
7/3/2001	Lightning		0	0	50,000	0	Jonesville	Emergency Manager
7/1/2002	Lightning		0	0	5000	0	Cross Keys	General Public
6/11/2009	Lightning		0	0	45000	0	Union	Newspaper
6/21/2011	Lightning		0	1	0	0	Johns	Trained Spotter
9/1/2013	Lightning		1	0	0	0	Union	Newspaper
Total:			1	1	135000	0		

FEMA’s National Risk Index has noted 1,313 lightning events between 1991 and 2021 (12 years) for an annualized frequency of 59.7 yearly events.

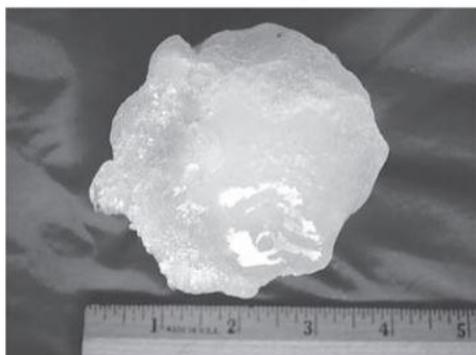
NOAA’s National Weather Service defines hail as a form of precipitation consisting of solid ice that forms inside thunderstorm updrafts. Hail can damage aircraft, homes, and cars and can be deadly to livestock and people.

Thunderstorms form hailstones when raindrops are carried upward by updrafts into cold areas of the atmosphere and freeze. Hailstones then grow by colliding with liquid water drops that freeze on the hailstone’s surface. Cloudy ice forms when water instantaneously freezes when colliding with the hailstone and traps air bubbles in the newly formed ice. However, if the water freezes slowly, the air bubbles can escape, and the new ice will be clear. The hail falls when the thunderstorm’s updraft can no longer support the weight of the hailstone, which can occur if the stone becomes large enough or the updraft weakens.

Hail can cause substantial damage to vehicles, roofs, landscaping, and other areas of the built environment. U.S. agriculture is typically the area most affected by hailstorms, which cause severe crop damage even during minor events.

How to Measure Hail

■ The **Torro Hailstorm Intensity Scale** was introduced by Jonathan Webb of Oxford, England, in 1986 as a means of categorizing hailstorms. The name derives from the private and mostly British research body named the TORnado and storm Research Organisation.



INTENSITY/DESCRIPTION OF HAIL DAMAGE

- H0** True hail of pea size causes no damage
- H1** Leaves and flower petals are punctured and torn
- H2** Leaves are stripped from trees and plants
- H3** Panes of glass are broken; auto bodies are dented
- H4** Some house windows are broken; small tree branches are broken off; birds are killed
- H5** Many windows are smashed; small animals are injured; large tree branches are broken off
- H6** Shingle roofs are breached; metal roofs are scored; wooden window frames are broken away
- H7** Roofs are shattered to expose rafters; cars are seriously damaged
- H8** Shingle and tile roofs are destroyed; small tree trunks are split; people are seriously injured
- H9** Concrete roofs are broken; large tree trunks are split and knocked down; people are at risk of fatal injuries
- H10** Brick houses are damaged; people are at risk of fatal injuries

The FEMA National Risk Index identifies 202 recorded hail events between 1986 and 2021 (34 years) with an annualized frequency of 5.9 yearly events. According to the National Centers for Environmental Information National Oceanic and Atmospheric Administration Storm Events Database, there were a total of 95 hail events recorded from 1960 to 2022, resulting in \$550,000 in property damages with no injuries and no deaths. (These events do not include tornadoes. The Tornado section lists tornado events and data). The most damaging hailstorm occurred in Union, with an intensity score of 3 on May 23, 2014. It caused \$250,000 worth of damage.

Union County Hail Events								
Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
6/11/1963	Hail	1.5	0	0	0	0		
12/26/1964	Hail	2	0	0	0	0		
6/6/1985	Hail	1.5	0	0	0	0		
6/7/1985	Hail	1	0	0	0	0		
5/17/1988	Hail	1.75	0	0	0	0		
5/17/1988	Hail	1.75	0	0	0	0		
5/17/1988	Hail	1.75	0	0	0	0		
5/24/1988	Hail	0.75	0	0	0	0		
5/28/1990	Hail	1	0	0	0	0		
6/21/1992	Hail	2	0	0	0	0		
6/26/1992	Hail	0.75	0	0	0	0		
5/3/1994	Hail	0	0	0	0	0	Union	
6/4/1994	Hail	2.75	0	0	50000	0	Jonesville	
5/15/1995	Hail	1.75	0	0	0	0	Pauline	
5/15/1995	Hail	1.75	0	0	0	0	Buffalo	
5/15/1995	Hail	0.88	0	0	0	0	Union and	
5/27/1995	Hail	0.75	0	0	0	0	Union	
3/16/1996	Hail	0.75	0	0	0	0	SEDALIA	
5/24/1996	Hail	1	0	0	0	0	UNION	
5/29/1996	Hail	1	0	0	0	0	UNION	
5/29/1996	Hail	1	0	0	0	0	ADAMSBURG	
5/29/1996	Hail	1.75	0	0	0	0	LOCKHART	
5/29/1996	Hail	0.88	0	0	0	0	JONESVILLE	
5/29/1996	Hail	1	0	0	0	0	LOCKHART	
7/26/1996	Hail	0.75	0	0	0	0	UNION	
3/29/1997	Hail	1	0	0	0	0	JONESVILLE	
4/22/1997	Hail	0.75	0	0	0	0	UNION	
4/22/1997	Hail	1	0	0	0	0	CARLISLE	

Union County Hail Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
6/2/1997	Hail	0.75	0	0	0	0	CARLISLE	
6/2/1997	Hail	1.75	0	0	0	0	JONESVILLE	
6/6/1998	Hail	1.75	0	0	0	0	JONESVILLE	TRAINED SPOTTER
6/6/1998	Hail	2.75	0	0	0	0	CARLISLE	TRAINED SPOTTER
6/24/1998	Hail	1	0	0	0	0	JONESVILLE	AMATEUR RADIO
4/27/1999	Hail	1.75	0	0	0	0	LOCKHART	GENERAL PUBLIC
5/13/1999	Hail	1	0	0	0	0	JONESVILLE	TRAINED SPOTTER
7/5/1999	Hail	0.75	0	0	0	0	UNION	EMERGENCY MANAGER
5/25/2000	Hail	1.75	0	0	0	0	UNION	LAW ENFORCEMENT
5/25/2000	Hail	1.75	0	0	0	0	JONESVILLE	LAW ENFORCEMENT
5/25/2000	Hail	1.75	0	0	0	0	UNION	TRAINED SPOTTER
5/12/2001	Hail	0.75	0	0	0	0	UNION	TRAINED SPOTTER
8/31/2001	Hail	1	0	0	0	0	UNION	LAW ENFORCEMENT
3/17/2002	Hail	0.75	0	0	0	0	JONESVILLE	FIRE DEPT/ RESCUE SQUAD
3/31/2002	Hail	1	0	0	0	0	MONARCH MILLS	GENERAL PUBLIC
2/22/2003	Hail	0.75	0	0	0	0	UNION	LAW ENFORCEMENT
5/22/2004	Hail	0.75	0	0	0	0	BUFFALO	TRAINED SPOTTER
6/4/2004	Hail	1	0	0	0	0	CARLISLE	TRAINED SPOTTER
1/13/2005	Hail	0.88	0	0	0	0	UNION	LAW ENFORCEMENT
5/10/2005	Hail	1.75	0	0	0	0	UNION	EMERGENCY MANAGER
6/27/2005	Hail	0.75	0	0	0	0	SEDALIA	LAW ENFORCEMENT
1/2/2006	Hail	0.75	0	0	0	0	JONESVILLE	GENERAL PUBLIC

Union County Hail Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
4/22/2006	Hail	0.75	0	0	0	0	BUFFALO	TRAINED SPOTTER
4/26/2006	Hail	0.75	0	0	0	0	CROSS KEYS	PARK/FOREST SERVICE
5/5/2006	Hail	1.75	0	0	0	0	BUFFALO	TRAINED SPOTTER
5/5/2006	Hail	0.88	0	0	0	0	UNION	GENERAL PUBLIC
6/12/2006	Hail	1	0	0	0	0	UNION	TRAINED SPOTTER
4/14/2007	Hail	1	0	0	0	0	UNION	COOP Observer
8/22/2007	Hail	1.75	0	0	0	0	UNION	Emergency Manager
3/15/2008	Hail	0.88	0	0	0	0	JONESVILLE	Trained Spotter
4/27/2008	Hail	0.75	0	0	0	0	LOCKHART JCT	Public
5/9/2008	Hail	0.88	0	0	0	0	UNION	County Official
7/6/2008	Hail	0.88	0	0	0	0	ADAMSBURG	Public
7/21/2008	Hail	0.88	0	0	0	0	CROSS KEYS	Emergency Manager
8/2/2008	Hail	0.75	0	0	0	0	LOCKHART JCT	Fire Department/Rescue
5/5/2009	Hail	1.75	0	0	0	0	CROSS KEYS	Fire Department/Rescue
5/6/2009	Hail	1.75	0	0	0	0	CROSS KEYS	Fire Department/Rescue
6/12/2009	Hail	0.75	0	0	0	0	ROBAT	Utility Company
6/18/2009	Hail	0.75	0	0	0	0	CROSS KEYS	County Official
7/27/2009	Hail	0.75	0	0	0	0	SANTUC	Public
7/28/2009	Hail	0.75	0	0	0	0	JONESVILLE	Broadcast Media
3/28/2010	Hail	1	0	0	0	0	UNION	Fire Department/Rescue
3/28/2010	Hail	0.88	0	0	0	0	JOHNS	Fire Department/Rescue

Union County Hail Events								
Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
8/7/2011	Hail	1	0	0	0	0	BONHAM	Fire Department/Rescue
8/14/2011	Hail	0.75	0	0	0	0	MEAN XRDS	Trained Spotter
3/2/2012	Hail	1	0	0	0	0	SANTUC	Public
3/24/2012	Hail	1	0	0	0	0	SANTUC	Trained Spotter
3/24/2012	Hail	1.25	0	0	0	0	NEAL SHOALS	Trained Spotter
4/5/2012	Hail	1.75	0	0	0	0	BONHAM	Fire Department/Rescue
4/5/2012	Hail	1	0	0	0	0	LOCKHART	Trained Spotter
4/5/2012	Hail	1.25	0	0	0	0	UNION	Fire Department/Rescue
6/26/2013	Hail	1	0	0	0	0	CARLISLE	Public
5/23/2014	Hail	1	0	0	0	0	JONESVILLE	Fire Department/Rescue
5/23/2014	Hail	1.75	0	0	250000	0	UNION	Trained Spotter
5/23/2014	Hail	3	0	0	250000	0	UNION	911 Call Center
6/11/2014	Hail	0.75	0	0	0	0	ROPERX XRDS	Trained Spotter
4/7/2015	Hail	1.75	0	0	0	0	NEAL SHOALS	Trained Spotter
4/20/2015	Hail	1	0	0	0	0	UNION	Public
4/20/2015	Hail	1	0	0	0	0	UNION	Public
6/17/2016	Hail	0.75	0	0	0	0	SANTUC	Public
6/17/2016	Hail	1	0	0	0	0	CARLISLE	Post Office
6/16/2018	Hail	0.75	0	0	0	0	UNION	911 Call Center
6/22/2019	Hail	1.5	0	0	0	0	ADA	Social Media
5/5/2020	Hail	1.5	0	0	0	0	LOCKHART	COOP Observer
3/25/2021	Hail	1	0	0	0	0	SANTUC	Public
5/6/2022	Hail	0.75	0	0	0	0	UNION	911 Call Center
Total:			0	0	550000	0		

According to the National Centers for Environmental Information National Oceanic and Atmospheric Administration Storm Events Database, there were 196 thunderstorm wind events recorded from 1960 to 2022, resulting in \$362,000 in property damages with one (1) injured and no deaths. (These events do not include tornadoes).

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
3/18/1961	Thunder storm Wind	0	0	0	0	0		
12/26/1964	Thunder storm Wind	0	0	0	0	0		
11/21/1965	Thunder storm Wind	0	0	0	0	0		
11/21/1973	Thunder storm Wind	0	0	0	0	0		
9/2/1974	Thunder storm Wind	0	0	0	0	0		
1/25/1975	Thunder storm Wind	0	0	0	0	0		
3/24/1975	Thunder storm Wind	0	0	0	0	0		
7/10/1980	Thunder storm Wind	50	0	0	0	0		
8/12/1982	Thunder storm Wind	0	0	0	0	0		
3/28/1984	Thunder storm Wind	0	0	0	0	0		
4/5/1985	Thunder storm Wind	0	0	0	0	0		
6/5/1985	Thunder storm Wind	0	0	0	0	0		
6/6/1985	Thunder storm Wind	0	0	0	0	0		
7/22/1985	Thunder storm Wind	0	0	0	0	0		
5/24/1988	Thunder storm Wind	0	0	0	0	0		
4/4/1989	Thunder storm Wind	0	0	0	0	0		
5/5/1989	Thunder storm Wind	0	0	0	0	0		
6/5/1989	Thunder storm Wind	0	0	0	0	0		
8/17/1989	Thunder storm Wind	0	0	0	0	0		
8/23/1989	Thunder storm Wind	0	0	0	0	0		
4/29/1991	Thunder storm Wind	0	0	0	0	0		
6/17/1991	Thunder storm Wind	0	0	0	0	0		
6/21/1992	Thunder storm Wind	0	0	0	0	0		

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
6/21/1992	Thunder storm Wind	0	0	0	0	0		
7/22/1992	Thunder storm Wind	0	0	0	0	0		
5/25/1993	Thunder storm Wind	0	0	0	50000	0	Union	
4/15/1994	Thunder storm Wind	0	0	0	0	0	near Carlisle	
6/4/1994	Thunder storm Wind	0	0	0	5000	0	Herbert near	
6/26/1994	Thunder storm Wind	0	0	0	0	0	Jonesville	
6/26/1994	Thunder storm Wind	0	0	0	0	0	Union	
6/28/1994	Thunder storm Wind	0	0	0	0	0	Carlisle	
7/21/1994	Thunder storm Wind	0	0	0	0	0	Union	
6/21/1995	Thunder storm Wind	0	0	0	0	0	Seneca	
6/21/1995	Thunder storm Wind	0	0	0	0	0		
3/15/1996	Thunder storm Wind		0	0	0	0	UNION	
5/24/1996	Thunder storm Wind	50	0	0	0	0	UNION	
5/29/1996	Thunder storm Wind	50	0	0	0	0	LOCKHART	
6/8/1996	Thunder storm Wind	50	0	0	0	0	UNION	
6/8/1996	Thunder storm Wind	50	0	0	20000	0	UNION	
6/8/1996	Thunder storm Wind	50	0	0	0	0	JONESVILLE	
6/19/1996	Thunder storm Wind	50	0	0	0	0	JONESVILLE	
7/15/1996	Thunder storm Wind	50	0	0	0	0	JONESVILLE	
7/23/1996	Thunder storm Wind	50	0	0	0	0	UNION	
7/23/1996	Thunder storm Wind	50	0	0	0	0	UNION	
9/7/1996	Thunder storm Wind	50	0	0	0	0	UNION	
2/21/1997	Thunder storm Wind	50	0	0	0	0	JONESVILLE	

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
2/21/1997	Thunder storm Wind	50	0	0	0	0	UNION	
4/28/1997	Thunder storm Wind	50	0	0	2000	0	BUFFALO	
7/28/1997	Thunder storm Wind	50	0	0	0	0	JONESVILLE	
8/5/1997	Thunder storm Wind	50	0	0	0	0	WEST SPGS	
6/16/1998	Thunder storm Wind	50	0	1	14000	0	UNION	LAW ENFORCEMENT
6/19/1998	Thunder storm Wind	60	0	0	0	0	JONESVILLE	UNKNOWN
6/19/1998	Thunder storm Wind	60	0	0	20000	0	UNION	UNKNOWN
6/22/1998	Thunder storm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
6/24/1998	Thunder storm Wind	50	0	0	0	0	WEST SPGS	EMERGENCY MANAGER
6/10/1999	Thunder storm Wind	50	0	0	0	0	UNION	NEWSPAPER
7/5/1999	Thunder storm Wind	50	0	0	0	0	UNION	EMERGENCY MANAGER
7/6/1999	Thunderstorm Wind	50	0	0	0	0	CROSS KEYS	LAW ENFORCEMENT
7/24/1999	Thunderstorm Wind	50	0	0	0	0	UNION	EMERGENCY MANAGER
7/24/1999	Thunderstorm Wind	50	0	0	0	0	CROSS KEYS	LAW ENFORCEMENT
11/11/1999	Thunderstorm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
5/25/2000	Thunderstorm Wind	60	0	0	0	0	UNION	TRAINED SPOTTER
5/25/2000	Thunderstorm Wind	60	0	0	0	0	ADAMSBURG	LAW ENFORCEMENT
7/6/2000	Thunderstorm Wind	60	0	0	0	0	UNION	LAW ENFORCEMENT
9/25/2000	Thunderstorm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
4/1/2001	Thunderstorm Wind	50	0	0	0	0	UNION	EMERGENCY MANAGER
4/1/2001	Thunderstorm Wind	50	0	0	0	0	BUFFALO	NEWSPAPER
6/24/2001	Thunderstorm Wind	50	0	0	0	0	CARLISLE	EMERGENCY MANAGER
8/29/2001	Thunderstorm Wind	50	0	0	0	0	UNION	EMERGENCY MANAGER

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
8/31/2001	Thunder storm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
8/31/2001	Thunder storm Wind	50	0	0	0	0	LOCKHART	LAW ENFORCEMENT
12/17/2001	Thunder storm Wind	50	0	0	0	0	UNION	FIRE DEPT/RESCUE SQUAD
12/17/2001	Thunder storm Wind	50	0	0	0	0	UNION	FIRE DEPT/ RESCUE SQUAD
7/3/2002	Thunder storm Wind	55	0	0	30000	0	LOCKHART	LAW ENFORCEMENT
8/2/2002	Thunder storm Wind	60	0	0	0	0	JONESVILLE	TRAINED SPOTTER
8/2/2002	Thunder storm Wind	50	0	0	1000	0	UNION	TRAINED SPOTTER
11/11/2002	Thunder storm Wind	50	0	0	15000	0	UNION	LAW ENFORCEMENT
2/22/2003	Thunder storm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
5/2/2003	Thunder storm Wind	50	0	0	0	0	BUFFALO	LAW ENFORCEMENT
5/6/2003	Thunder storm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
6/19/2003	Thunderstorm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
6/19/2003	Thunderstorm Wind	50	0	0	0	0	CARLISLE	DEPT OF HIGHWAYS
7/21/2003	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	EMERGENCY MANAGER
7/21/2003	Thunderstorm Wind	50	0	0	0	0	UNION	TRAINED SPOTTER
7/29/2003	Thunderstorm Wind	50	0	0	0	0	CROSS KEYS	UTILITY COMPANY
8/5/2003	Thunderstorm Wind	60	0	0	5000	0	JONESVILLE	EMERGENCY MANAGER
8/5/2003	Thunderstorm Wind	55	0	0	0	0	UNION	LAW ENFORCEMENT
11/19/2003	Thunderstorm Wind	50	0	0	0	0	CARLISLE	EMERGENCY MANAGER
6/12/2004	Thunderstorm Wind	50	0	0	0	0	UNION	EMERGENCY MANAGER
7/8/2004	Thunderstorm Wind	50	0	0	0	0	BUFFALO	TRAINED SPOTTER
7/11/2004	Thunderstorm Wind	50	0	0	0	0	KELTON	EMERGENCY MANAGER

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
3/8/2005	Thunderstorm Wind	55	0	0	20000	0	JONESVILLE	NEWSPAPER
4/22/2005	Thunderstorm Wind	50	0	0	3000	0	UNION	LAW ENFORCEMENT
6/27/2005	Thunderstorm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
7/1/2005	Thunderstorm Wind	50	0	0	0	0	CROSS KEYS	GENERAL PUBLIC
8/5/2005	Thunderstorm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
5/5/2006	Thunderstorm Wind	55	0	0	0	0	UNION	LAW ENFORCEMENT
6/23/2006	Thunderstorm Wind	55	0	0	0	0	JONESVILLE	TRAINED SPOTTER
7/15/2006	Thunderstorm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
7/20/2006	Thunderstorm Wind	55	0	0	0	0	BUFFALO	LAW ENFORCEMENT
7/22/2006	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	DEPT OF HIGHWAYS
8/8/2006	Thunderstorm Wind	55	0	0	0	0	BUFFALO	LAW ENFORCEMENT
8/10/2006	Thunderstorm Wind	55	0	0	0	0	CROSS KEYS	GENERAL PUBLIC
8/30/2006	Thunderstorm Wind	50	0	0	0	0	UNION	LAW ENFORCEMENT
9/28/2006	Thunderstorm Wind	50	0	0	0	0	UNION	DEPT OF HIGHWAYS
11/15/2006	Thunderstorm Wind	50	0	0	0	0	LOCKHART	Emergency Manager
6/12/2007	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	County Official
7/10/2007	Thunderstorm Wind	50	0	0	0	0	UNION	County Official
8/22/2007	Thunderstorm Wind	55	0	0	0	0	UNION	Emergency Manager
8/25/2007	Thunderstorm Wind	50	0	0	0	0	UNION	County Official
8/26/2007	Thunderstorm Wind	50	0	0	0	0	CROSS KEYS	County Official
8/30/2007	Thunderstorm Wind	50	0	0	0	0	UNION	Department of Highways
3/4/2008	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	County Official

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
4/26/2008	Thunderstorm Wind	50	0	0	0	0	BUFFALO	Emergency Manager
6/11/2008	Thunderstorm Wind	50	0	0	0	0	UNION	County Official
6/22/2008	Thunderstorm Wind	50	0	0	0	0	UNION	County Official
6/22/2008	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	County Official
6/23/2008	Thunderstorm Wind	50	0	0	0	0	UNION	County Official
6/26/2008	Thunderstorm Wind	50	0	0	0	0	CARLISLE	County Official
6/27/2008	Thunderstorm Wind	50	0	0	0	0	BUFFALO	County Official
7/6/2008	Thunderstorm Wind	50	0	0	0	0	ADAMSBURG	Trained Spotter
7/21/2008	Thunderstorm Wind	55	0	0	0	0	CROSS KEYS	Emergency Manager
7/22/2008	Thunderstorm Wind	60	0	0	50000	0	CROSS KEYS	Fire Department/Rescue
8/2/2008	Thunderstorm Wind	65	0	0	0	0	JOHNS	Emergency Manager
8/2/2008	Thunderstorm Wind	50	0	0	0	0	CARLISLE	Fire Department/Rescue
6/11/2009	Thunderstorm Wind	55	0	0	0	0	UNION	County Official
6/13/2009	Thunderstorm Wind	50	0	0	0	0	UNION CO ARPT	Public
6/18/2009	Thunderstorm Wind	55	0	0	0	0	UNION	Trained Spotter
6/18/2009	Thunderstorm Wind	55	0	0	0	0	ROBAT	Utility Company
6/26/2009	Thunderstorm Wind	55	0	0	6000	0	WEDGEFIELD	Emergency Manager
7/27/2009	Thunderstorm Wind	55	0	0	0	0	SANTUC	Public
6/13/2010	Thunderstorm Wind	50	0	0	0	0	BUFFALO	County Official
11/30/2010	Thunderstorm Wind	50	0	0	0	0	CAREM	County Official
4/5/2011	Thunderstorm Wind	55	0	0	0	0	JONESVILLE	Trained Spotter
4/5/2011	Thunderstorm Wind	55	0	0	0	0	UNION	Trained Spotter
5/10/2011	Thunderstorm Wind	55	0	0	0	0	JOHNS	Fire Department/Rescue

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
5/26/2011	Thunderstorm Wind	55	0	0	0	0	WEST SPGS	Trained Spotter
6/5/2011	Thunderstorm Wind	50	0	0	0	0	CAREM	Amateur Radio
6/12/2011	Thunderstorm Wind	50	0	0	0	0	MEAN XRDS	Amateur Radio
6/15/2011	Thunderstorm Wind	55	0	0	0	0	CROSS KEYS	Trained Spotter
6/15/2011	Thunderstorm Wind	55	0	0	0	0	BUFFALO	Newspaper
6/18/2011	Thunderstorm Wind	50	0	0	0	0	JOHNS	Amateur Radio
7/3/2011	Thunderstorm Wind	50	0	0	0	0	BUFFALO	County Official
7/8/2011	Thunderstorm Wind	50	0	0	0	0	UNION	County Official
7/8/2011	Thunderstorm Wind	50	0	0	0	0	SANTUC	County Official
7/13/2011	Thunderstorm Wind	50	0	0	0	0	UNION	Department of Highways
7/25/2011	Thunderstorm Wind	50	0	0	0	0	ADAMSBURG	County Official
7/31/2011	Thunderstorm Wind	50	0	0	0	0	BONHAM	County Official
7/31/2011	Thunderstorm Wind	50	0	0	0	0	LOCKHART	County Official
8/7/2011	Thunderstorm Wind	50	0	0	0	0	UNION	Trained Spotter
8/8/2011	Thunderstorm Wind	50	0	0	0	0	JOHNS	Trained Spotter
8/11/2011	Thunderstorm Wind	50	0	0	0	0	SEDALIA	County Official
8/13/2011	Thunderstorm Wind	50	0	0	0	0	JOHNS	Trained Spotter
8/14/2011	Thunderstorm Wind	60	0	0	0	0	BUFFALO	Emergency Manager
7/18/2012	Thunderstorm Wind	50	0	0	0	0	MONARCH MILLS	911 Call Center
1/30/2013	Thunderstorm Wind	50	0	0	0	0	MONARCH MILLS	Newspaper
1/30/2013	Thunderstorm Wind	50	0	0	0	0	CARLISLE	911 Call Center
7/14/2013	Thunderstorm Wind	50	0	0	0	0	DELTA	County Official

Union County Thunderstorm Wind Events

Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
1/11/2014	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	County Official
5/9/2014	Thunderstorm Wind	55	0	0	1000	0	JONESVILLE	Emergency Manager
4/7/2015	Thunderstorm Wind	50	0	0	0	0	MEAN XRDS	911 Call Center
4/7/2015	Thunderstorm Wind	50	0	0	0	0	KELLY	911 Call Center
4/7/2015	Thunderstorm Wind	50	0	0	0	0	SANTUC	911 Call Center
7/13/2015	Thunderstorm Wind	50	0	0	0	0	CROSS KEYS	911 Call Center
8/6/2015	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	911 Call Center
8/6/2015	Thunderstorm Wind	50	0	0	0	0	ROBAT	911 Call Center
7/8/2016	Thunderstorm Wind	50	0	0	0	0	ADA	Emergency Manager
4/3/2017	Thunderstorm Wind	55	0	0	5000	0	ADA	NWS Storm Survey
5/24/2017	Thunderstorm Wind	55	0	0	0	0	BONHAM	NWS Storm Survey
6/15/2017	Thunderstorm Wind	55	0	0	0	0	UNION	911 Call Center
7/23/2017	Thunderstorm Wind	50	0	0	0	0	UNION CO ARPT	Public
6/1/2018	Thunderstorm Wind	55	0	0	0	0	SEDALIA	911 Call Center
6/16/2018	Thunderstorm Wind	50	0	0	0	0	UNION	NWS Employee
6/22/2018	Thunderstorm Wind	50	0	0	0	0	UNION	911 Call Center
6/25/2018	Thunderstorm Wind	55	0	0	20000	0	WEST SPGS	911 Call Center
6/27/2018	Thunderstorm Wind	50	0	0	0	0	WEST SPGS	911 Call Center
4/19/2019	Thunderstorm Wind	50	0	0	0	0	ADA	COOP Observer
4/19/2019	Thunderstorm Wind	50	0	0	0	0	ADAMSBURG	NWS Storm Survey
6/22/2019	Thunderstorm Wind	55	0	0	0	0	JONESVILLE	911 Call Center
1/11/2020	Thunderstorm Wind	50	0	0	5000	0	SANTUC	COOP Observer
5/22/2020	Thunderstorm Wind	55	0	0	50000	0	BUFFALO	Public

Union County Thunderstorm Wind Events								
Begin Date	Event Type	Magnitude	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Num	Begin Location	Source
6/28/2020	Thunderstorm Wind	55	0	0	0	0	BUFFALO	911 Call Center
7/20/2020	Thunderstorm Wind	50	0	0	0	0	UNION	911 Call Center
3/25/2021	Thunderstorm Wind	75	0	0	0	0	DELTA	NWS Storm Survey
8/10/2021	Thunderstorm Wind	50	0	0	0	0	JOHNS	911 Call Center
8/14/2021	Thunderstorm Wind	50	0	0	10000	0	MONARCH MILLS	911 Call Center
5/23/2022	Thunderstorm Wind	50	0	0	0	0	LOCKHART	Department of Highways
6/16/2022	Thunderstorm Wind	50	0	0	0	0	JOHNS	Emergency Manager
6/16/2022	Thunderstorm Wind	50	0	0	0	0	BUFFALO	911 Call Center
6/17/2022	Thunderstorm Wind	50	0	0	0	0	JONESVILLE	Emergency Manager
6/17/2022	Thunderstorm Wind	50	0	0	0	0	CROSS KEYS	Emergency Manager
6/17/2022	Thunderstorm Wind	50	0	0	0	0	CARLISLE	Emergency Manager
7/5/2022	Thunderstorm Wind	50	0	0	0	0	BUFFALO	911 Call Center
7/19/2022	Thunderstorm Wind	50	0	0	0	0	JOHNS	911 Call Center
7/24/2022	Thunderstorm Wind	70	0	0	30000	0	MEAN XRDS	Public
Total:			0	1	362000	0		

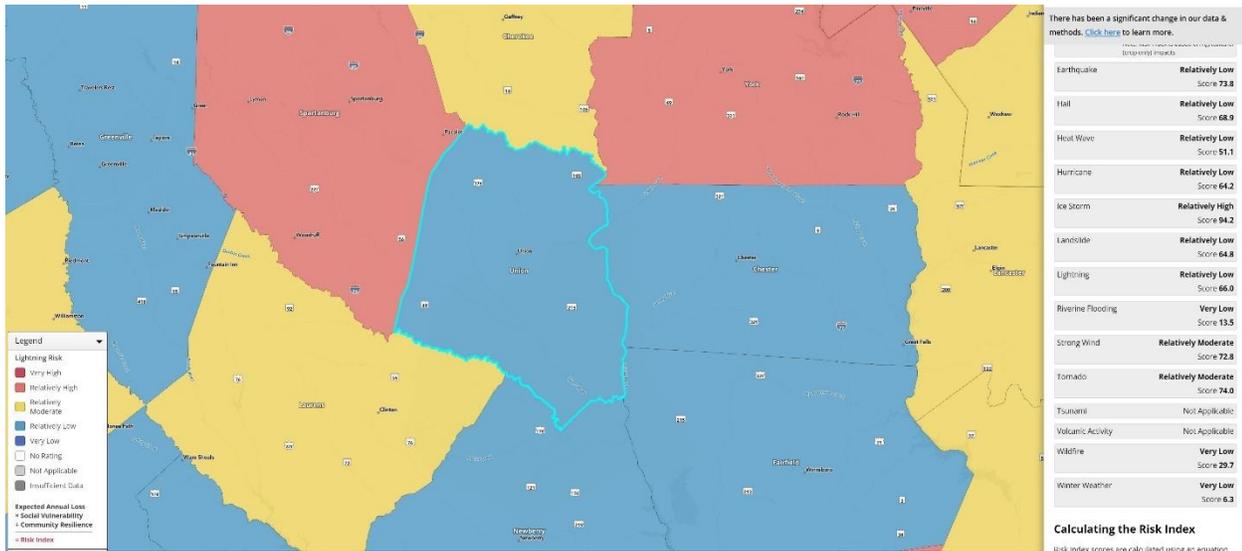
The National Centers for Environmental Information National Oceanic and Atmospheric Administration Storm Events Database Records indicate thunderstorm-related hail, wind, and lightning were found throughout -Union County and did not favor any location.

LOCATION

Severe Thunderstorm events can affect the entire Union County planning area. Thunderstorms affect relatively small areas compared to hurricanes and winter storms, as the average storm is 15 miles in diameter and lasts an average of 30 minutes.

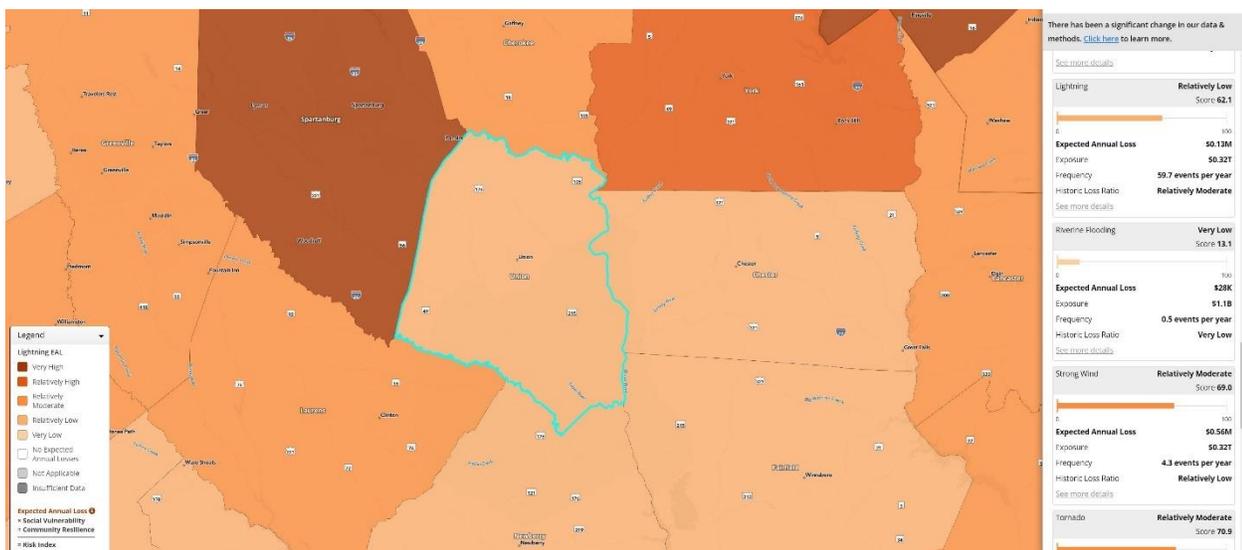
RISK

According to the FEMA National Risk Index, the overall risk for Lightning is Relatively Low for Union County. The National Risk Index score for lightning in Union County is 62.1, where the median score is 52.91 for all hazards.



Source: FEMA National Risk Index Map

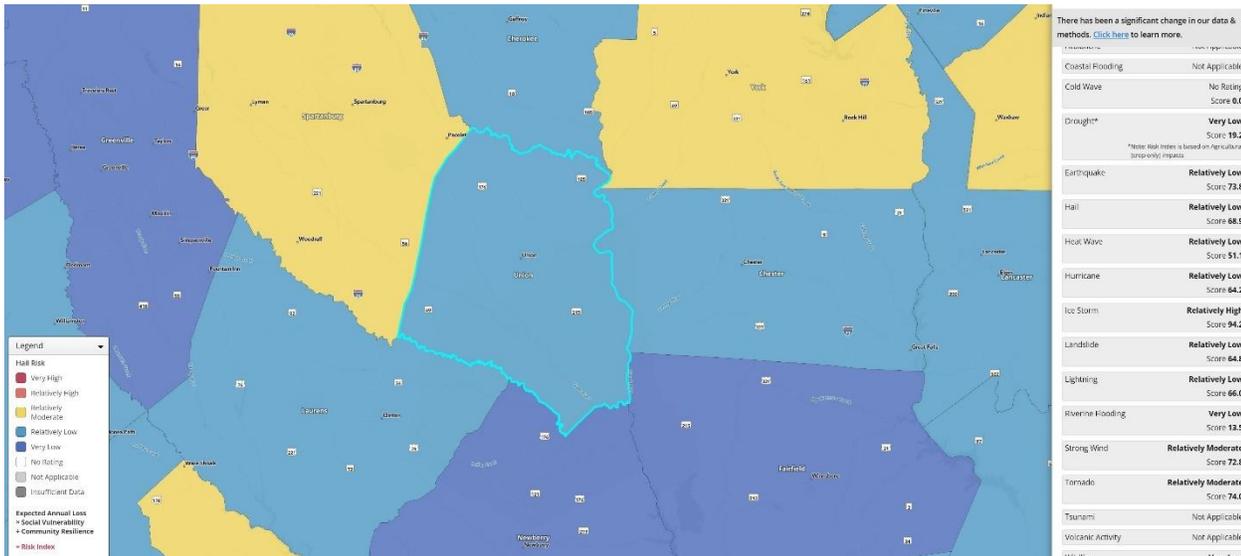
The FEMA National Risk Index ranks the expected annual loss of lightning as relatively low in Union County, with an annual expected loss of \$128,608 out of 0.32 trillion dollars. The annualized frequency value for lightning is 59.7 events per year. The historic loss ratio is relatively moderate.



Source: FEMA National Risk Index Map

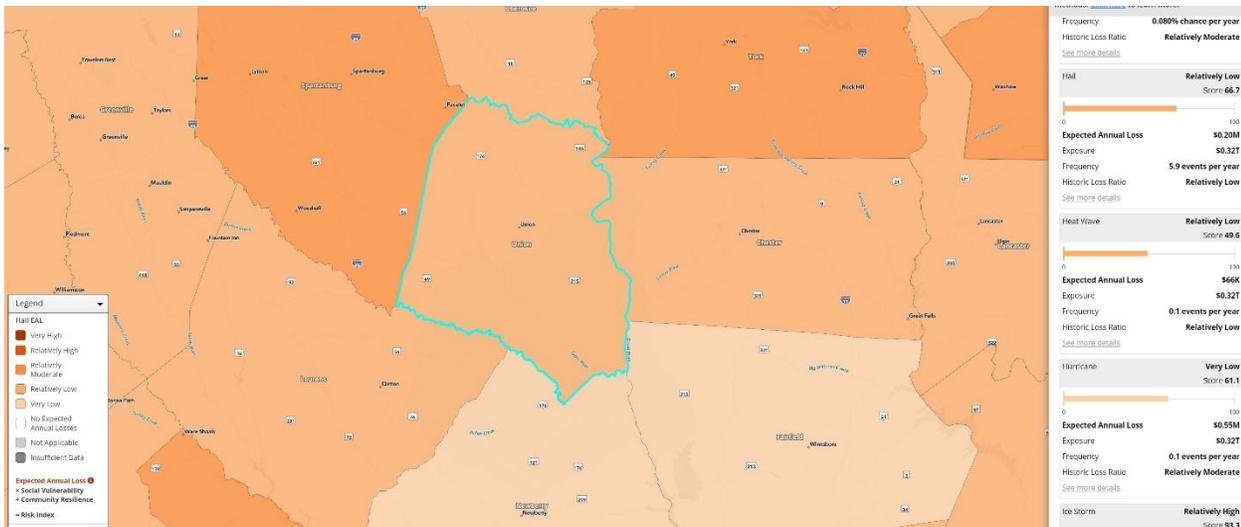
According to the FEMA National Risk Index, the overall risk for Hail is Relatively Low for Union County.

The National Risk Index score for Hail in Union County is 66.7, where the median score is 52.91 for all hazards.



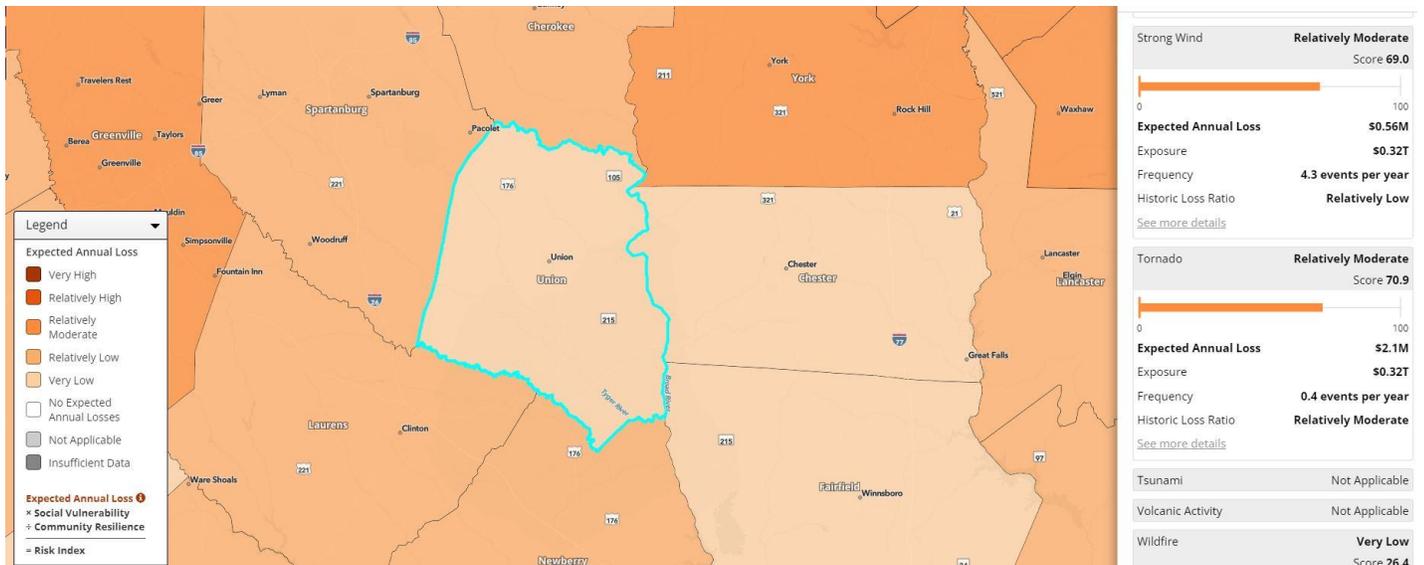
Source: FEMA National Risk Index Map

The FEMA National Risk Index ranks the expected annual loss of hail as relatively low, with an annual expected loss of 0.20 million dollars out of 0.32 trillion dollars. The annualized frequency value for lightning is 5.9 events per year. The historic loss ratio is relatively low.



Source: FEMA National Risk Index Map

There is no National Risk Index score or Expected Annual Loss for Thunderstorm Winds events. Thunderstorm winds are similar to Strong Winds. Strong winds have a relatively moderate National Risk Index score, with a score of 72.8.



Source: FEMA National Risk Index Map

The expected annual loss rating of strong winds is ranked as relatively moderate, with an annual expected loss of 0.56 million dollars out of 0.32 trillion dollars.

The annualized frequency value for lightning is 4.3 events per year. The historic loss ratio is relatively low.

CLIMATE CHANGE

According to the 2023 South Carolina Hazard Mitigation Plan, climate change is expected to affect the frequency and severity of severe thunderstorms. Overall, climate trends are not definitive because of interannual variation and the inconsistencies in the recording of past occurrences. Some climate model simulations suggest that convective available potential energy will increase in the future and wind shear will decrease. If these simulations are accurate and the energy for severe thunderstorms is more prevalent, a safe assumption would be an increase in severe thunderstorms (Brooks H., 2012). Less conservative climate models predicting a higher global average annual temperature increase will also increase the potential for severe thunderstorms and the hazards that come with them. Increase in severe thunderstorms also increase hail, lightning, and thunderstorm winds.

IMPACT

The impacts of severe thunderstorms on community lifelines are not considered substantial. The highest impacts on lifelines are estimated in the communications, energy, and safety and security lifelines as noted below.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	Severe thunderstorms could damage telecommunications and broadband equipment and systems. Extended power outages resulting from downed power lines could negatively impact services.	Localized or Regional
Energy	Medium	Power transmission and distribution lines may be damaged by high winds, lightning, or wind-driven debris.	Localized or Regional
Food, Water & Shelter	Low	Significant impacts are not anticipated. Residential structures and crops could see damage from high winds, large hail, or tornadoes.	localized
Hazardous Materials	Low	Significant impacts are not anticipated.	Localized
Health and Medical	Low	Facilities may be damaged by severe thunderstorms. Injuries from the storms could lead to an increase in the number of people seeking emergency care.	Localized
Safety and Security	Medium	There may be an increase in traffic accidents and other needs for assistance. Response personnel may face hazardous conditions.	Localized
Transportation	Low	Road closures because of fallen debris could cause transportation disruptions. Delays in air traffic are anticipated from the severe thunderstorms	Localized or Regional

RECOMMENDATIONS

1. Implement the recommendation of the Severe Winds section of this report.
2. Educate the public about retrofitting buildings with the following techniques to minimize hail damage:
 - Install measures such as structural bracing, shutters, laminated glass in windowpanes, and hail-resistant roof coverings or flashing in building design to minimize damage.
 - Improve roof sheathing to prevent hail penetration.
 - Installing hail-resistant roofing and siding
 - Contact the Insurance Institute for Business and Home Safety (IBHS) to learn about the most appropriate roof covering for your geographic region.

4. Educate the public about the dangers of hail. The County should consider the following methods for implementation.
 - Mail safety brochures with monthly water bills or annual tax bills.
 - Posting warning signage at local parks, county fairs, and other outdoor venues
 - Teach school children about the dangers of hail and how to take safety precautions.
5. Protect critical facilities and infrastructure from lightning damage with the following measures:
 - Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.
 - Install and maintain surge protection on critical electronic equipment.
6. Conduct a Lightning awareness program. Use outreach programs to promote awareness of lightning dangers. The outreach program can include ideas such as:
 - Develop a lightning brochure for distribution by the recreation department via vendors utilizing parks, distribution to the YMCA and school to distribute to their members.
 - Mail safety brochures with monthly water bills
 - Post warning signage at local parks
 - Teach school children about the dangers of lightning and how to take safety precautions.

CHANGES TO THIS SECTION

- ✓ Updated Historical Occurrence Subsection to include the latest data and include descriptions for lightening and hail, broke data tables to reflect lightening, hail, and thunderstorm winds
- ✓ Added Location Subsection
- ✓ Added Risk Subsection
- ✓ Added Climate Change Subsection
- ✓ Added Impact Subsection
- ✓ Added Recommendation Subsection

WILDFIRES

DESCRIPTION

A wildfire is an undesirable, uncontrolled burning of grasslands, brush, or woodlands. According to the National Weather Service, more than 100,000 wildfires occur in the United States each year. About 90% of these wildfires are started by humans (i.e., campfires, debris burning, smoking, etc.); the other 10% are started by lightning.

The potential for wildfire depends upon surface fuel characteristics, weather conditions, recent climate conditions, topography, and fire behavior. Fuels are anything that fire can and will burn and are the combustible materials that sustain a wildfire. Typically, this is the most prevalent vegetation in a given area.

Weather is one of the most significant factors in determining the severity of wildfires. The intensity of fires and the rate with which they spread are directly related to the wind speed, temperature, and relative humidity. Climatic conditions such as long-term drought also play a significant role in the number and intensity of wildfires. Topography can also assist fires to spread because the slope and shape of the terrain can change the speed at which fire travels.

There are four major types of wildfires. Ground fires burn in natural litter, duff, roots, or sometimes high organic soils. Once started, they are complicated to control, and some ground fires may even rekindle after being extinguished. Surface fires burn in grasses and low shrubs (up to 4' tall) or in the lower branches of trees. They have the potential to spread rapidly, and the ease of their control depends upon the fuel involved. Crown fires burn in the tops of trees, and the ease of their management depends greatly upon wind conditions. Spotting fires occur when burning embers are thrown ahead of the main fire or by crown fires and wind and topographic conditions.

Once spotting begins, the fire will be challenging to control. Wildfires become significant threats to life and property along what is known as the "wildland/urban interface." The wildland/urban interface is the area where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Since 1985, urban/wildland interface fires have burned 9,000 homes across the United States.

All of South Carolina is susceptible to wildfire. Although wildfires are possible throughout the year, the fire season peaks for South Carolina are in the Spring and late Winter months (January through mid-April). March is frequently the busiest month for firefighters, but some of the largest fires have occurred during the first two weeks of April. South Carolina's fire season is in the winter because most vegetation is dead or dormant. Fires do not start or spread as quickly when vegetation is green.

FIRE CAUSES

South Carolina does not use a uniform fire reporting system, so there are no complete statistics on fire occurrence or causes. Catawba Regional utilized the South Carolina Forestry Commission data in this section. The data does not include the many fires handled by the Fire Service and forest industry.

Lightning. Lightning contributes to only about 2% of our wildfires. The low percentage of fires caused by lightning is because it usually rains during thunderstorms. Also, high summertime humidities in the southeast help reduce the number of ignitions from lightning strikes.

Campfires. This class accounts for 1-3% of SC wildfires. Most outdoor activity is in the summertime, and there is less chance of ignition from campfires when the vegetation is green, and humidity is high.

Smoking. Careless smoking causes approximately 3-4% of the total wildfires in the state. The percentage of fires caused by smoking may be an inflated figure due to errors in cause determination. A dropped cigarette is unlikely to kindle a new fire unless the humidity is very low. Most bona fide smoking fires occur along high-speed highways where traffic movement and reflected heat create a microclimate.

Debris Burning. Any planned fire that escapes, falls into this category. It includes wildfires caused by burning trash, yard debris, construction waste, land clearing piles, crop stubble, and prescribed burning for forestry or wildlife management purposes. Every year, 35-45% of our wildfires fall into this cause category.

Woods Arson. Fires set to burn someone else's property without the owner's consent account for 25-30% of all wildfires in SC. State law recognizes two types of incendiary fire: willful and malicious and intentional fires. Deliberate and malicious fires are set with malicious intent or with the knowledge that the fire may cause damage. Revenge, malicious mischief, and thrill-seeking are common motives.

Intentional fires are those set to burn someone else's property without intent to cause damage. An example is when someone living close to a forest sets it on fire to eliminate vermin, clear out brush, etc. To that person, the burning is desirable; it becomes arson because the property owner did not order or approve the fire.

Equipment Use. Usually, around 5% of our fires originate with faulty equipment. These include fires started by farm equipment and hot catalytic converters on automobiles.

Railroad. Railroad operations cause only 1-2% of SC wildfires. With the advent of efficient diesel engines, this cause is no longer significant. Most railroad fires result from braking or sparks from a carbon build-up in the engines.

Children. The activities of children cause 3-5% of our wildfires. Most of these result from unsupervised use of fireworks, matches, and lighters.

Miscellaneous. This catchall category includes such things as irresponsible use of fireworks by adults, structure fires that ignite nearby woods, and unattended warming fires. South Carolina categorizes around 4-6% of SC wildfires in this category.

HISTORICAL OCCURRENCES AND LOCATION

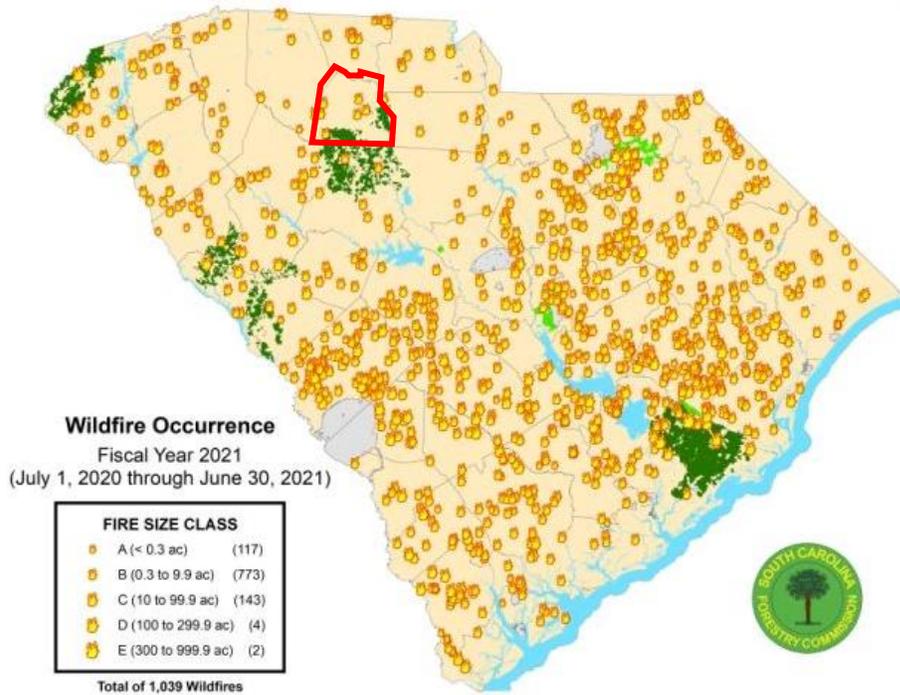
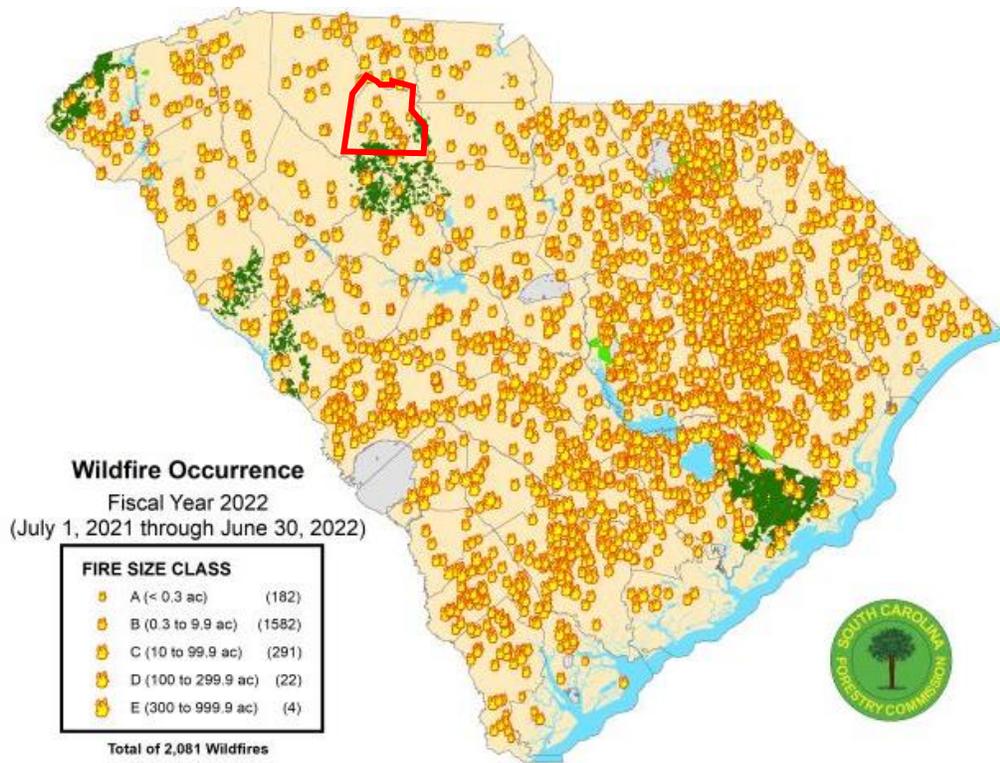
According to the South Carolina Forestry Commission, South Carolina averages 3,000 wildfires per year (including only fires handled by the Forestry Commission). Considering the size and population of South Carolina, this is one of the highest rates in the nation. The average area burned per year for all of South Carolina is 18,000 acres for fires handled by the Forestry Commission only.

According to the Spatial Hazard Events and Losses database, Union County has recorded four (4) wildfires between the period of 1950 to 2022. The database does not list any fires in the period after 1988.

Union County Wildfire Events, 1950 to 2022				
Hazard	Wildfire	Wildfire	Wildfire	Wildfire
Start Date	3/15/1966	3/1/1985	4/1/1985	12/28/1988
End Date	3/31/1966	3/21/1985	4/30/1985	12/28/1988
Duration Days	17	21	30	1
Crop Dmg	0	108695.65	10869.6	8333.33
Crop Dmg (ADJ)	0	265915.06	26591.59	18542.87
Crop Damage Duration	0	21	30	1
Crop Dmg Per Capita	0	8.71	0.87	0.61
Fatalities	0	0	0	0
Fatalities	0	0	0	0
Fatalities Duration	0	0	0	0
Fatalities Per Capita	0	0	0	0
Location	Statewide	Statewide	Statewide	SCZ003 Eastern Piedmont
Property Dmg	10869.6	88310.01	108.7	0
Property Dmg (ADJ)	88310.1	26591.52	265.93	0
Property Dmg Duration	17	21	30	0
Property Damage Capita	2.99	0.87	0.01	0
Remarks	Forest Fires	Fire	Fire	Forest Fires

Source: Arizona State University, Spatial Hazard Events and Losses Database for the United States (SHELDUS), wildfires 1950-2022

The South Carolina Forestry Commission provides a more comprehensive list of fires. The South Carolina Forestry Commission has recorded 2407 wildfires in Union County from 1946 to 2022. The wildfires burned a combined 14,611.3 acres. There is no central wildfire recording agency in South Carolina, and the fires noted were recorded by the South Carolina Forestry Commission only. The distribution of fires in Union County is spread evenly throughout the County and varies year to year.



Forestry Commission recorded Wildfires in Union County, SC

Fiscal Year	Number of Fires	Acres	Fiscal Year	Number of Fires	Acres	Fiscal Year	Number of Fires	Acres
1946-47	49	874.5	1982-83	15	51.5	2018-19	3	1.8
1947-48	23	179.6	1983-84	29	120.4	2019-20	6	6.5
1948-49	44	576.7	1984-85	69	553.1	2020-21	6	9
1949-50	61	591.1	1985-86	57	169.5	2021-22	14	22.7
1950-51	50	395.5	1986-87	23	58.5	Total:	2407	14611.3
1951-52	33	243.3	1987-88	61	465.9			
1952-53	40	714	1988-89	44	380.9			
1953-54	28	201.1	1989-90	34	64.5			
1954-55	48	639.5	1990-91	46	126.5			
1955-56	28	270	1991-92	79	268.5			
1956-57	32	99.5	1992-93	32	168			
1957-58	10	39.5	1993-94	64	259.5			
1958-59	44	131	1994-95	35	72.6			
1959-60	23	85.5	1995-96	29	102.5			
1960-61	34	165.6	1996-97	26	42			
1961-62	52	178.1	1997-98	29	114.5			
1962-63	65	390.5	1998-99	37	100.3			
1963-64	32	231.5	1999-2000	25	78.6			
1964-65	20	55.6	2000-01	47	106.5			
1965-66	39	416.4	2001-02	48	233.3			
1966-67	44	237.2	2002-03	23	83.3			
1967-68	67	1158.1	2003-04	42	247			
1968-69	18	155.9	2004-05	17	37.4			
1969-70	26	148.7	2005-06	30	86.1			
1970-71	30	97	2006-07	19	140.9			
1971-72	13	22.3	2007-08	31	62.7			
1972-73	10	35.8	2008-09	17	67.5			
1973-74	36	88.4	2009-10	15	43.7			
1974-75	29	135.6	2010-11	22	92.8			
1975-76	32	83.9	2011-12	7	56.9			
1976-77	31	218.4	2012-13	20	109.1			
1977-78	20	70.1	2013-14	10	138.3			
1978-79	23	98.5	2014-15	18	57.2			
1979-80	19	56.5	2015-16	7	20.3			
1980-81	63	508	2016-17	11	39.3			
1981-82	31	128.8	2017-18	13	30			

Source: South Carolina Forestry Commission

HAZARD ANALYSIS

Union County’s 76-year average for wildfires is 32 fires per year, totaling a loss of 192 acres per year. Wildfires are assumed to impact all areas uniformly across the planning area, with a similar extent and probability of occurrence.

STATE LAWS

State law ***requires*** that citizens notify the Forestry Commission before burning outdoors. This requirement applies only to unincorporated areas of the state (outside of city/town limits). Citizens burning residential yard debris must 1) limit their fires to vegetative material like leaves, limbs, and branches; 2) clear a firebreak around the burning site; 3) have the right equipment available to keep the fire under control; and 4) stay with the fire until it is completely safe.

There are three types of outdoor burns for which the Forestry Commission takes notifications:

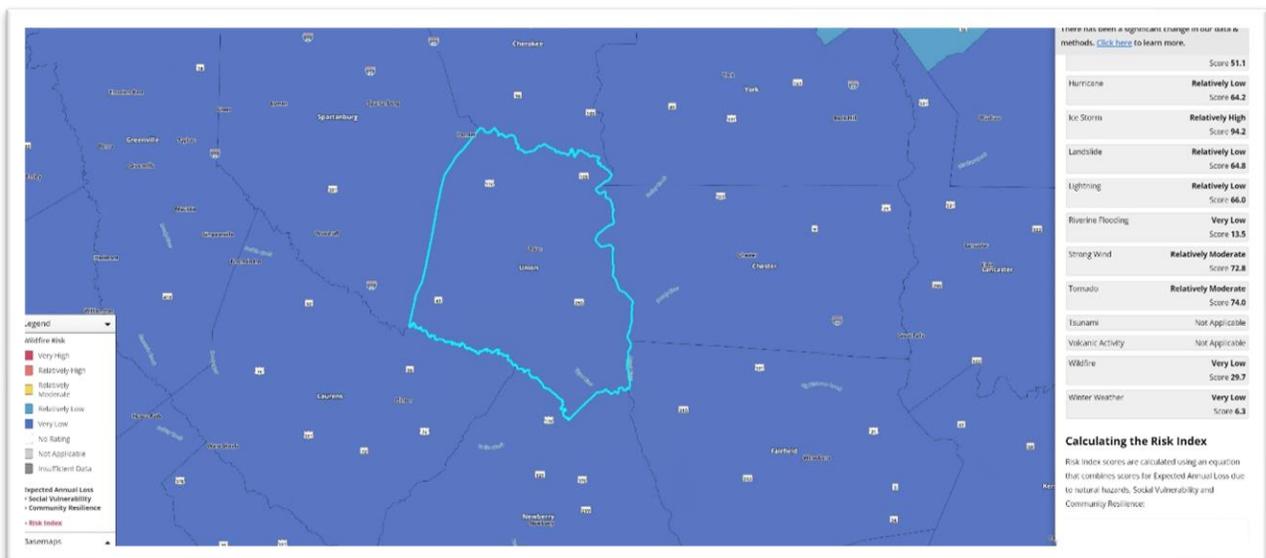
1. Residential yard debris burns
2. Forestry, wildlife, and agricultural burns (also known as prescribed or controlled burns)
3. Construction-related/land-clearing burns

Source: South Carolina Forestry Commission

LOCATION

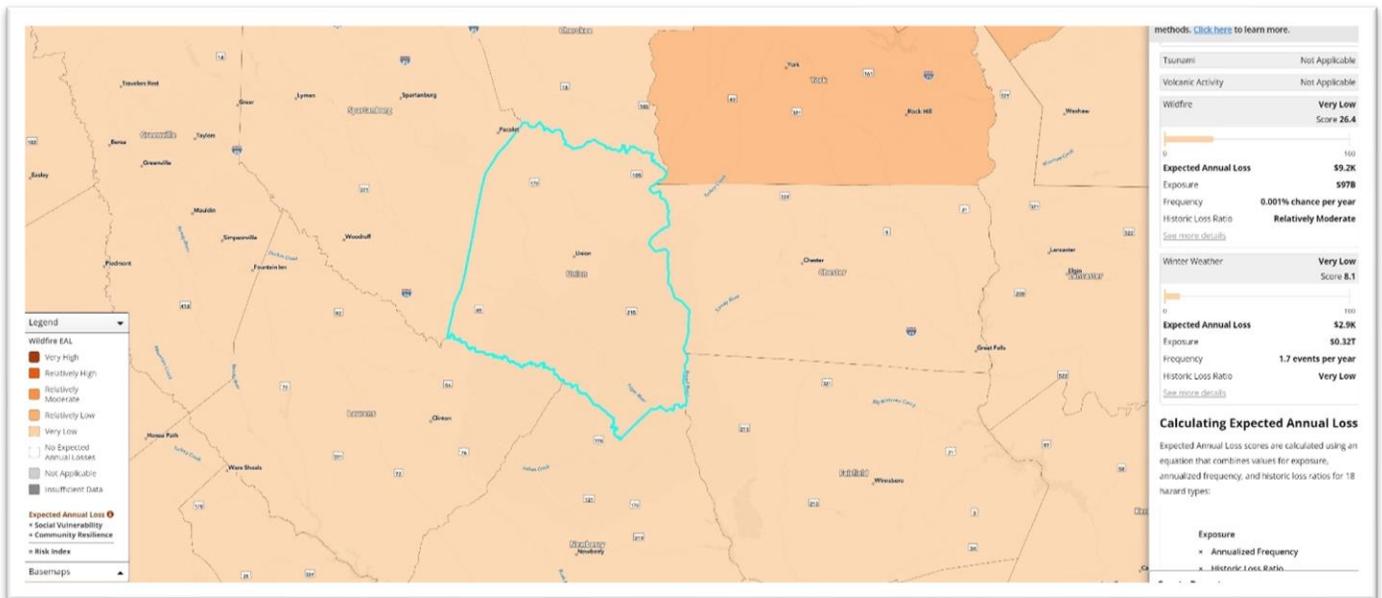
All of Union County is vulnerable to wildfires.

RISK



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

According to the FEMA National Risk Index, the overall risk for Wildfires is Very Low for Union County. The National Risk Index score for Wildfires in Union County is 29.7, where the median score is 52.91 for all hazards in the United States.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

According to the FEMA National Risk Index, Union County has a very low expected annual loss due to wildfires.

The expected annual loss is 9.2 thousand dollars out of \$97 billion of exposure. The historic Loss Ratio for wildfire events is relatively moderate. The frequency of a wildfire is 0.001% chance per year, although based on South Carolina data, the frequency is 32 fires per year. FEMA's record source for the number of events on record or the number of fires for the Wildfire frequency percentage is unknown. The County should use the frequency of 32 fire events per year.

Wildfire Risk to Communities was developed by the USDA Forest Service under the direction of Congress in the 2018 Consolidated Appropriations Act (H.R. 1625, Section 210) as a tool to help communities understand, explore, and reduce wildfire risk. Tools include interactive maps, charts, and resources.

Union County has a **low** risk of wildfire—lower than 82% of counties in the US.

Understand your risk

Wildfire risk is based on several factors. Understanding which factors affect your community can help you identify strategies to reduce your risk.

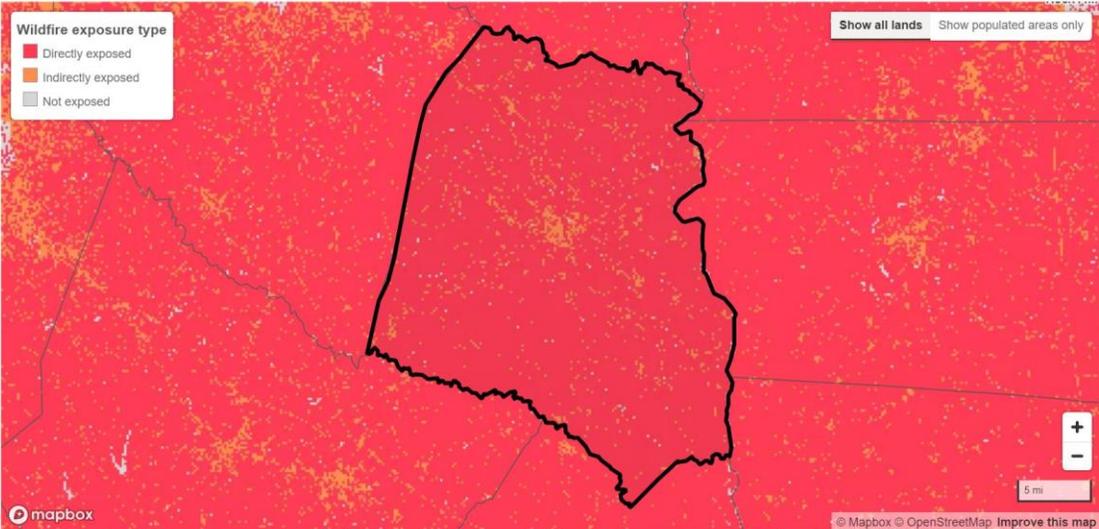


Source: Wildfire Risk to Communities, USDA

According to the US Department of Agriculture, Union County has a low Risk to Homes and likelihood, however, a very high exposure to wildfires. Most of Union County is directly exposed to Wildfires (71%), while approximately 29% is indirectly exposed.

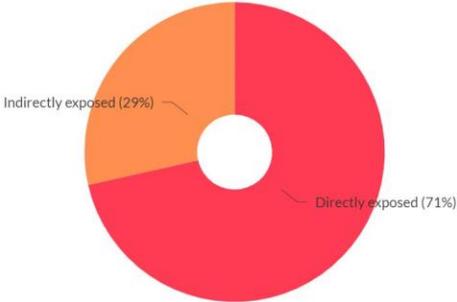
Exposure

Populated areas in Union County are predominantly exposed to wildfire from **direct** sources, such as adjacent flammable vegetation.

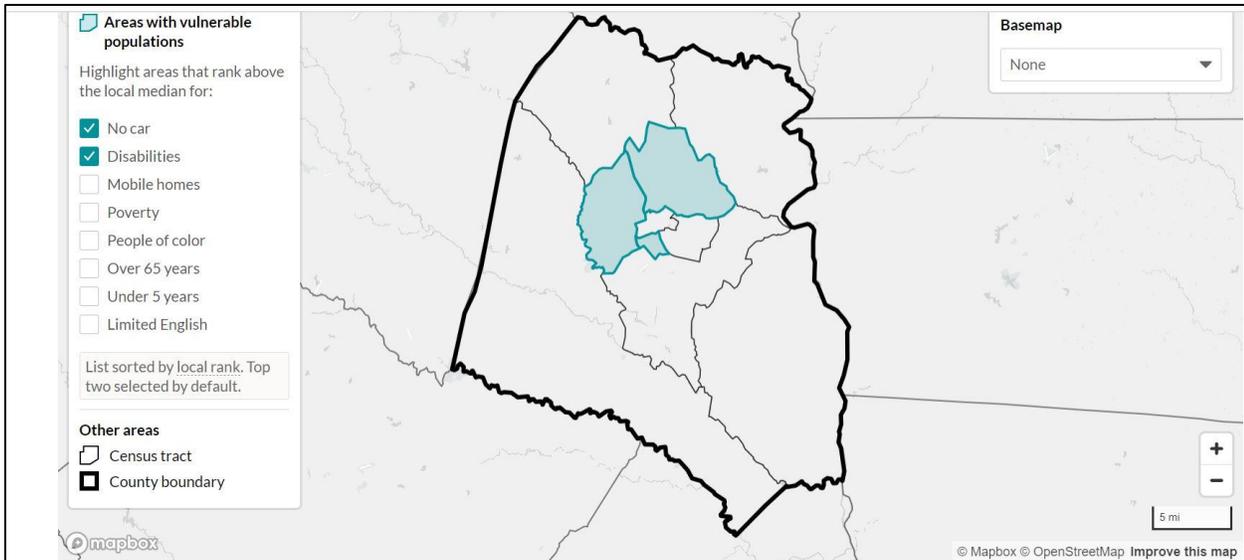


About exposure

Exposure is the intersection of wildfire likelihood and intensity with communities. Communities can be directly exposed to wildfire from adjacent wildland vegetation, or indirectly exposed to wildfire from embers and home-to-home ignition. Communities that are not exposed are not likely to be subjected to wildfire from either direct or indirect sources.



Source: Wildfire Risk to Communities, USDA



About vulnerable populations

Social and economic factors can make it more difficult for some people to prepare for, respond to, and recover from wildfire. Vulnerable populations may lack access to resources, experience cultural and institutional barriers, have limited mobility, or have medical conditions exacerbated by stress or smoke.

For example, people over age 65 and people who are disabled are more susceptible to air pollution and particulates associated with wildfire smoke. Language barriers can make it difficult to follow directions during an evacuation or to access support after a disaster. Race and ethnicity are strongly correlated with disparities in health and access to aid and resources. Wildfires disproportionately impact people with low incomes because of factors such as inadequate housing and a diminished ability to evacuate or relocate.

Vulnerable populations

All areas in Union County

Indicator	Number	Percent
Families in poverty	1,102 ±237	14.3% ±3.2%
People with disabilities	5,591 ±502	20.8% ±2.1%
People over 65 years	5,444 ±431	19.9% ±1.8%
People under 5 years	1,538 ±254	5.6% ±1%
People of color	9,768 ±1,615	35.7% ±6.1%
Black	8,262 ±747	30.2% ±3.1%
Native American	6 ±35	0% ±0.1%
Hispanic	440 ±193	1.6% ±0.7%
Difficulty with English	27 ±202	0.1% ±0.8%
Households with no car	1,092 ±251	9.3% ±2.2%
Mobile homes	2,391 ±358	20.4% ±7.3%

[Download detailed report](#)

Data are from the U.S. Census Bureau, American Community Survey. See [methods](#) for more information.

Source: Wildfire Risk to Communities, USDA

Areas north and west of the City of Union have a concentration of vulnerable populations to wildfires.

Vulnerable populations include:

- People with disabilities.
- People over 65 years of age.
- People under five years of age.
- Minorities.
- People with limited English communication.
- Households with no car.
- Households residing in mobile homes.

Union County should target areas with high levels of vulnerable populations for evacuation assistance in emergency preparedness plans. These populations may need help with translators, transportation, and physical assistance with evacuating.

CLIMATE CHANGE

According to the 2023 South Carolina Hazard Mitigation Plan, climate change factors may increase. Increased temperatures and changes in soil moisture, relative humidity, wind speed, and vegetation suggest that wildfire occurrences may increase in the coming years. Drought conditions and wildfires are directly linked, as an increase in dry conditions increases the fire risk for an ecosystem (Littell, 2016).

IMPACTS

Wildfires can impact many key lifelines. Some of the most significant impacts of wildfires include disrupting communication, transportation, power and gas services, and water supply and property destruction. A powerful wildfire can cause local and even regional impacts, though safety and security could see potential statewide impacts, as seen in the community lifeline impacts table below.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	A wildfire event could damage telecommunications and broadband equipment and systems, causing interruptions in service. Communications outages could negatively impact public sector information sharing platforms, 911/dispatch operations, and the finance sector. Additional communications outages are possible in extended power outages.	Localized or Regional
Energy	Low	Power generation, transmission, and distribution facilities, equipment, and systems may be damaged by wildfire. Fuel storage facilities and stations may be damaged, closed, or inoperable. Pipelines may be damaged, or operations altered to minimize risk.	Localized or Regional
Food, Water & Shelter	Low	Wildland-interface fire could damage residential structures. Food supplies, including crops and livestock, could be damaged. Displaced citizens will need short- or long-term housing.	Localized
Hazardous Materials	Medium	Hazardous material storage or transport facilities and equipment could be damaged,	Localized or Regional

		releasing hazard materials. Damage to storage containers and transportation infrastructure could cause environmental human, and animal health risks. Facilities and transport may alter operations or routes to minimize risk, which may delay supply chains or services. Wildfires may ignite fuel storage or transport facilities or equipment.	
Health and Medical	Medium	Healthcare facilities in the immediate area may be damaged by wildfire or require evacuation of patients. Poor air quality may result in medical issues that increase the number of patients seeking emergency care. Facilities may be inaccessible or see delays in access based on fire location and smoke. Medical staff may have difficulty accessing areas of need because of wildfire or smoke.	Regional
Safety and Security	High	Evacuation of local communities near the wildfire may be required. Firefighting and other response and emergency management resources may be stressed by high demand for firefighting, coordination, logistics, communications, and evacuation support tasks. Personnel and equipment assigned to fight wildfire will be at increased risk of injury, health effects, and damage.	Regional
Transportation	Medium	Surface transportation routes may be closed, damaged, or inaccessible because of wildfire or smoke. Air transportation may be hindered and require grounding in immediate area or rerouting because of smoke.	Localized or Regional

RECOMMENDATIONS

1. Educate the public about the Home Ignition Zone Program, which includes simple steps from roof to foundation to make a home safer from embers and radiant heat. ([nfpa.org/Public Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire](https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire)).
2. Prepare an emergency preparedness plan that includes translators, transportation (including ADA-accessible buses/shuttles), and volunteers/staff to physically help with wildfire evacuations.
3. Develop a program to remove or thin vegetation to mitigate wildfire hazards.

4. Adopt or continue to enforce the International Fire Code (International Code Council 2021) or the NFPA 1 Fire Code (National Fire Protection Association 2021). According to Firetopia, “Although often confused, fire codes and building codes are separate documents that complement one another. Both codes set minimum requirements to safeguard the occupants of a building and to protect the building structure from exposure and hazards. Fire codes dictate fire prevention measures on an ongoing basis. In contrast building codes control and integrate fire-safe design into the construction of the building and the fire-protection systems. Fire code provisions will often reference related building codes.

Regarding wildfires, fire codes regulate access roads, emergency exits, water supply, emergency planning and preparedness, and fire protection systems, in addition to the accumulation of combustible material and the storage and use of hazardous materials. If a community lacks any other form of wildfire mitigation measures, an adopted fire code can provide important public safety requirements in the event of a wildfire. In some jurisdictions, a WUI chapter may be included within the fire code, making it even more robust.” (<https://cpaw.headwaterseconomics.org/apps/firetopia/fire-code>)

CHANGES TO THIS SECTION

- ✓ Updated Description Subsection to provide causes of fire in South Carolina
- ✓ Updated Historical Occurrence Subsection to include the latest data
- ✓ Added Location Subsection
- ✓ Added Risk Subsection
- ✓ Added Climate Change Subsection
- ✓ Added Impact Subsection
- ✓ Added Recommendation Subsection

EARTHQUAKES

DESCRIPTION

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

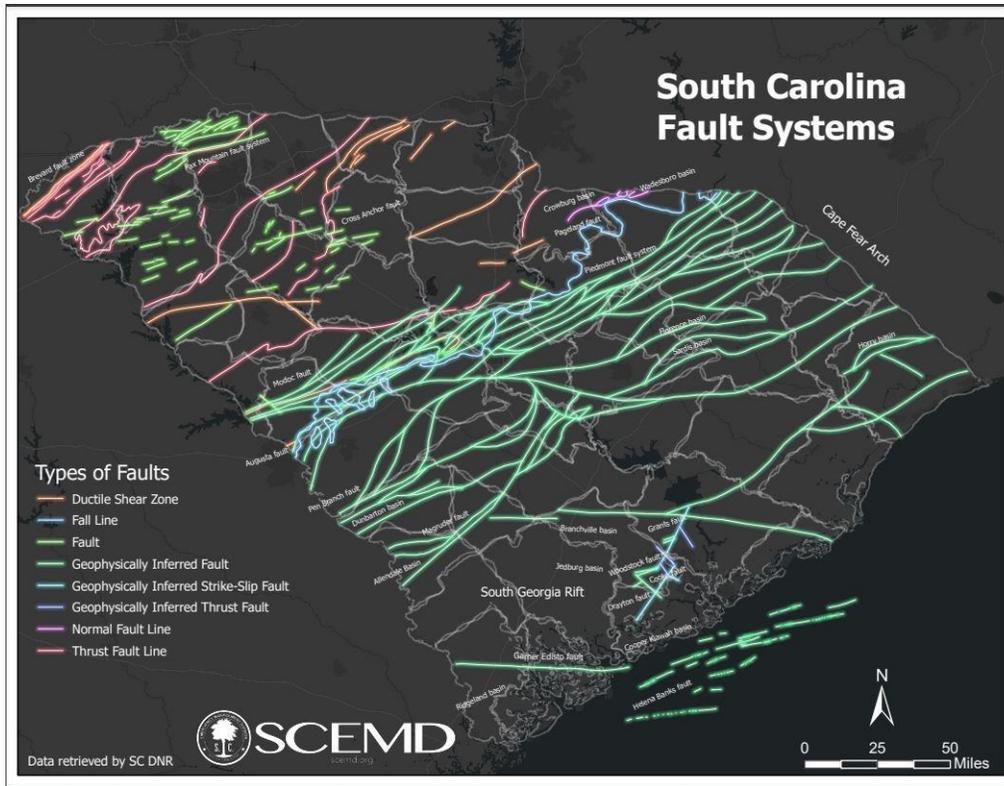
Ground shaking causes most earthquake-related deaths and property damage, such as building failures and collapses. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and in which ground soil loses its ability to resist shear and flows much like quicksand. In the case of liquefaction, anything relying on the substrate for support can shift, tilt, rupture, or collapse.

Most earthquakes are caused by the release of stress accumulated due to the rupture of rocks along opposing fault planes in the earth's outer crust. The borders of the earth's ten tectonic plates are the location of the fault planes. These plate borders generally follow the outlines of the continents, with the North American plate following the continental border with the Pacific Ocean in the west but following the mid-Atlantic trench in the east. As earthquakes occurring in the mid-ocean trench usually pose little threat to humans, the most significant earthquake threat in North America is along the Pacific coast.

The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, where there are tremendous strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes tension 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 snaps, releasing the stored energy and producing seismic waves, generating an earthquake.

The Cross Anchor Fault is partially located in Union County. The Cross Anchor fault is the terrane boundary east of Waterloo, South Carolina, and forms the southeastern boundary of the Whitmire reentrant.

Earthquakes are measured in terms of their magnitude and intensity. The Richter Scale is an open-ended logarithmic scale that measures the magnitude and describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter Scale corresponds to a ten-fold increase in wave amplitude or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale. It is a twelve-level scale based on direct and indirect measurements of seismic effects. The scale levels use Roman numerals, with an I corresponding to imperceptible (instrumental) events, IV corresponding to moderate (felt by people awake), and XII for catastrophic (total destruction).



Source: SC Emergency Management Division

A detailed description of the Modified Mercalli Scale of Earthquake Intensity and its correspondence to the Richter Scale is given in Table E-1.

TABLE E-1

Intensity	Scale Intensity Description of Effects	Corresponding Richter Scale Magnitude
I	Detected only on seismographs	< 3.5
II	Feeble; Some people feel it	3.4
III	Slightly felt by people resting; like a truck rumbling by	4.2
IV	Moderate Felt by people walking	4.5
V	Slightly Strong Sleepers awake; church bells ring	4.8
VI	Strong; Trees sway; suspended objects swing, objects fall off shelves	5.4
VII	Very Strong Mild Alarm; walls crack; plaster falls	6.1
VIII	Destructive; Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	6.5
IX	Ruinous; Some houses collapse; ground cracks; pipes break open	6.9
X	Disastrous; Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	7.3
XI	Very Disastrous; Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	8.1
XII	Catastrophic; Total destruction; trees fall; ground rises and falls in waves	>8.1

Source: U. S. Geological Survey

HISTORICAL OCCURRENCES

Earthquakes are relatively common in South Carolina. South Carolina is the most seismically active state on the East Coast. Approximately 10 to 20 earthquakes are recorded each year by seismologists. From 1698 to 2001, 20 earthquakes occurred in South Carolina with a Richter Scale magnitude equal to greater than 4. The most property damage in South Carolina ever attributed to an earthquake was caused by the August 31, 1886, Charleston, South Carolina shock. The quake left about 65 people dead in Charleston.

Generally, the Piedmont/Blue Ridge and Midlands section of South Carolina are considered at a low risk of major (magnitude 6+) earthquakes. Not much is known about the cause of the Union County earthquake because of the lack of technology at the time, but at the present, the risk of a major earthquake is considered low. The Piedmont/Blue Ridge area is susceptible to smaller earthquakes (magnitude 2-4) in other locations, especially near dams. University of South Carolina (USC) seismic stations have recorded numerous small earthquakes associated with dams in the Piedmont/Blue Ridge area and some smaller earthquakes distributed around the area. These small earthquakes not associated with dams may be associated with the uplift of the Appalachian Mountains as is seen in other areas near the mountains. Earthquakes in this region are likely to be felt over large areas because of the relatively unbroken mass of rock in which they occur. This allows earthquake waves to travel long distances before they become attenuated and are no longer felt. Because most buildings are built on rock, earthquakes will cause less damage than earthquakes in the Lowcountry because solid rock does not increase the amplitude of earthquake waves, whereas loose sediment can increase the shaking by increasing the amplitude of the waves.

Source: 2023 South Carolina Hazard Mitigation Plan

Earthquakes can cause property damage, injury, and potentially death directly from the earthquake and its aftershocks. Earthquakes can also cause fires, landslides, soil liquefaction, and large bodies of water to rise and fall. The shifting of the ground can cause road buckles, building collapses, electric lines, gas mains, water, and sewer lines to snap, depending on the earthquake's magnitude. The Richter Scale describes the effects of various earthquake magnitudes.

Union County has a minimal history of earthquakes. Six (6) historical earthquake events have been recorded within Union County between 1698 and June 2023, with the most significant magnitude being 5.5 on January 1, 1913.

Union County Earthquake Events, 1968 - June 2023					
Year	Lat	Long	Depth	Magnitude	Location
1912	34.7	81.7		3.30	
1913	34.7	81.7		5.50	City of Union
2006	34.8	81.7		1.5	
2006	34.8	81.7		2.50	
2018 (Feb. 17)	34.73	-81.55	2.50	2.31	3 km ENE of Monarch Mill
2023 (April 4)	34.661	-81.781	11.45 KM	1.62	11.2 km from Buffalo (near Cross Keys)

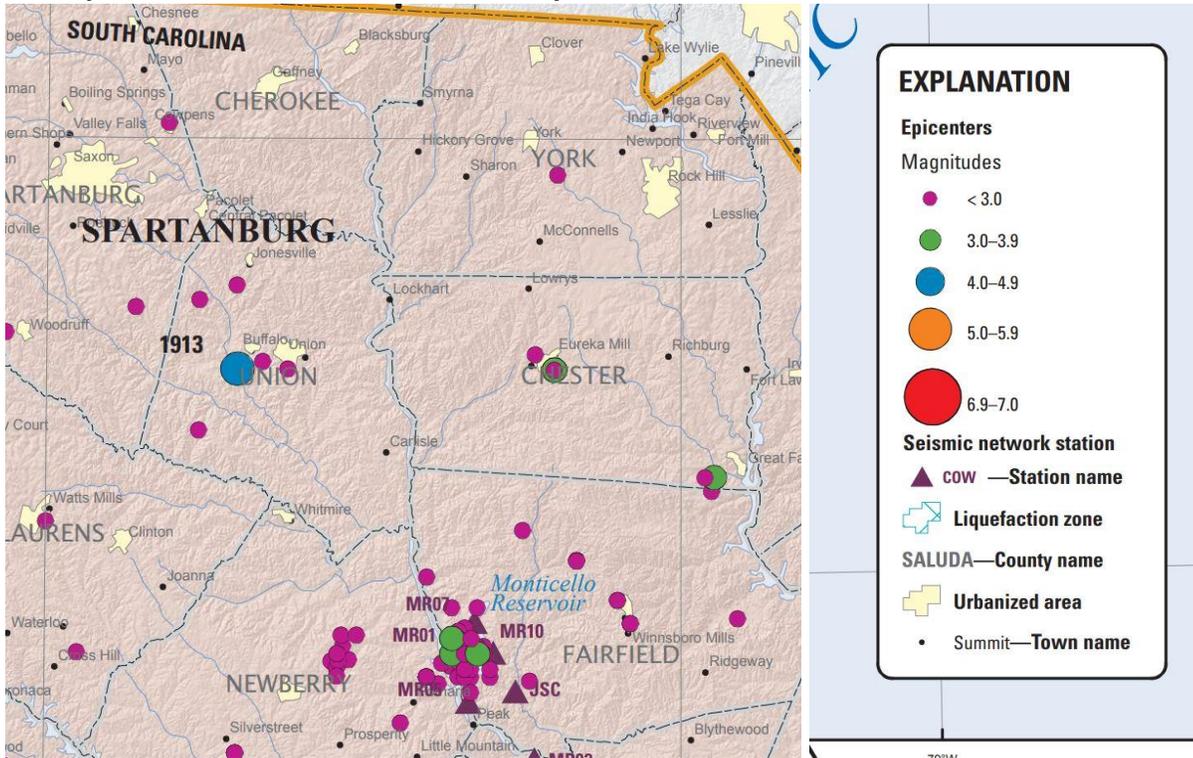
Union County Earthquake of 1913

Twenty-seven years after the 1886 Charleston earthquake and subsequent aftershocks, another strong earthquake occurred in South Carolina. This quake happened on the afternoon of January 1, 1913, at 1:28 p.m. near the town of Union in Union County, with an estimated magnitude of 5.5 (Figure 1). Shock waves moved out from the western portion of South Carolina into adjacent Georgia and North Carolina and even up into parts of Virginia. Fortunately, damage was minimal, and no deaths resulted. This event is significant because it demonstrates that large, destructive earthquakes can strike the Piedmont region.

LOCATION

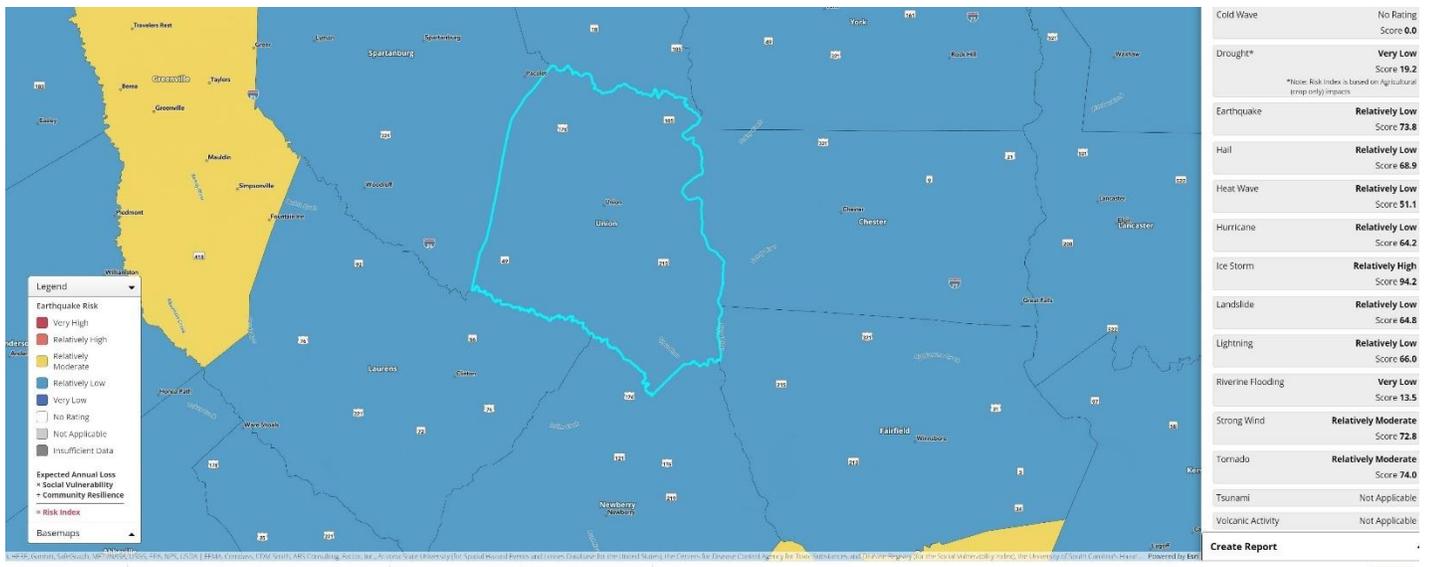
Many of the earthquakes that have occurred in Union County are located close to the Cross Anchor Fault (West of City of Union along the border with Spartanburg County). The City of Union has experienced three earthquakes, with the most significant earthquake occurring in 1913. The location of Union County recorded earthquakes has been provided below in a portion of the USGS-prepared map of all Earthquakes located in South Carolina.

Earthquakes in South Carolina and Vicinity 1968-2009



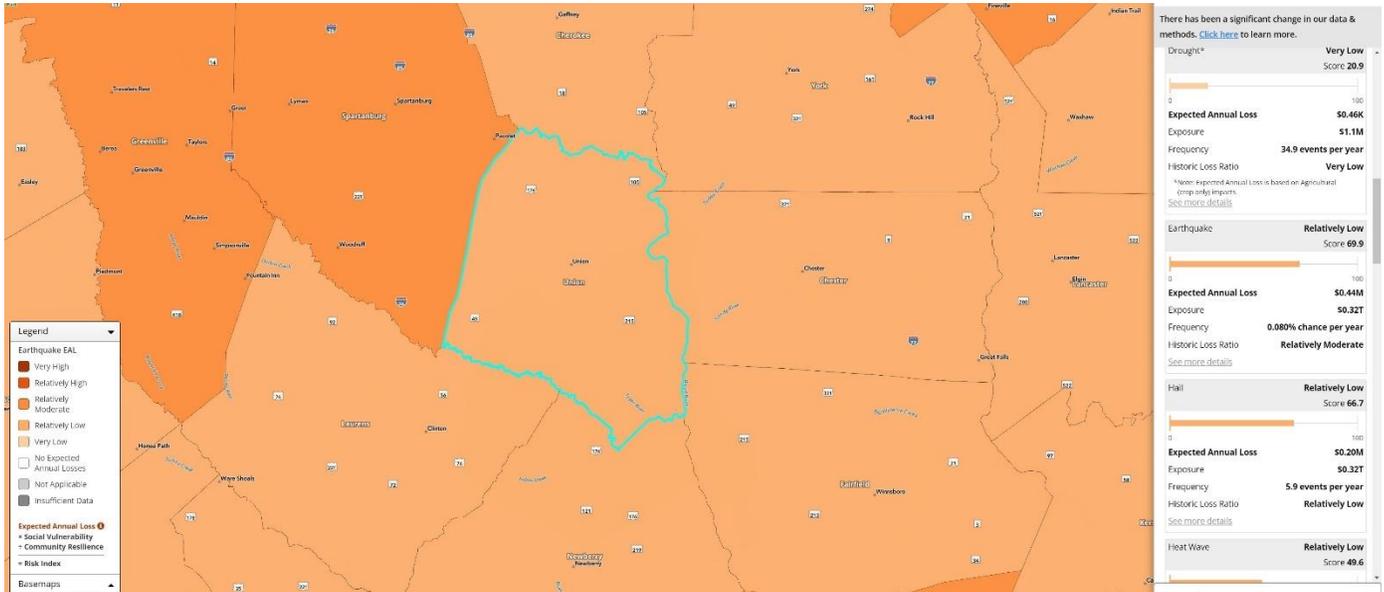
Source: USGS, Base from U.S. Geological Survey National Elevation Dataset, National Hydrologic Database, and Digital Chart of the World (ESRI, 1993) Albers equal-area conic projection, standard parallels 30°30'00" and 35°30'00", central meridian -81°00'00", latitude of origin 0°00'00"

RISK



Source: FEMA National Risk Index Map

According to the FEMA National Risk Index, the overall risk for earthquakes is Relatively Low for Union County. The National Risk Index score for earthquakes in Union County is 73.8, where the median score is 52.91 for all hazards in the United States.



Source: FEMA National Risk Index Map

The Expected Annual Loss for Earthquake Disasters in Union County is relatively low, with a score of 69.9. The expected annual loss is \$0.44 million, with an exposure of \$0.32 trillion. The Frequency of the event is 0.080% chance per year. The Historic Loss Ratio is Relatively Moderate for earthquake disasters.

The 2023 South Carolina Hazard Mitigation Plan has a frequency of 2% annual probability of an earthquake occurring in Union County, with a frequency interval (years between events) of 61.50.

CLIMATE CHANGE

According to the MIT study Untangling the Environmental and Tectonic Drivers of the Noto Earthquake Swarm in Japan appearing in Science Advances, it appears that heavy snowfall and rain can contribute to some types of earthquakes. “The new study focuses on a series of ongoing earthquakes in Japan’s Noto Peninsula. The team discovered that seismic activity in the region is surprisingly synchronized with certain changes in underground pressure, and that those changes are influenced by seasonal patterns of snowfall and precipitation. The scientist suspect that this new connection between earthquakes and climate may not be unique to Japan and could play a role in shaking up other parts of the world.” (Chu, Jennifer, “Study: Heavy snowfall and rain may contribute to some earthquakes” MIT News May 8, 2024) Union County is expected to get less frequent, but heavier rain events due to climate change. Some earthquake events in South Carolina are triggered by earth shifts near dams which could be impacted by heavy rainfall. More research needs to be performed to see if this finding is true for South Carolina and Union County.

IMPACT

Earthquakes can cause catastrophic impacts on people, property, and infrastructure. The rapid onset nature of earthquakes usually means no warning before an occurrence. A significant earthquake would cause detrimental impacts on the community's lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	High	Communications infrastructure can be expected to be damaged, which will result in disruptions to services. Extent and duration will depend on severity. Emergency response/operations centers and critical infrastructure could be impacted and need prioritization for restoration. Broadband infrastructure would likely experience disruptions, making it more difficult to use VoIP phones and information sharing platforms. Emergency dispatch/911 services could be negatively impacted and require backup communications networks or support by centers not affected by the earthquake. Availability of financial services could be limited because of power and/or internet outages	Localized or Regional
Energy	High	Power lines and power generation facilities could see major damage based on location. Fuel supply chain could be disrupted because of damage to pipelines and transportation, storage, and transmission infrastructure, possibly throughout the state, causing fuel shortages. Fuel supplies could be brought in from other locations, but transportation dependencies could create delays. Critical facilities without power would rely on generators, creating additional demand for fuel.	Localized or Regional; possibly stateside
Food, Water & Shelter	High	People within the impacted area could experience scarcity of food, water, and shelter, potentially for an extended period, depending on accessibility, transportation, and supply chain. Emergency shelters would need resupply; however, transportation issues would create challenges delivering necessities. Water lines would likely be damaged in a large earthquake, leaving large populations without potable water. Wastewater infrastructure could be damaged. Agricultural impacts could be seen due to lack of water and	Localized or Regional; possibly stateside

		inability to move food in supply chain. Delivery of feed for livestock may be impacted.	
Hazardous Materials	High	Releases of hazardous materials caused by structural failure and damage to storage containers and transportation infrastructure could cause environmental, human, and animal health risks.	Localized; Possibly Regional
Health and Medical	High	Medical facilities in affected areas could be damaged or destroyed at a time when an increased number of injured people would require medical care. Conditions could result in increased health risks. Medical supply chains also could be disrupted. Power outage or lack of water for an extended period of time may necessitate transfer of patients to other facilities, which may be hindered by damaged transportation infrastructure.	Localized or Regional; possibly stateside
Safety and Security	High	Damage could cause gaps in response and security personnel and equipment availability and accessibility. Direct and cascading impacts including structural instability, fires, explosions, and hazardous materials may cause hazardous conditions. Search and rescue operations would be overwhelmed and require additional support from outside the affected area.	Localized or Regional; possibly stateside
Transportation	High	Transportation infrastructure in the immediate area is expected to be heavily damaged. A high number of bridges and roads needing inspection will delay response and recovery. Large-scale evacuations and/or displacement may occur using undamaged roads, causing congestion. Railway systems will most likely be damaged, affecting the supply chain throughout the state and potentially the East Coast. The most effective way to travel in and out of the impacted area would be by helicopter as damaged runways at airports may render fixed-wing aircraft unusable. Maritime ports may sustain damage, causing supply chain disruptions.	Localized or Regional; possibly stateside

RECOMMENDATIONS

1. Educate residents on the fact that homeowner's insurance does not cover earthquake damage. Separate coverage must be purchased to cover Earthquakes.

2. Educate the public about sheltering in place and emergency preparedness kits to assist the public in surviving for three-plus days without assistance. South Carolina has prepared an Earthquake Guide that provides information about how to shelter in place, how individuals with disabilities can prepare, and the general hazards of earthquake and its aftermath. A link to the guide should be provided on each jurisdiction's website. Mailings of the guide to all property owners should also be considered.
3. Continue to enforce International Building Code Standards (IBC) and International Residential Code (IRC).
4. Continue to fund and ensure firehouses have the proper equipment and staffing levels.
5. Seek funding to demolish vacant, dilapidated buildings to protect the health and safety of residents.
6. Develop an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and homes with cripple wall foundations.

CHANGES TO THIS SECTION

- ✓ Updated Description Subsection to provide a map of South Carolina fault lines
- ✓ Updated Historical Occurrence Subsection to include the latest data and history of 1913 Union County Earthquake
- ✓ Added Location Subsection
- ✓ Added Risk Subsection
- ✓ Added Climate Change Subsection
- ✓ Added Impact Subsection
- ✓ Added Recommendation subsection

DROUGHTS

DESCRIPTION

A simple definition of a drought is a period of prolonged dryness. However, a drought can have a wide range of impacts that can affect a population with the resulting water shortage that affects some activities, groups, or environmental sectors. Drought should be considered relative to some long-term average balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area, a condition often perceived as "normal." Drought is also related to the timing of rain (i.e., the principal season of occurrence, delays in the start of the rainy season, the occurrence of rains with principal crop growth stages) and the rain's effectiveness (i.e., rainfall intensity, number of rainfall events). Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with it in many regions of the world and can significantly aggravate its severity.

To better understand droughts, it can be helpful to sub-classify them into the following groups:

- **Agricultural Drought**, defined by soil moisture deficiencies
- **Hydrological Drought**, defined by declining surface and groundwater supplies.
- **Meteorological Drought**, defined by a lack of precipitation.
- **Hydrological Drought and land Use** are defined as a meteorological drought in one area that has a hydrological drought impact in another area.
- **Socioeconomic Drought**, defined as drought that impacts the supply and demand of some economic activity.

Agricultural Drought Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced groundwater or reservoir levels, etc. Plant water demand depends on prevailing weather conditions, the biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil. A good definition of agricultural drought should be able to account for the variable susceptibility of crops during different stages of crop development, from emergence to maturity. Deficient topsoil moisture at planting may hinder germination, leading to low plant populations per hectare and a reduction of final yield. However, if topsoil moisture is sufficient for early growth requirements, deficiencies in subsoil moisture at this early stage may not affect final yield if subsoil moisture is replenished as the growing season progresses or if rainfall meets plant water needs.

Hydrological Drought Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on the surface or subsurface water supply (i.e., streamflow, reservoir and

lake levels, groundwater). The watershed or river basin scale defines the frequency and severity of hydrological drought. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system, such as soil moisture, streamflow, and groundwater and reservoir levels. As a result, these impacts are out of phase with implications in other economic sectors. For example, a precipitation deficiency may result in a rapid depletion of soil moisture that is almost immediately discernible to agriculturalists. Still, the impact of this deficiency on reservoir levels may only affect hydroelectric power production or recreational uses for a few months. Also, water in hydrologic storage systems (e.g., reservoirs, rivers) is often used for multiple competing purposes (e.g., flood control, irrigation, recreation, navigation, hydropower, wildlife habitat), further complicating the sequence and quantification of impacts. Competition for water in these storage systems escalates during drought, and conflicts between water users increase significantly.

Meteorological Drought Meteorological drought is usually defined based on the degree of dryness (compared to some “normal” or average amount) and the duration of the dry period. Definitions of meteorological Drought are region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region. For example, some definitions of meteorological drought identify periods of drought based on the number of days with precipitation less than some specified threshold. This measure is only appropriate for regions characterized by a year-round precipitation regime, such as a tropical rainforest, humid subtropical climate, or humid mid-latitude climate.

Hydrological Drought and Land Use Although climate is a primary contributor to hydrological drought, other factors such as changes in land use (e.g., deforestation), land degradation, and the construction of dams all affect the hydrological characteristics of the basin. Because hydrologic systems interconnect regions, the impact of meteorological drought may extend well beyond the borders of the precipitation-deficient area. Land use change is one of the ways human actions alter the frequency of water shortage, even when there is no change in the frequency of meteorological drought.

Socioeconomic Drought: Socioeconomic definitions of drought associate the supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought. It differs from the abovementioned types because its occurrence depends on the time and space processes of supply and demand to identify or classify droughts. The supply of many economic goods, such as water, forage, food grains, fish, and hydroelectric power, depends on the weather. Because of the natural climate variability, water supply is ample in some years but unable to meet human and environmental needs in other years. Socioeconomic drought occurs when the demand for an economic good exceeds the supply due to a weather-related shortfall in water supply.

Figure D-1 shows how climatic factors interact and contribute to drought, impacting environmental and social conditions.

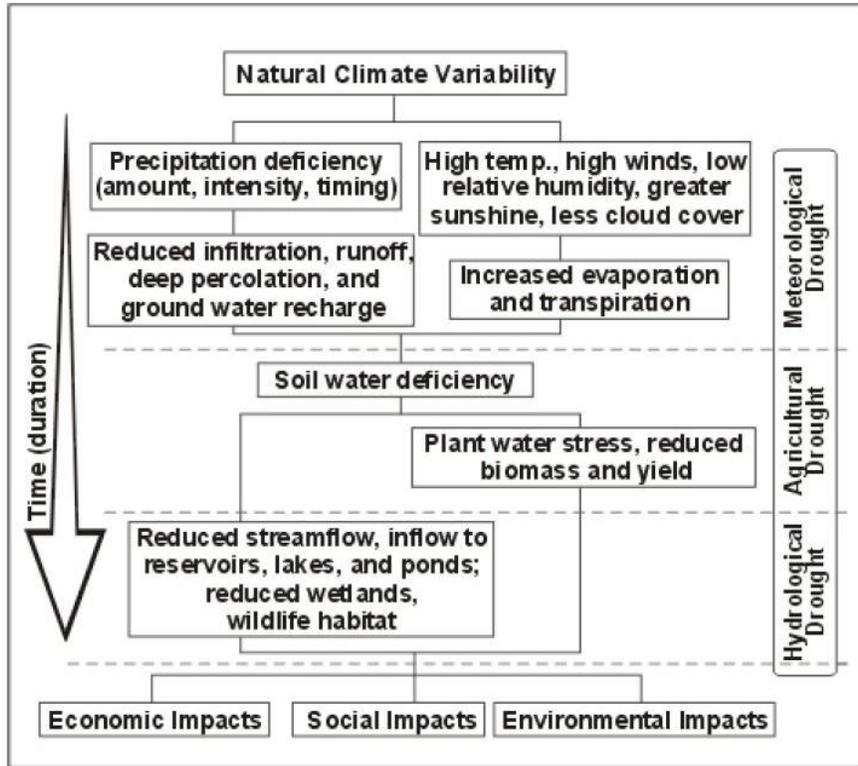


Figure D-1
Source: The National Drought Mitigation Center

The U.S. Drought Monitor (USDM) is a map released every Thursday, showing where drought is and how bad it is across the U.S. and its territories. The map uses six classifications: normal conditions, abnormally dry (D0), showing areas that may be going into or are coming out of drought, and four levels of drought: moderate (D1), severe (D2), extreme (D3) and exceptional (D4).

An associated product—the North American Drought Monitor—comes out monthly, reflecting drought conditions across the continent.

Category	None	D0	D1	D2	D3	D4
Description	Normal or wet conditions	Abnormally Dry	Moderate Drought	Severe Drought	Extreme Drought	Exceptional Drought

Source: US Drought Monitor

The Drought Severity and Coverage Index is an experimental method for converting drought levels from the U.S. Drought Monitor map to a single value for an area. DSCI values are part of the U.S. Drought Monitor data tables. Possible values of the DSCI are from 0 to 500. Zero means that none of the area is abnormally dry or in drought, and 500 means that all area is in D4, exceptional drought.

The US Drought Monitor has prepared a table of examples of historically observed impacts for each drought category for South Carolina.

Historic Impacts

No two states have the same experience during a drought. Below are examples of some of the impacts experienced in South Carolina in the past. To view a more complete record, and to filter impacts by drought severity, sector and season, check out the interactive [State Impacts Tool](#).

Category	Examples of historically observed impacts
D0	Brush fires increase
	Row crop growth is stunted, irrigation begins early
D1	Fire risk increases; tree pests increase
	Peach size is reduced; non-irrigated corn shows severe stress
	Voluntary conservation of water and energy is requested
	Water use is high; creeks, streams, and lakes are low
D2	Boating recreation is compromised
	Cattle are lighter, producers are selling calves early and feeding cattle earlier
	Fisheries are impacted; duck hunting areas close
	Number of fires increases, and fires are more intense
	River and lake levels are low; saltwater intrusion occurs; hydroelectric power production is reduced
D3	Burn bans begin
	Hay is scarce and expensive; owners are giving away horses
	Mandatory water restrictions are implemented, violators are fined; lake outflow is low
	Small aquatic species are stressed
D4	Soil moisture is low, winter crops are slow to germinate
	Daily life is compromised
	Producers are hauling water for cattle; auctions see record number of cattle
	Trees are stressed; fish are dying
	Wells are contaminated or running dry; lakes are extremely low with hazards exposed

Source: U.S. Drought Monitor, Examples of Drought Impacts, Historic Impacts for South Carolina, <https://droughtmonitor.unl.edu/DmData/StateImpacts/ImpactExamples.aspx>

HISTORICAL OCCURRENCES

The state has high inter-annual and seasonal variability of precipitation. The leading cause of this is the strength and geographic placement of the Bermuda High-Pressure System. As the high pressure continues its grip over the area, solar radiation increases, which in turn increases the temperature, which then decreases the cloud cover, thereby reducing the probability of substantial precipitation.

A tropical cyclone sometimes alleviates droughts. In 1954, Hurricane Hazel ended an extreme drought in eastern South Carolina, although drought conditions continued in western sections. In 1990, the remnants of Hurricane Klaus and Tropical Storm Marco ended a severe drought.

Precipitation occurs during periods of drought; however, it is highly localized, inconsequential, and generally evaporates within 24 hours after falling. Periods of insufficient rainfall for crop growth occur during some summers. There is approximately a one in four probability of a drought somewhere in South Carolina at any time (Guttman and Plantico, 1987). Field crops such as corn, cotton, and soybeans are incredibly stressed when drought conditions extend over several weeks during the growing season because only 9% of all farms in the state have irrigated acres, compared to 26% nationwide. However,

the state has a similar proportion of irrigated acres compared to Alabama, North Carolina, and Virginia. Only Florida and Georgia have higher percentages of irrigated land in the Southeast United States (U.S. Department of Commerce, 1993).

Severe Droughts are documented at intervals of roughly every thirty years, with some exceptions since the early 19th Century. Documented severe droughts have occurred statewide in 1818, 1845, 1890, 1925, 1933, 1954, 1977, 1983, 1986, 1988, 1990, and 1993. Additionally, the South Carolina Department of Natural Resources cites a significant statewide drought from 2007-2008

Drought Monitor provides a data series of all known drought category levels for Union County from 2000 to 2023. Union County, in its entirety, was at D4 status for the following periods:

- 8/6/2002 - 9/17/2002 (43 days)
- 10/2/2007 – 10/15/2007 (13 days)
- 11/13/2007 – 12/31/2007 (49 days)
- 7/22/2008 - 8/25/2008 (35 days)

Union County also had many other D4 category days in 2007 and 2008—however, only a portion of the county qualified under the D4 category. The D4 category percentages and dates are provided below.

D3	D4	Valid Start	Valid End
0.18	99.82	10/16/2007	10/22/2007
0.55	99.45	11/6/2007	11/12/2007
0.55	99.45	10/30/2007	11/5/2007
0.55	99.45	10/23/2007	10/29/2007
1.23	98.77	7/15/2008	7/21/2008
1.23	98.77	7/8/2008	7/14/2008
1.23	98.77	7/1/2008	7/7/2008
3.66	96.34	2/19/2008	2/25/2008
3.66	96.34	2/12/2008	2/18/2008
3.66	96.34	2/5/2008	2/11/2008
3.66	96.34	1/29/2008	2/4/2008
3.66	96.34	1/22/2008	1/28/2008
3.66	96.34	1/15/2008	1/21/2008
3.66	96.34	1/8/2008	1/14/2008
3.66	96.34	1/1/2008	1/7/2008
9.43	90.57	7/30/2002	8/5/2002
40.47	59.53	6/24/2008	6/30/2008
88.96	11.04	10/7/2008	10/13/2008
88.96	11.04	9/30/2008	10/6/2008
88.96	11.04	9/23/2008	9/29/2008
88.96	11.04	9/16/2008	9/22/2008
88.96	11.04	9/9/2008	9/15/2008

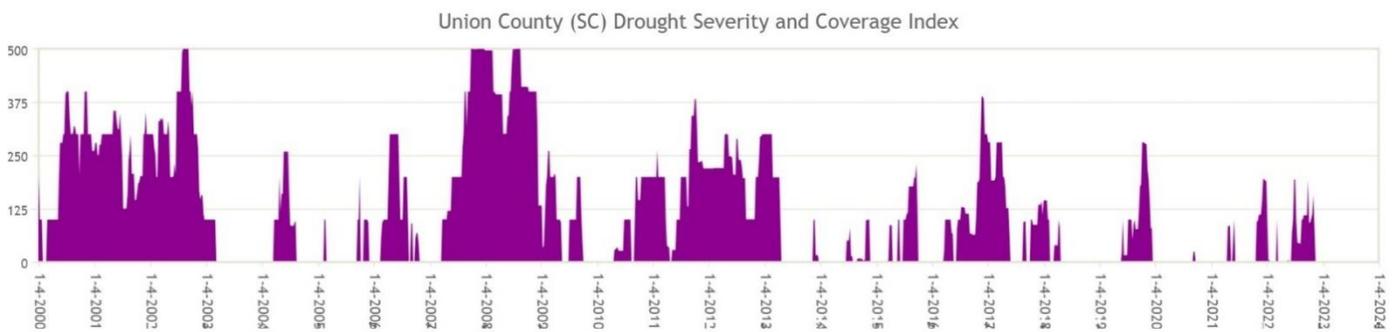
88.96	11.04	9/2/2008	9/8/2008
88.96	11.04	8/26/2008	9/1/2008
99.32	0.01	3/4/2008	3/10/2008
99.32	0.01	2/26/2008	3/3/2008

The following dates had 100% to 81% of Union County categorized as a D3 drought area:

D2	D3	D4	Valid Start	Valid End
0	100	0	6/17/2008	6/23/2008
0	100	0	6/10/2008	6/16/2008
0	100	0	9/25/2007	10/1/2007
0	100	0	9/18/2007	9/24/2007
0	100	0	9/11/2007	9/17/2007
0	100	0	8/28/2007	9/3/2007
0	100	0	8/21/2007	8/27/2007
0	100	0	10/8/2002	10/14/2002
0	100	0	9/24/2002	9/30/2002
0	100	0	9/17/2002	9/23/2002
0	100	0	7/23/2002	7/29/2002
0	100	0	7/16/2002	7/22/2002
0	100	0	7/9/2002	7/15/2002
0	100	0	7/2/2002	7/8/2002
0	100	0	6/25/2002	7/1/2002
0	100	0	11/14/2000	11/20/2000
0	100	0	11/7/2000	11/13/2000
0	100	0	10/31/2000	11/6/2000
0	100	0	7/18/2000	7/24/2000
0	100	0	7/11/2000	7/17/2000
0	100	0	7/4/2000	7/10/2000
0.01	99.99	0	12/2/2008	12/8/2008
0.01	99.99	0	11/25/2008	12/1/2008
0.01	99.99	0	11/18/2008	11/24/2008
0.01	99.99	0	11/11/2008	11/17/2008
0.01	99.99	0	11/4/2008	11/10/2008
0.01	99.99	0	10/28/2008	11/3/2008
0.02	99.98	0	10/21/2008	10/27/2008
0.02	99.98	0	10/14/2008	10/20/2008
0.66	99.32	0.01	3/4/2008	3/10/2008
0.66	99.32	0.01	2/26/2008	3/3/2008
6.61	93.39	0	4/22/2008	4/28/2008
6.61	93.39	0	4/15/2008	4/21/2008
6.61	93.39	0	4/8/2008	4/14/2008

6.61	93.39	0	4/1/2008	4/7/2008
6.61	93.39	0	3/25/2008	3/31/2008
6.61	93.39	0	3/18/2008	3/24/2008
6.61	93.39	0	3/11/2008	3/17/2008
6.93	93.07	0	6/27/2000	7/3/2000
0	88.96	11.04	9/16/2008	9/22/2008
0	88.96	11.04	9/9/2008	9/15/2008
0	88.96	11.04	9/2/2008	9/8/2008
0	88.96	11.04	8/26/2008	9/1/2008
0.06	88.89	11.04	10/7/2008	10/13/2008
0.06	88.89	11.04	9/30/2008	10/6/2008
0.06	88.89	11.04	9/23/2008	9/29/2008
11.58	88.42	0	11/29/2016	12/5/2016
11.58	88.42	0	11/22/2016	11/28/2016
18.13	81.87	0	10/11/2011	10/17/2011
18.13	81.87	0	10/4/2011	10/10/2011
18.31	81.69	0	12/6/2016	12/12/2016

Union County Emergency Management should monitor all drought levels. The D3 and D4 drought dates were noted because these droughts have the highest impacts on human life, livestock, animals, and crops. The Chart below shows drought levels from April 2000 to April 2023.



Source: US Drought Monitor

LOCATION

Drought impacts all parts of Union County. Drought levels are variable. Drought maps will show the weekly location of drought conditions. For example, June 15, 2023, and June 14, 2023, drought levels are shown on the drought maps.

Map released: Thurs. June 15, 2023

Data valid: June 13, 2023 at 8 a.m. EDT

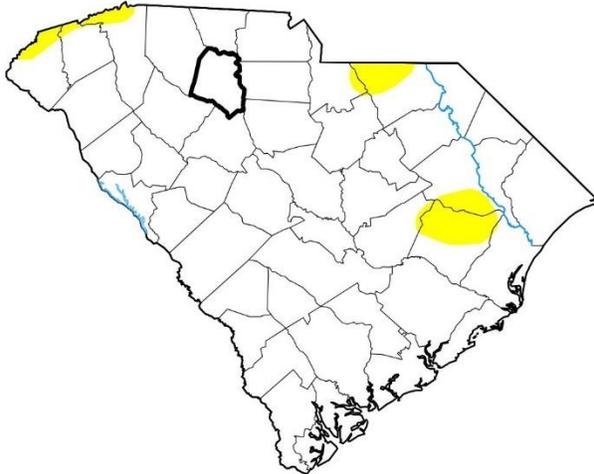
Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

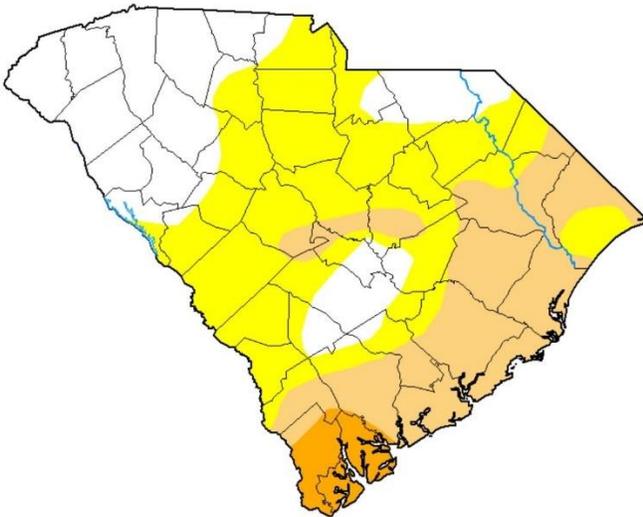
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[Richard Tinker](#), NOAA/NWS/NCEP/CPC



June 14, 2022



Source: US Drought Monitor

The South Carolina Drought Response Act requires all public water suppliers to develop and implement local drought plans and ordinances. The Drought Regulations recognize that local governments have primary responsibility for alleviating drought impacts and encourage cooperation among neighboring

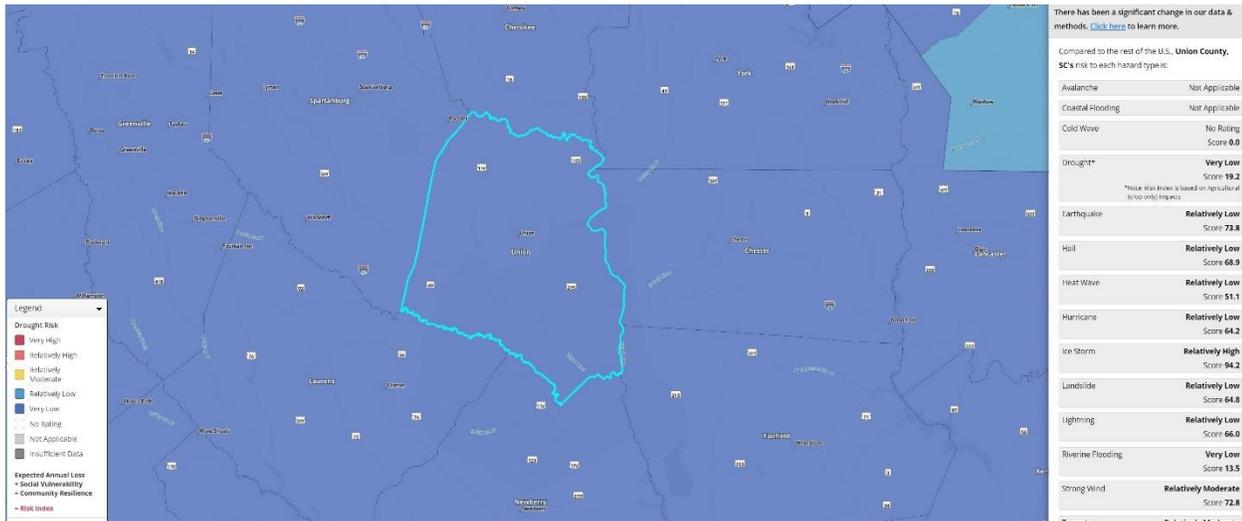
water systems. The South Carolina Department of Natural Resources (DNR) created a sample drought plan and ordinance for local governments and water systems to develop documents.

The following water suppliers are required to develop and implement local drought plans and ordinances:

Union County Water Suppliers					
Agency	Type of Agency	Address	Phone Number	Water Source	Drought Water Management Plan
City of Union Utility Department	Sewer, Water, electricity & Gas Utilities, Govn't agency	101 Sharpe Avenue	(864) 429-1700 & 864-319-1322 (admin Assistant Mary Jo Sanders)	Broad River, looking to partner with City of Spartanburg for acquisition of Emergency Water	yes
Brown's Creek Water Company Inc.	Water Company	4287 Lockhart Highway, Union SC 29379	(864) 424-9820		unknown
Meansville Riley Water Company	Water Company	1779 Cross Keys Hwy, Union SC	864-427-5832		Yes – April 2003
Santuc Hebron Water Company	Water Company	174 State Road, Carlisle SC	(864) 429-0807		Yes -2016
Town of Carlisle Water district	Govn't	3911 Fishdam Avenue P.O. Box 305 Carlisle, SC 29031	(864) 427-1505	Broad River	Yes
Town of Jonesville	Govn't			Broad River, in future will purchase water from City of Union	No
Town of Lockhart	Govn't			Broad River	No

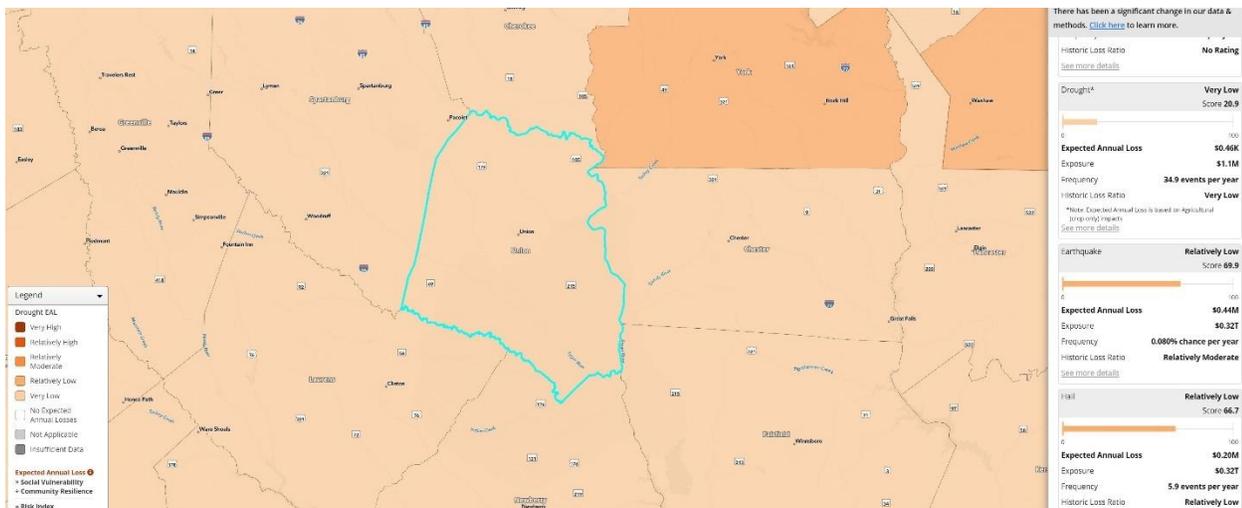
RISK

According to the FEMA National Risk Index, the overall drought risk is very Low for Union County. The drought risk is based on Agricultural (crop-only) impacts. The National Risk Index score for Drought in Union County is 19.2, where the median score is 52.91 for all hazards in the United States.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

The Expected Annual Loss for droughts in Union County is very low, with a score of 20.9. The expected annual loss is \$0.46 thousand, with an exposure of \$1.1 million. The frequency of the event is 34.9 events per year, with a 0.080% chance of occurrence per year. The Historic Loss Ratio is very low for droughts.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

CLIMATE CHANGE

According to the 2023 South Carolina Hazard Mitigation Plan, climate change effects on drought are unknown. The overall precipitation expected trend is for more intense hourly accumulations with fewer, shorter rain events. South Carolina used the annual precipitation total over the observed precipitation duration to prepare the trend. Major storms, tropical cyclones, and severe thunderstorms provide the chance for extreme rainfall conditions.

Higher average annual temperatures and drier conditions in response to temperature and precipitation levels hold the keys to South Carolina’s future regarding climate and drought. With warmer evenings, daily average temperatures during the warmer months would lead to drier conditions. Precipitation levels may change in intensity; however, the extent to which the annual precipitation levels change is uncertain.

IMPACT

A significant drought can create a range of impacts on community lifelines. The table below identifies the potential impacts a drought can have on community lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	No significant effects anticipated.	Regional
Energy	Medium	Hydroelectric and nuclear power generation could see challenges because of reduced water resources. Severe drought may result in structural stresses to infrastructure.	Regional
Food, Water & Shelter	High	Agricultural crop production will be reduced. Food and water resources will be reduced locally and regionally based on lack of rain and potential high heat conditions, if present. Economic impacts to agricultural interests because of lower productivity and increased costs, including irrigation.	Regional
Hazardous Materials	Low	No significant effects anticipated.	Regional
Health and Medical	Medium	Reduced availability of water could have negative health effects on people and animals. Reduced water resources could negatively impact emergency and medical operations	Regional

Safety and Security	Low	Reduced availability or consistency in water supplies may compromise firefighting capabilities.	Regional
Transportation	Low	No significant effects anticipated. Severe drought may result in structural stresses to transportation infrastructure.	Regional

RECOMMENDATIONS

1. Continue to monitor drought conditions by communicating with the State Climatologist's office and local monitoring station.
2. Communicate with water agencies that monitor the water supply.
3. The City of Union should continue to enforce its drought ordinance and drought emergency plan when necessary.
4. Union County should secure copies of each water provider's Drought Management Plan.
5. Union County should encourage citizens to take water-saving measures during drought events and ensure Drought Management Plans throughout the County are enforced.
6. The Towns of Carlisle and Jonesville should adopt an ordinance stating they will comply with the City of Union drought ordinance and drought emergency plan. The City of Lockhart should adopt an ordinance stating that it will abide by Union County drought ordinance and drought emergency plans.
7. The City of Union and other water providers in Union County should continue to monitor for leaks and improve water supply monitoring regularly.
8. Union County, City of Union, Towns of Carlisle, Lockhart, and Jonesville should consider adopting an ordinance that promotes landscaping with plants that are at minimum compatible with Zone 7b and 8a hardiness zone. Plants that are compatible with this zone can tolerate the heat of these zones and require less water usage than plants that are not native to the region. The jurisdictions should also promote other drought-tolerant plants and xeriscaping. Due to the jurisdiction's limited funds, it is recommended that the communities work together to prepare one ordinance that all communities can adopt.
9. Educate the public about water-saving measures such as the following:
 - Installing flow-saving showerheads and toilets.
 - Turning the water flow off while brushing teeth or during other cleaning activities.
 - Adjusting sprinklers to water the lawn and not the sidewalk or street.
 - Running the dishwasher and washing machine only when they are full.
 - Checking for leaks in plumping or dripping faucets.
 - Installing rain-capturing devices for irrigation.
 - Encouraging the installation of greywater systems in homes to promote water reuse.
 - Farming resources such as the Clemson Extension and local Soil and Water Conservation District for education on crop rotation, soil health, zero or reduced tillage, and other farming methods, and crop insurance.

10. The City of Union, Towns, and other water providers can apply for Hazard Mitigation funding to retrofit existing water systems to accommodate drought events or new systems to eliminate breaks or leaks.

CHANGES TO THIS SECTION

- ✓ Updated Historical Occurrence Subsection to include the latest data and drought maps
- ✓ Added Location Subsection
- ✓ Added Water Provider's table under Location Subsection
- ✓ Added Risk Subsection
- ✓ Added Climate Change Subsection
- ✓ Added Impact Subsection
- ✓ Added Recommendation Subsection
- ✓ Added Changes To This Section Subsection

EXTREME HEAT

DESCRIPTION

Heat is the number one weather-related killer in the United States. The National Weather Service statistical data shows that heat causes more yearly fatalities than floods, lightning, tornadoes, and hurricanes combined.

Extreme heat can be defined as temperatures that hover 10 degrees or more above the average high temperature for the region, last for prolonged periods, and can have high humidity. Under normal conditions, the human body's internal thermostat produces perspiration that evaporates and cools the body. However, in extreme heat and high humidity, evaporation slows, and the body must work much harder to maintain a normal temperature. Elderly persons, young children, persons with respiratory difficulties, and those who are sick or overweight are more likely to become victims of extreme heat. Because men sweat more than women, they are more susceptible to heat-related illness because they become more quickly dehydrated. Studies have shown that a significant rise in heat-related illness occurs when excessive heat persists for more than two days. Spending at least two hours per day in air conditioning can significantly reduce the number of heat-related illnesses.

Long periods of extreme heat in urban areas can create health concerns when stagnant atmospheric conditions trap pollutants, thus adding unhealthy air to sweltering temperatures. In addition, the "urban heat island effect" can produce significantly higher nighttime temperatures because asphalt and concrete (which store heat longer) gradually release heat at night.

NOAA'S WATCH, WARNING, AND ADVISORY PRODUCTS FOR EXTREME HEAT

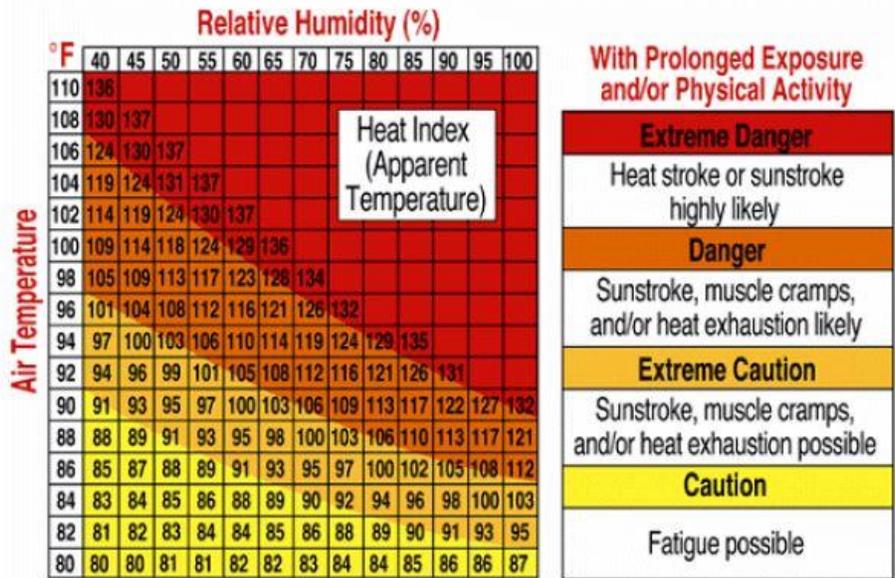
Excessive Heat Outlook: These are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead time to prepare for the event, such as public utilities, emergency management, and public health officials.

Excessive Heat Watch: This is issued when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A Watch is used when the risk of a heat wave has increased, but its occurrence and timing are still uncertain. A Watch provides enough lead time so those who need to prepare can do so, such as cities that have excessive heat event mitigation plans.

Excessive Heat Warning/Advisory is issued when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurring. NOAA issues warnings when conditions pose a threat to life or property. An advisory is for less severe conditions that cause significant discomfort or inconvenience. Excessive heat warnings/advisories could lead to a threat to life or property with a lack of caution.

The National Weather Service uses a relative heat measurement known as a heat index to describe to the public what the combination of high temperature and high humidity feels like during periods of high

temperatures. “Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature.” (Center for Disease Control, 2017) The combination of relative humidity and air temperature amplifies what is experienced outside and can impact the safety of outdoor activities for people and animals.



Source of data: National Oceanic and Atmospheric Administration

HISTORICAL OCCURRENCES

NOAA defines Extreme heat as temperatures that hover 10 degrees or more above the average high temperature for a region and last for several weeks. Though the event may not be as notable as other hazards that affect Union County, its effects can have devastating consequences. While it is hard to quantify the exact total number of deaths that are caused by heat wave weather, in an average year, about 170 Americans succumb to the demands of summer heat.

The Union County 2018 Hazard Mitigation Plan notes that the Hazards & Vulnerability Research Institute identified seven (7) extreme heat events between 1976 and 1999 in Union County resulted in over \$5,700,000 in property damage and over \$1,300,000 in crop damage. The National Climatic Data Center at NOAA lists no additional extreme heat records for Union County between 1950 and 2010. Temperatures reached 104-107 degrees during the 2012 extreme heat event. The highest temperature on record in the County is 110 degrees, which occurred in 1925.

Hazards & Vulnerability Research Institute Heat Records for Union County

Begin Date	Hazard Type	County	State	Injuries	Fatalities	Property Damage*	Crop Damage*
2/1/1976	Heat	Union	SC	0	0	108.7	1086.96
7/1/1977	Drought - Heat	Union	SC	0	0	1086.96	108695.65
10/1/1978	Drought - Heat	Union	SC	0	0	108.7	1086.96
6/1/1985	Heat	Union	SC	0	0	0	108695.65
6/1/1993	Heat	Union	SC	0	0	0	1086956.5
7/1/1993	Drought - Heat	Union	SC	0	0	5739130.43	0
7/23/1999	Heat	Union	SC	0	1	0	0
6/29/2012	Excessive Heat	Union	SC	0	0	0	0
7/1/2012	Excessive Heat	Union	SC	0	0	0	0
7/8/2012	Heat	Union	SC	0	0	0	0
Total	1	5,740,434.79	1,306,521.7				

Data Source: Hazards & Vulnerability Research Institute

*Losses are not adjusted for inflation.

Spatial Hazard Events and Losses Database for the United States (SHELDUS) identifies eight (8) heat records with a total \$4,121,195.65 (\$7,716,782.255 Adjusted in 2021 dollars) of crop damage and \$2,870,271.745 (\$5,230,549.985 adjusted in 2021 dollars) of property damage. The extreme heat events lasted for a total of 31 days and caused 1 death and no injuries.

Union County, SC Excessive Heat Events

Event ID	Begin Location	Begin Date	Begin Time	Event Type	Deaths Direct	Injuries Direct	Damage Property Num	Damage Crops Numb	Injuries Indirect	Deaths Indirect	Source	End Date
407661		6/29/2012	1200	Excessive Heat	0	0	0	0	0	0	ASOS	6/30/2012
<p>Episode Narrative: An oppressively hot and humid airmass that spent several days building west of the Appalachians finally made it east of the mountains, bringing very hot conditions to upstate South Carolina. The high temperature at Greenville-Spartanburg International Airport hit 105 degrees on the 29th and 103 degrees on the 30th, both records for the day. The heat index hit 106 degrees. The high temperature at Anderson hit 105 degrees on both the 29th and 30th with a heat index up to 107 degrees. Excessive heat affected areas south of Interstate 85. The Greenwood ASOS hit 106 degrees both days, with a heat index of 110 degrees on the 30th. The heat index also hit 110 at the Rock Hill ASOS. An elderly woman died on the 30th from heat-related complications in an Easley nursing home after the air conditioning quit working. Even hotter conditions extended through July 1st, before thunderstorms brought somewhat cooler conditions.</p>												
407698		7/1/2012	0	Excessive Heat	0	0	0	0	0	0	ASOS	7/1/2012
<p>Episode Narrative: Oppressive heat continued the first day of July over the Upstate, with Greenville-Spartanburg International Airport hitting an all-time record high temperature of 107 degrees. However, low dewpoints kept the heat index just below 110. The Greenwood ASOS had a max temp of 107 and a heat index of at least 110. At Rock Hill the high was 104, but the heat index topped out at 112 degrees as dewpoints were higher in the lower elevations of the Catawba River valley. Widespread thunderstorms developed during the afternoon hours, bringing a few days of relief from the heat.</p>												

HAZARD ANALYSIS

There is no digital GIS data available for Union County to delineate localized areas of the county prone to extreme heat or to determine a Union Counties propensity for extreme heat events in relation to the

rest of the state. Data may be available in the future and mapping will be updated as it becomes available.

VULNERABILITY

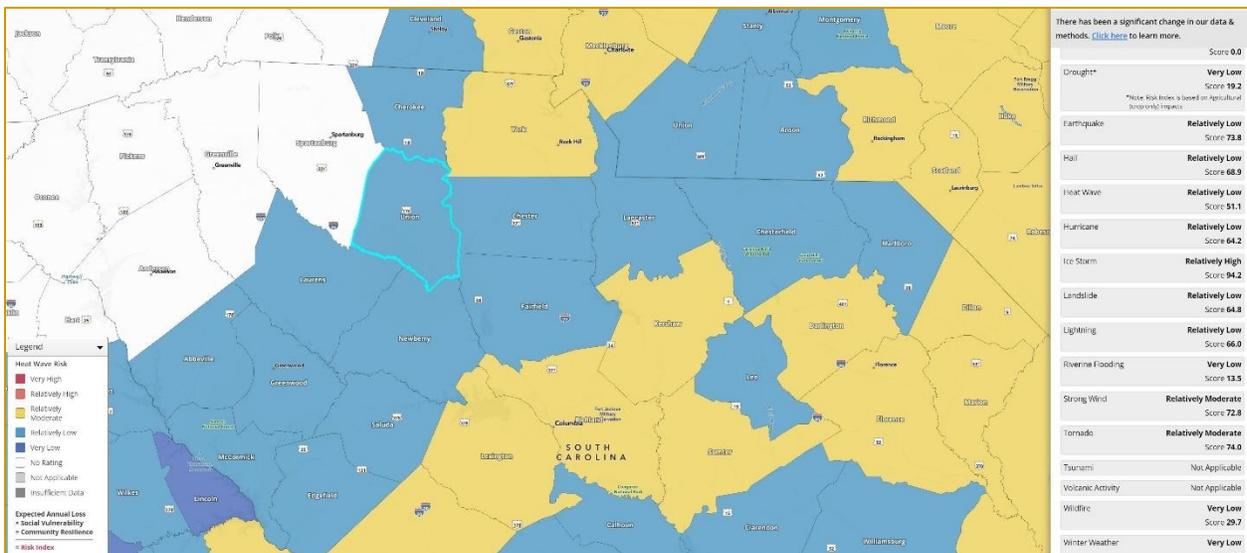
All areas of Union County have vulnerability to extreme heat events. According to the CDC, populations most at risk of health impacts during periods of extreme heat include those aged 65 and older, infants and children, outdoor workers, individuals with chronic medical conditions, and low-income residents. People without access to adequate air conditioning also are more vulnerable.

LOCATION

Extreme Heat has the potential to affect the entire planning area. All regions are impacted uniformly across the planning area, with a similar extent and probability of occurrence.

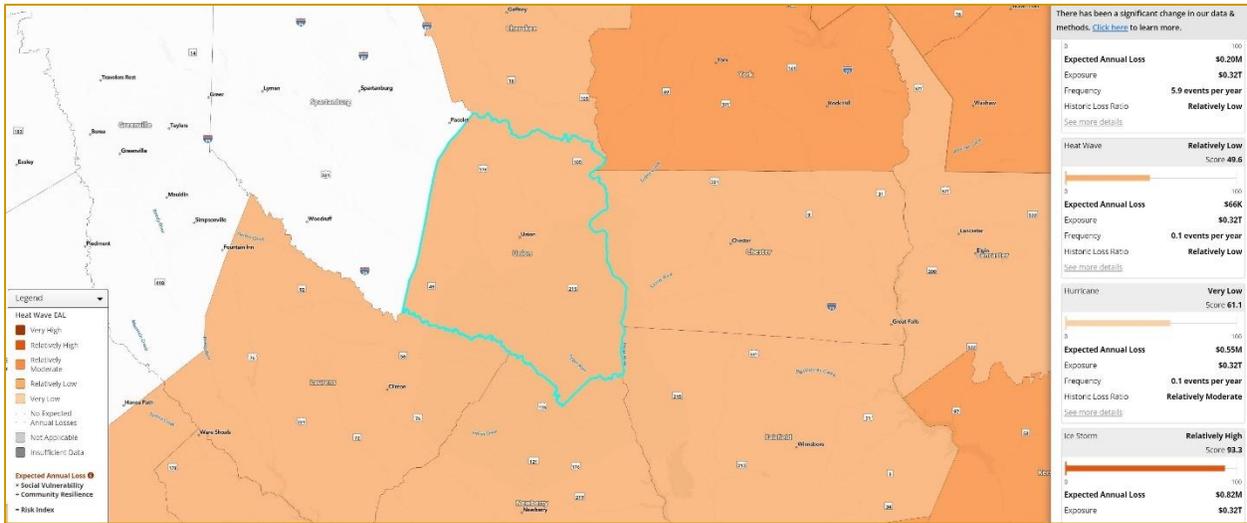
RISK

According to the FEMA National Risk Index, the overall risk of Heat Wave events is Relatively Low for Union County. The National Risk Index score for Heat Wave events in Union County is 51.1, where the median score is 52.91 for all hazards in the United States.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

The Expected Annual Loss for Excessive Heat in Union County is relatively low, with a score of 49.6. The expected annual loss is \$66 thousand, with an exposure of \$0.32 trillion. The frequency of the event is 0.1 events per year.



Source: FEMA National Risk Index (hazards.fema.gov/nri/map)

CLIMATE CHANGE

According to the 2023 South Carolina Hazard Mitigation Plan, climate studies anticipate the global average temperature will increase during the next few decades between “between 0.5°F and 1.3°F (0.3°–0.7°C).”³ Many factors play a role in the anticipated increase in temperatures such as global aerosol, carbon, and greenhouse gas emissions; human activities such as development and land use; and the Earth’s natural atmospheric and environmental feedback variabilities. As temperatures warm, vulnerability to temperature-related illnesses, injuries, and fatalities can be expected to increase.

IMPACT

Impacts of extreme heat that are of most concern are impacts on human health and on agricultural production. The table below identifies the potential impacts extreme heat can have on community lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	No significant effects anticipated.	Regional
Energy	Medium	Generation operations and other electric power sources may be stressed by increased demand. Energy disruptions could affect supply chains and create cascading impacts in other lifeline sectors.	Regional
Food, Water & Shelter	medium	Agricultural crop production could be reduced. Food and water resources will be reduced locally and regionally based on lack of rain and potential high heat conditions if present. Economic impacts to agricultural interests because of lower productivity and increased costs, including irrigation.	Regional
Hazardous Materials	Low	No significant effects anticipated.	Localized
Health and Medical	Medium	Excessive Heat temperatures may add an influx of patients to medical facilities for treatment for exposure; elderly patients and those in areas with power outages from blackouts or homeless will be most vulnerable.	Regional
Safety and Security	Low	Safety and security personnel could experience health risks from extreme cold temperatures	Localized
Transportation	Low	Over an extended period of excessive heat, roads and runways can buckle, train tracks warp and bridges swell. A few days of excessive heat should not cause this impact.	Localized or Regional

RECOMMENDATIONS

1. Educate the public about ways to reduce the Urban Heat Island effect by:
 - Increase tree plantings around buildings to shade parking lots and along public rights-of-way.
 - Encourage the installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air.
 - Use cooling roofing products that reflect sunlight and heat away from a building.
2. Assist vulnerable populations by:
 - Establishing and promoting accessible cooling centers in the community

- Creating a database to track those individuals at high risk of death, such as the elderly, homeless, etc.
1. Educate the public about utility and weatherization programs that can assist low/moderate-income individuals.
 2. Union County and Towns – Encourage plantings of trees and other landscaping measures as part of stormwater management when reviewing applications for water/sewer extension lines.

CHANGES TO THIS SECTION

- ✓ Updated Historical Occurrence Subsection to include the latest data
- ✓ Added Location Subsection
- ✓ Added Risk Subsection
- ✓ Added Climate Change Subsection
- ✓ Added Impact Subsection
- ✓ Added Recommendation Subsection
- ✓ Added Changes to This Section Subsection

MANMADE/ TECHNOLOGICAL DISASTERS

The following disasters are manmade technological disasters.

- ◆ Hazardous Materials Trucks and Railways
- ◆ Hazardous Materials Manufacturing Facilities, Fuel Storage & Other Hazardous Materials
- ◆ Airports and Flight Paths
- ◆ Nuclear Station Disaster
- ◆ High Hazard Potential Dams
- ◆ Power Outages
- ◆ Terrorism (includes Cyber Security and school emergencies)
- ◆ Infectious Diseases
- ◆ Local Economic Hazards

Hazardous Materials Disasters Truck Routes and Railways

DESCRIPTION

Truck Routes, Railway, and Manufacturing facilities can pose a hazardous materials disaster. Trucks and trains can carry toxic chemicals. The US Department of Transportation requires labeling with appropriate placards for all trucks, train cars, other ground shipments, air shipments, and vessels carrying toxic chemicals.

Should an accident with a toxic chemical occur, Union County, City, and municipal officials should contact the National Response Center (1-800-424-8802) to report such an incident within 12 hours of such incident. Federal regulations Section 171.16 require incidents to be reported through the Pipeline and Hazardous Materials Safety Administration (PHMSA) within 30 days of the incident. The regulation also requires a follow-up written report within one year of the incident, based on certain circumstances, to be reported to PHMSA through the Hazardous Materials Incident Report Form DOT F 5800.1 ([49 eCFR 171.16](#)).

Certain chemical spills may warrant an evacuation of a specific perimeter area, such as half of a mile, mile, etc. evacuation zone. The county, City, and towns should prepare to properly evacuate residents located along truck routes, train tracks, and manufacturing facilities.

The Town of Carlisle has two train tracks that intersect with each other. The Town of Carlisle should consider preparing a plan for this area to address train derailments, as it is more vulnerable than other county areas to such an incident.

The City of Union has truck routes and train routes that run through the city. The City of Union should create a plan and review annually for train derailments and truck hazardous materials incidents.

The Town of Lockhart has the Route 9 bridge that travels over the Lockhart Dam and Broad River into Chester County. This bridge is a designated truck route traveling next to existing housing stock.

The appendix section of this report includes maps of train and truck routes.

County, city, and town officials should review identified dangerous truck route intersections and high accident areas for potential improvements.

The following intersections and road sections have been provided by committee members and the public and noted for review:

- 114 & 9 intersection
- Arthur Blvd & Main Street (a vehicle took out a pole at this location)

- Industrial Road – No Truck Traffic Sign needs to be relocated. The current location is too close to Industrial Road, and trucks do not have enough time to turn. Sign relocation would prevent truck traffic onto the road.
- 72 curve and stretch by Carlisle – many accidents due to curve and speeding.
- Bob Little/Bob Faucette & Route 9 intersection – accidents
- Monarch Highway overpass – needs to be addressed.
- Downtown Jonesville – alternative Truck Route onto Pacolet Street proposed to bypass downtown (high number of Dollar General Distribution trucks)
- Concern with tanker rail cars from Piedmont Concrete and other trains getting into an accident (train accident/derailment from accident)

VULNERABILITY

Sites closest to rail and truck traffic routes are the most vulnerable in Union County. Changes to transportation routes or the volume of materials transported can alter vulnerability. Areas with a higher concentration of residents adjacent to truck routes and rail lines are more vulnerable. The City of Union, Town of Jonesville, Town of Carlisle, and Town of Lockhart are vulnerable to hazardous materials accidents from truck routes. The City of Union, the Town of Jonesville, and the Town of Carlisle are vulnerable to trains carrying hazardous materials on rail lines and derailments.

HISTORICAL INCIDENTS

There have been four (4) Hazardous Materials spill incidents in Union County documented in the Pipeline and Hazardous Materials Safety Administration portal. The towns of Jonesville and Carlisle each had two (2) reported incidents. The responsible parties quickly resolved the incidents and contacted cleanup contractors when warranted. Three incidents were on highways and one on rail at an existing facility.

There was a train derailment in Delta on State Route 176 in Union County on June 11, 1993. Seven of the train's cars derailed and rolled down the embankment. Six of the cars were loaded, and one was empty. The following chemicals were leaked:

1. Ethylene Glycol
2. Hydrochloric acid solution (18,000 gallons leaked)
3. Methyl Alcohol (5,000 gallons leaked) and Phosphatic Fertilizer.

(Source:

US Department of Transportation Hazardous Materials Incident Report for Incident Id: I-1993070408)

FREQUENCY AND PROBABILITY

The South Carolina Department of Emergency Management has prepared future annual probability and frequency intervals for future hazardous materials events based on 2000-2021 Hazmat transportation occurrence data. Union County’s future annual probability is 9.09% chance per year with a frequency of 11 years.

County	HAZMAT Transportation Occurrence (2000-2021)	
	Future Annual Probability (% chance per year)	Frequency Interval (years between event)
Union	9.09	11.00

CLIMATE CHANGE

According to the 2023 South Carolina Hazard Mitigation Plan, there is no indication of a direct relationship between climate change and hazardous materials incidents. However, increases in temperature extremes and severe weather events could result in hazardous material releases as secondary effects.

IMPACT

A high consequence hazardous materials scenario can have impacts on community lifelines. The table below describes the potential impacts a significant hazardous material scenario could have lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	Significant impacts are not anticipated other than potential increases in telecommunications volume.	Localized
Energy	Medium	A release could cause loss/wastage of fuel, which could reduce supply. Releases may disrupt access to power facilities, fuel stations, or pipelines.	Localized or Regional
Food, Water & Shelter	High	Release of hazardous materials may result in the need to evacuate residential areas and may cause contamination of local food or water supply. Residents in affected areas may need emergency shelter and other support. Large	Localized or Regional

		releases could result in embargos of crops and livestock.	
Hazardous Materials	High	A hazardous material release may damage or contaminate immediate facilities as well as nearby areas. This could cause public health and environmental risks. Damage could result in loss of material, causing economic loss. Site personnel may be injured or need to be evacuated. Operations related to the storage, production, or transport of the hazardous materials involved in the release may be disrupted or halted and supplies of the materials may be constrained.	Localized or Regional
Health and Medical	High	A hazardous material release in the immediate area could create health and safety hazards that necessitate evacuation of medical facilities and interruption of normal operations. A release may cause contamination that requires decontamination. Medical facilities can expect an influx of patients who have been exposed to the hazardous material or report symptoms. Hazardous conditions may result in closure or rerouting of transportation used to access facilities or locations where medical assistance is needed.	Localized or Regional
Safety and Security	Low	A hazardous material release in the immediate area could create health and safety hazards that necessitate evacuation of nearby areas. Specialized detection, modeling, containment/mitigation, and safety equipment as well as training may be needed, depending on the type and volume of material. Responders will need to quickly identify the type of material and appropriate protocols to protect human health and safety, including their own, and the environment.	Localized
Transportation	Low	Release of hazardous materials in transit could cause hazardous conditions on roadways or rail or at port or airport facilities, resulting in closures and disruptions to operations. From a fixed site release, significant impacts on transportation are not expected. A significant release of petroleum products could impact transportation through loss of supply.	Localized or Regional

RECOMMENDATIONS

1. Union County should prepare Action Plans for Train Derailments and Truck Hazardous Materials for truck routes and railroads located in Union County. Plans should include community evacuation plans if warranted.
2. Contact Information to report spills should be easily accessible at police, fire, and EMS facilities, as well as in the Emergency Management Office.
3. Union County Emergency Management should communicate concerns and try to find a solution regarding tanker cars with rail lines to prevent a train accident.

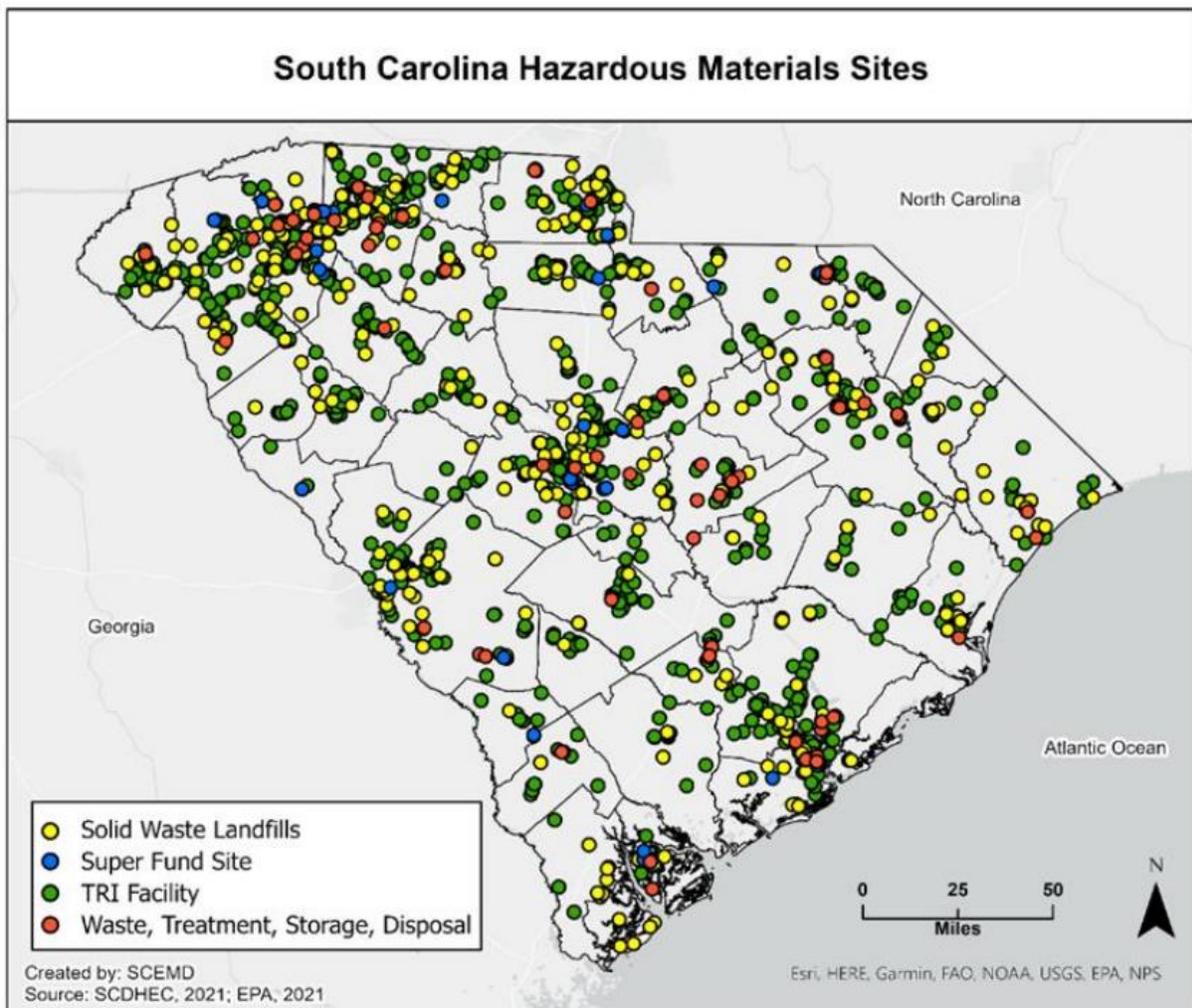
CHANGES TO THIS SECTION

- ✓ This entire section is new.

MANUFACTURING, FUEL STORAGE AND OTHER HAZARDOUS MATERIALS FACILITIES

DESCRIPTION

The United States Environmental Protection Agency provides a list of locations of Superfund sites, Toxic Release Inventory (TRI) facilities, and other hazardous material sites for South Carolina for 2021. Data on these locations is reported to the federal Environmental Protection Agency (EPA) by operators to comply with federal laws and regulations. According to the EPA, Superfund sites are uncontrolled or abandoned places where hazardous waste is located that may affect the local ecosystem or community. The TRI database contains information on 709 chemicals and chemical categories that industrial and other facilities manage (dispose of, recycle, treat, etc.) for the country (United States Environmental Protection Agency, 2022).



Source: 2023 South Carolina Hazard Mitigation Plan

Union County has 53 TRI, Hazardous Materials Treatment, Storage, Disposal and Solid Waste Landfill Sites. There are no Superfund Sites located in Union County.

County	TRI	Superfund	Hazardous Material Treatment, Storage, Disposal	Solid Waste Landfill	Total
Union	35	0	8	10	53

Manufacturing facilities may utilize or produce toxic chemicals as a byproduct of the production process. Union County emergency management, police, and fire officials should take tours of each facility within their jurisdiction to assess chemicals utilized, materials stored (such as batteries, fuel, etc.), and chemical byproducts created and stored.

These site visits will allow officials to prepare response plans for fires and hazardous materials incidents for each manufacturing facility. Emergency responders should review response plans annually to ensure plans include new manufacturing technology, closures, and new facilities. In addition, Union County Emergency Management or manufacturing owner/ operator should prepare evacuation plans for the community around each facility to address a potential fire/hazardous release incident caused by the chemical/byproduct/material storage.

The 2021 EPA data identifies the following four locations as Toxic Release Facilities:

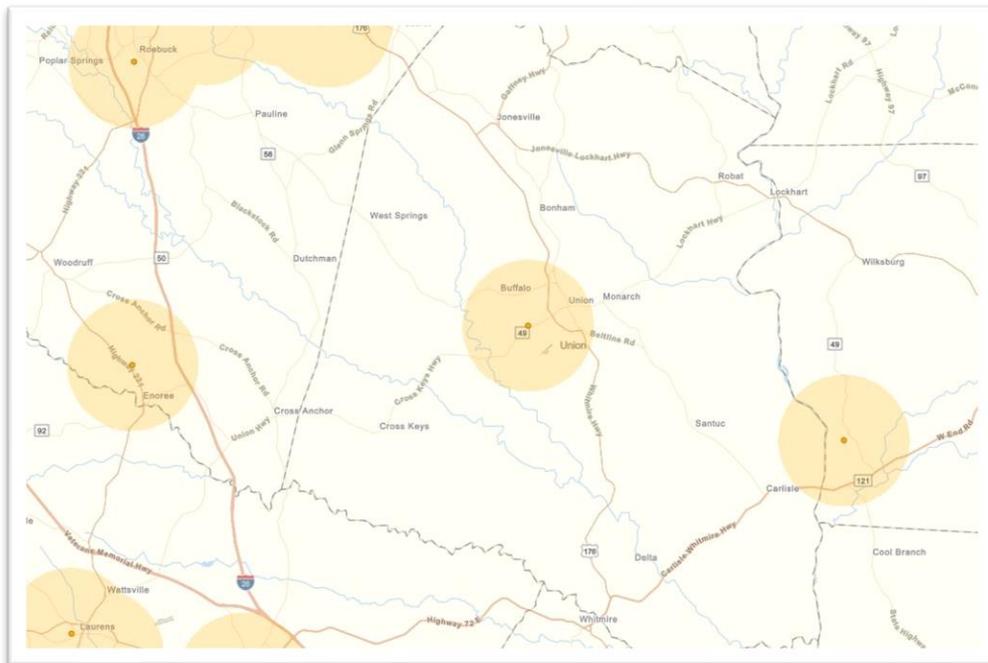
Union County Toxic Release Facilities (EPA 2021)									
Facility Name	Address	City	State	Industry	Air Releases (lb)	Water Releases (lb)	Land Releases (lb)	Offsite Releases (lb)	Total Releases (lb)
STELLA-JONES CORP	1121 DELTA RD	WHITMIRE	SC	321	9	42	0	6044	6095
THE TIMKEN CO - TYGER RIVER PLANT	408 INDUSTRIAL PARK RD	UNION	SC	332	2499	4	0	72	2575
GESTAMP SOUTH CAROLINA LLC	1 LSP RD	UNION	SC	336	0	0	0	0	0
SPECTRA COLORANTS	228 INDUSTRIAL PARK RD	UNION	SC	325	0	0	0	0	0

Source: US EPA Toxic Release Facilities, 2021

Union County’s manufacturing facilities are mostly isolated from the County’s housing stock. As the County develops, communities with zoning should consider carefully locating manufacturing facilities an appropriate distance from housing. Union County does not have zoning codes. Sewer and water providers should only approve the extension of new sewer and water lines for new facilities, which will have a limited impact on existing or approved new housing developments. Sewer and water providers should only approve extension lines for uses compatible with existing manufacturing plants and industrial parks to avoid residential/industrial use incompatibility.

Other Hazardous Materials facilities include sites that store highly flammable materials such as fuels, tires, batteries, and pressurized gases, including scrap yards. The location of existing fire hydrants can cause closure of roads and train tracks when fires occur at the facilities. Union County Firehouses should perform a complete fire hydrant study for all existing manufacturing facilities and other Hazardous Materials sites to ensure that fire hydrants are located on the same side of the road as the facility and that no other barriers, such as train tracks, are preventing adequate access to the hydrant. Hydrants must also be able to provide sufficient water pressure. In addition, fire departments should locate hydrants away from highly flammable storage tanks or other flammable facilities and be easily accessible.

High Risk Industrial and Commercial Facilities with 300 Buffer



High Risk and Major Hazard Facilities are industrial sites where large amounts of hazardous materials are stored, handled, or processed. The United States Environmental Protection Agency requires facilities that use extremely hazardous substances to develop a Risk Management Plan (RPM). The RPM identifies

the potential effects of a chemical accident, identifies steps the facility is taking to prevent an accident, and spells out emergency response procedures should an accident occur.

Facilities that are determined to be regulated are subject to four types of emergency planning notifications [40 CFR 355.20]:

1. You must provide notice to your State or Tribal Emergency Response Commission (SERC or TERC) and Local or Tribal Emergency Planning Committee (LEPC or TEPC) that your facility is subject to the emergency planning requirements of this subpart, within 60 days after your facility first becomes subject to the requirements of this subpart.
2. You must designate a facility representative to participate in the local emergency planning process as a facility emergency response coordinator. You must provide notice of this facility representative to your Local or Tribal Emergency Planning Committee (LEPC or TEPC) within 60 days after your facility first becomes subject to the requirements of this subpart.
3. You must provide notice of any changes occurring at your facility that may be relevant to emergency planning to the Local or Tribal Emergency Planning Committee (LEPC or TEPC) within 30 days after the changes have occurred.
4. You must provide any information necessary for developing or implementing the local emergency plan if the Local or Tribal Emergency Planning Committee (LEPC or TEPC) requests it within the timeframe set by the Local or Tribal Emergency Planning Committee (LEPC or TEPC).

EPA does not require any specific format. EPA recommends submitting the information described above in writing to ensure appropriate documentation. The State or Tribal Emergency Response Commission (SERC or TERC) or Local or Tribal Emergency Planning Committee (LEPC or TEPC) may request that this information be submitted in a specific format. Contact your State or Tribal Emergency Response Commission (SERC or TERC) for specific reporting requirements.

Homeland Infrastructure Foundation-Level Data (HIFLD) identifies the following facilities requiring EPA Emergency Response Risk Management Plan (RMP) Facilities.

EPA Emergency Response Risk Management Plan (RMP) Facilities		
Facility Name	Location	Status
Tosches Creek Wastewater Treatment Plant	1701 Cross keys Hwy	Active
Union City of Water Filter Plant	108 Calhoun Street	Inactive
Chemtrade Performance Chemicals LLC	3507 Leeds Road	Active

Emergency Management officials must visit an EPA reading room to review Risk Management Plans (RMP) for the RMP-identified facilities.

Union County has a total of 30 manufacturing facilities. Manufacturing facilities are or have the potential of utilizing, producing, or storing hazardous materials. This report assumes all manufacturing facilities are hazardous materials facilities.

Hazardous Materials - Manufacturing Facilities				
Name	Type	Description	Address	Phone
Covalent Chemical Warehouse	Oil/HAZMAT Facilities (e.g., chemical, nuclear)	specialty and commodity chemical distributor serving the paint and coatings, oil and gas, adhesives and sealants, agriculture, and custom blending operations industries	945 Rice Avenue Ext Union, SC 29379	(864) 427-0371
Kemper Corporation	HAZMAT Facilities	Manufacturer of cargo securement products	100 Times Blvd Union, SC 29379	(864) 424-9894
Organic Dyes and Pigments	Hazmat Facilities	Manufacturer of high-quality dyes, pigments, and chemical auxiliaries	100 Industrial Dive Union, SC 29379	(864) 427-5824
Spectra Colorants Inc.	Hazmat Facilities	Production of flexo-printing Ink, paper coating, seeds coating, mulch dyes, sealer, textile printing, etc.	228 Industrial Park Rd Union SC, 29379	(864) 427-2720
Gillespie Plant – Milliken & Company	Hazmat Facilities	Textile Manufacturing	153 Lower Fairforest Church Road Union, SC 29379	(888) 723-2876
CSL Plasma – former Haemonetics manufacturing facility		Manufacturing of liquid saline and sodium citrate	155 Medical Sciences Union, SC 29379	(864) 427-6293
Gestamp	Hazmat Facilities	Design, development, and manufacture of metal automotive components	1 LSP Rd Union, SC 29379	(864) 466-3960
Gestamp – Building #2	Hazmat Facilities	Design, development, and manufacture of metal automotive components	2 LSP Rd Union, SC 29379	(864) 466-3960
The Timken Company	Hazmat Facilities	Manufacturing of industrial bearings, seals, lubrications, and lubricating systems, etc.	7 LSP Rd Union, SC 29379	(864) 424-1600
P&M Fabrications	Hazmat Facility	Pipe fabrication, pipe bending, welding and related services	452 Industrial Park Rd Union, SC 29379	(864) 429-3648
Standard Textile Co Inc.	Hazmat Facilities	Textile Manufacturing	100 High Point Drive Union, SC 29379	(864) 427-4601
Gonvauto South Carolina LLC	Hazmat Facilities	Steel Distributor	1725 Jonesville Hwy Union, SC 29379	(864) 466-3346

Hazardous Materials - Manufacturing Facilities				
Name	Type	Description	Address	Phone
Sonoco Plastics	Hazmat Facilities	Plastic fabrication	242 State Rd S-44-290 Union SC 29379	(864) 429-4231
Anduran Inc.	Hazmat Facilities	Molded Plastic Manufacturing company	2391 Jonesville Hwy Union, SC 29379	(864) 427-4684
Pea Ridge Distillery	Hazmat Facility	Distilling of Moon Shine	1141 Pineland Rd Union, SC 29379	(864) 426-5078
Cedar-Hill Plant – Milliken and Company	Hazmat Facility	Textile Manufacturing	225 Bob Little Rd Jonesville, SC 29353	(864) 429-2771
Resolute Forest Products	Hazmat Facility	Producer of diverse range of wood, pulp, tissue and paper products	307 Chip Mill Road Jonesville, SC 29353	(864) 674-5749
International Paper Co.	Hazmat Facility	Producer of fiber-based products (paper, packaging, pulp and reuse of recycle paper materials)	177 Strother Rd Union, SC 29379	(864) 427-2179
Global Felt Technologies	Hazmat Facility	Manufacturer and supplier of nonwoven fabrics	541 Buffalo-West Springs Hwy Union, SC 29379	(864) 427-1815
DC Heavy Hydraulics	Hazmat Facilities	Heavy Equipment rebuilds, hydraulic pumps repair and remanufacturing, and dyno and diagnostic testing for remanufactured hydraulic pumps and cylinders	124 Times Blvd Union, SC 29379	(864) 206-4884
Southeast Emulsions – Union Terminal	Hazmat Facilities	Paving materials supplier	1404 Jonesville Hwy Union, SC 29379	(706) 244-0772
Ace Auto Salvage	Hazmat Facilities	Auto salvage	419 Poplar Road Jonesville, SC 29353	(864) 674-6789
Santuc Precisions LLC	Hazmat Facility	Machine services for global industrial and manufacturing industries	101 Highpoint Drive Union, SC 29379	(864) 427-1153

Hazardous Materials - Manufacturing Facilities				
Name	Type	Description	Address	Phone
Allied Industries	Hazmat Facility	Commercial Flooring Manufacturing	1088 Gaffney Hwy, Jonesville SC 29353	(864) 674-0018
GES Recycling	Hazmat Facility	recycling	1370 Jonesville Hwy Union, SC 29379	
Piedmont Concrete Products Inc.	Hazmat Facility	Concrete Products	1318 Jonesville Hwy Unio, SC 29379	(864) 427-1756
Timken US Corporation Tyger River Plant	Hazmat Facility	Manufacturing of industrial bearings, seals, lubrications, and lubricating systems, etc.	408 Industrial Park Rd Union, SC 29379	(864) 427-0898
Carlisle Finishing Plant	Hazmat Facility	Textile Mill	3863 Carlisle Chester Hwy Carlisle, SC 29031	(864) 466-4100
Daifuku Carlisle Forging Plant	Hazmat Facility	Metal Production – Metal Forging	P.O. Box 400, 156 Webb Foraging Road Carlisle, SC 29031	(864) 427-8421
MycoWorks	Unknown (begins production in 2024)	Production of leather alternative (Fine Mycelium)	260 Midway Drive Union, SC 29379	

There are 21 known fuel storage facilities, as noted below. Fuel storage facilities are highly flammable.

Fuel Storage /Distribution Facilities

Name	Type	Address	Phone
KinderMorgan Plantation Pipeline	Pipelines (Petroleum products and biodiesel)	City of Spartanburg nearest portion of pipeline	(800) 276-9927 Publicawareness@kindermorgan.com
Colonial Pipeline Co	Pipelines (Petroleum products)	City of Spartanburg	(678) 762-2250 Fax (678) 762-2315 dharring@colpipe.com
Carolina Gas Transmission, LLC (located in Union County)	Pipeline (Natural Gas)	925 White Oaks Blvd. Bridgeport, WV 26330	(681)842-3200 Samantha.Norris@bhegts.com
Southeast Emulsions Inc., Southeast Emulsions Union Asphalt	Petroleum Product Terminal (storage facility)	1404 Jonesville Hwy, Union SC 29379	(706) 244-0772
City West Diesel Plant – Lockhart Power Co. (Electric Utility)	Petroleum Liquids (Fossil Fuel Electric Power Generator)	198 Times Blvd Union, SC 29379	
Webb Foraging Plant – Electric Utility	Petroleum Liquids	160 Webb Foraging Road, Carlisle, SC 29031	1-800-847-7424 Customercare@santecooper.com
Murphy USA	Fuel Distribution (gas stations)	309 Buffalo-West Springs Hwy Union, SC 29379	(864) 427 - 3567
Wingo’s Tires	Fuel Distribution (gas stations)	501 Thompson Blvd Union, SC 29379	(864) 427-3151
Marathon	Fuel Distribution (gas stations)	908 S. Duncan Bypass Union, SC	(864) 427-4512
Valero	Fuel Distribution (gas stations)	100 N. Duncan Bypass Union, SC	(864) 429-0550
Gene’s One Stop	Fuel Distribution (gas stations)	870 Jonesville Hwy Jonesville, SC 29353	(864) 674-5425
J& T Express	Fuel Distribution (gas stations)	2549 Santuc Drive Union, SC	(864) 427-4210

Fuel Storage /Distribution Facilities			
Name	Type	Address	Phone
Mobile	Fuel Distribution (gas stations)	439 N Duncan Union, SC 29379	(864) 429-5758
Exxon	Fuel Distribution (gas stations)	1315 Lockhart Hwy Union, SC 29379	(864) 427-4577
Valero	Fuel Distribution (gas stations)	1237 Arthur Blvd. Union, SC 29379	(864) 427-5130
Valero	Fuel Distribution (gas stations)	1241 Duncan Bypass Union, SC 29379	(210) 345-2000
Exxon	Fuel Distribution (gas stations)	101 N Duncan Bypass Union, SC 29379	(864) 427-2050
Kelly's One Stop	Fuel Distribution (gas stations)	1508 Jonesville Lockhart Hwy Union, SC 29379	(864) 674 - 6659
Exxon	Fuel Distribution (gas stations)	2908 Furman L. Fendley Hwy Jonesville, SC 29353	(864) 674-6742
Circle K	Fuel Distribution (gas stations)	400 S. Main Street Jonesville, SC 29353	
Troy Shelton Field, Union County	Aviation fuel	198 Airport Road Union, SC 29379	(864) 429-1680 - Mr. Ronnie Wade, Airport Manager

HISTORICAL OCCURRENCES

The following manufacturing facilities suffered fires and were on the news:

- 1. Southeast Emulsions – March 16, 2019, Asphalt Tank Fire (Emergency Management, Bonham Fire Company and other fire companies responded)**

Incident description:

According to Bonham Fire Department, an asphalt storage tank overflowed while it was being filled Sunday morning. Crews at the facility discovered the fire Sunday afternoon and called fire departments.

The tank was holding 2.1 million gallons of liquid asphalt. Officials say insulation between the inner tank and the outer shell of the tank caught fire. Fire officials say the tank was leaking asphalt but the leak has been plugged by the cooled asphalt.

Crews were still working to take tank shell apart and extinguish remaining flames early Monday.

On Sunday afternoon, Union County Emergency Management asked residents living within a mile of the facility to voluntarily evacuate. Emergency officials said the evacuation is a precaution and there is no threat to citizens, property, or animals.

Major Robert Hines with Union County Emergency Management said in an email Monday morning that all evacuations were suspended at 4 a.m. and that the fire was finally out.

At least 50 firefighters responded to the scene.

Public Comments at the August 8, 2023 meeting: “Railroad was closed down due to this fire and the rail company was not happy. The rail had to be closed to access the Fire Hydrant across the tracks and on the other side of the road. There was a fire hydrant on site but we couldn’t access it because it was located next to the burning storage tanks”

1. Standard Textile Fire (March 11, 2022, May 9, 2022) –fire (Emergency Management Response, local news reports)

May 9, 2022 (7 News WSPA.com) - A fire broke out Monday night at a textile plant in Union County. Firefighters responded to Standard Textile on Highpoint Drive shortly after 9:00pm. According to the Bonham Fire Department, firefighters arrived at the plant to find fire and heavy smoke inside the facility.

The department said the fire originated in a tenter frame machine at the plant. Three tenter frame machines were also damaged by smoke.

March 11, 2022 (WYFF 4) - According to dispatch, a machine inside the plant caught fire. All 10 fire departments in Union County responded to the plant. Just before 11 p.m. dispatch confirmed the fire was under control.

The following facilities have had an oil/HAZMAT/Toxic incident. A list of the facilities and status of incident are identified in the tables below. Note: some of the facilities no longer exist and have since closed. Most incidences are from petrol leaks.

Union County Oil/HAZMAT/ Toxic Incidents from Facilities

Agency	Substance	Status	address
Circle K	Petrol	No further action	400 S. Main Street Jonesville, SC 29353
Union One Stop Shop	Petrol	Open	4509 Jonesville Lockhart Hwy Union, SC 29379
Cabaniss Service Station	Petrol	Open	5150 Jonesville Lockhart Hwy Lockhart, SC
F M Webber Store	Petrol	No Further Action	SC #9 & SC #49 Lockhart, SC
Parks Service Station	Petrol	No Further Action	Canal Street Lockhart, SC
Union School Bus Shop	Petrol	No Further Action	1734 Jonesville Hwy Union, SC 29379
Premier Colors Inc.	Other (Toxic Incident)	No Further Action	100 Industrial Drive Union, Sc 29379
Lil Cricket 216	Petrol	No Further Action	1100 Lakeside Drive Extension Union, SC 29379
Morris Service Station	Petrol	No Further Action	1502 Lockhart Hwy Union, SC 29379
Fast Phils	Information not provided	No Further Action	1103 E Main Street Union, SC 29379
Union Dry Cleaning	Petrol	No Further Action	307 E. Main Street Union, SC 29379
Arthur State Bank	Petrol	No Further Action	100 E Main Street Union, SC 29379
City of Union	Petrol	No Further Action	101 Sharpe Avenue Union, SC 29379
Timken US Corporation Tyger River Plan	Other -2020	Brought back into compliance (continually monitored by state and currently in compliance)	408 Industrial Park Rd Union, SC 29379
Union Mill	Petrol	No Further Action	201 Enterprise Street Union, SC 29379
McCoy Service Co Inc	Petrol	open	215 N. Pinckney Street Union, SC 29379
Greers Shell 1	Petrol	open	307 Pinckney Street Union, SC 29379
Derrick Motor Co	Petrol	No Further Action	218 S Pinckney St Union, Sc 29379
Clifford Knox Gulf	Petrol	No Further Action	Pinckney & Palmer Street Union, SC 29379

Union County Oil/HAZMAT/ Toxic Incidents from Facilities

Agency	Substance	Status	Address
DD's Food Mart #2	Petrol	No Further Action	616 W. Main Street Union, SC 29379
Union Medical Center	Petrol	No Further Action	322 W. South St Union, SC 29379
Milliken & Co Midway Finishing Plan	Petrol	No Further Action	SC Hwy 49 W Union, SC 29379
Paul Greer Exxon	Petrol	No Further Action	101 N Duncan Bypass Union, Sc 29379
Torrington Company	Petrol	No Further Action	408 Industrial Park Rd Union, SC 29379
Southern Bell Union SOC	Petrol	No Further Action	844 Rice Avenue Ext Union, SC 29379
FMS #8 Union	Petrol	No Further Action	165 Industrial Park Rd Union, SC 29379
Cricket 3849	Petrol	No Further Action	1126 Main Street Buffalo, SC 29321
Bob's Gulf	Petrol	open	2014 Main Street Buffalo, SC 29321
Cricket 3818	Petrol	No Further Action	2007 Main Street Buffalo, SC 29321
KC Mart	Petrol	No Further Action	439 N Duncan ByPass Union, SC 29379
Conso Products Company Inc	Petrol	No Further Action	513 N Duncan Bypass Union, SC 29379
Car Quest Auto Parts	Petrol	No Further Action	605 N Duncan Bypass Union, SC 29379
SC 531	Petrol	No Further Action	531 Thompson Blvd Union, SC 29379
Wingo's Tire Center	Petrol	No Further Action	501 Thompson Blvd Union, Sc 29379
ENK 560	Petrol	Open	303 Thompson Blvd Union, SC 29379
Union Patrol Facility	Petrol	No Further Action	1000 N Pinckney St Union, SC 29379
110 May St LLC	Petrol	No Further Action	104 May Street Union, SC 29379
Hot Shots Gulf	Petrol	Open	425 Thompson Blvd Union, SC 29375
Norfolk Southern Railway Co	Petrol	No Further Action	210 Keenan Ave Union, SC 29379
Loring Oil	Petrol	No Further Action	316 Keenan Avenue Union, SC 29379

Union County Oil/HAZMAT/ Toxic Incidents from Facilities

Agency	Substance	Status	address
Dixie Curb Market	Petrol	No Further Action	503 S Church St Union, SC 29379
DD's Food Market	Petrol	No Further Action	803 S Pinckney St Union, SC 29379
Lucy Cox	Petrol	No Further Action	1000 S Pinckney St Union, SC 29379
Ralph Kirby Chevrolet Buick Pontiac Oldsmobile Inc.	Petrol	No Further Action	1262 S Duncan Bypass Union, SC 29379
Cricket 3846	Petrol	No Further Action	1241 S Duncan Bypass Union, SC 29379
Energy Market 4508	Petrol	No Further Action	908 S Duncan Bypass Union, SC 29379
Lil Cricket 3801	Petrol	No Further Action	100 N Duncan Bypass Union, SC 29379
Union County Airport	Petrol	No Further Action	198 Airport Rd Union, SC 29379
River Chase Golf Club	Petrol	No Further Action	459 Fairwoods Blvd Union, SC 29379
Amoco Station Union	Petrol	No Further Action	SR 44, 52 & SR 44 & 7 Union, SC 29321
Princes Grocery	Petrol	No Further Action	4222 Crosskeys Hwy Union, SC 29379
L&B Junction	Petrol	No Further Action	6266 Whitmire Hwy Whitmire, SC 29178
Savage Service Station	Petrol	No Further Action	Santuc Community Carlisle, SC 29031
Cricket 3806	Petrol	No Further Action	3200 Janie Gymph Goree Rd Carlisle, SC 29031
Central Transport Inc.	Petrol	No Further Action	Rt 1 PO Box 78A Carlisle, SC 29031
Johnnie's Market & More	Petrol	open	Hwy 215 Carlisle, SC 29031
Gregory's Store	Petrol	open	263 Woodyard Rd Carlisle, SC 29031
Adams Grocery	Petrol	Open	2729 Santuc-Carlisle Hwy Union, SC 29379

VULNERABILITY

Vulnerability to hazardous material releases is related to proximity to storage, production, and transportation sites for materials that can have dangerous effects. Changes in a location's potential vulnerability to hazardous material events can occur quickly and go unnoticed.

Development or expansion of industry can mean the presence of substances not previously found in a community. In addition, altering the production processes can create toxic byproducts that must be stored or disposed of.

CLIMATE CHANGE

According to the 2023 South Carolina Hazard Mitigation Plan, there is no indication of a direct relationship between climate change and hazardous materials incidents. However, increases in temperature extremes and severe weather events could result in hazardous material releases as secondary effects.

IMPACTS

Impacts of hazardous material incidents are typically based on deaths and injuries as well as property damage and response costs measured in dollars. Hazardous material releases can create traffic congestion or rerouting, permanent or temporary displacement of businesses and households, and environmental damage. Environmental damage can include air, soil, and water damage to local and potentially distant locations carried by wind or water.

According to South Carolina 2023 Hazard Mitigation Plan Union County has 0 deaths and an annualized loss of \$70 for period from 2000 to 2021 and annualized loss of \$381 from 2015 to 2021. The overall hazard risk for hazardous materials for Union County is 0.00 to 0.02.

A high consequence hazardous materials scenario can have impacts on community lifelines. The table below describes the potential impacts a significant hazardous material scenario could have lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	Significant impacts are not anticipated other than potential increases in telecommunications volume.	Localized
Energy	Medium	A release could cause loss/wastage of fuel, which could reduce supply. Releases may disrupt access to power facilities, fuel stations, or pipelines.	Localized or Regional
Food, Water & Shelter	High	Release of hazardous materials may result in the need to evacuate residential areas and may cause contamination of local food or water supply. Residents in affected areas may need emergency shelter and other support. Large releases could result in embargos of crops and livestock.	Localized or Regional
Hazardous Materials	High	A hazardous material release may damage or contaminate immediate facilities as well as nearby areas. This could cause public health and environmental risks. Damage could result in loss of material, causing economic loss. Site personnel may be injured or need to be evacuated. Operations related to the storage, production, or transport of the hazardous materials involved in the release may be disrupted or halted and supplies of the materials may be constrained.	Localized or Regional
Health and Medical	High	A hazardous material release in the immediate area could create health and safety hazards that necessitate evacuation of medical facilities and interruption of normal operations. A release may cause contamination that requires decontamination. Medical facilities can expect an influx of patients who have been exposed to the hazardous material or report symptoms. Hazardous conditions may result in closure or rerouting of transportation used to access facilities or locations where medical assistance is needed.	Localized or Regional
Safety and Security	Low	A hazardous material release in the immediate area could create health and safety hazards that necessitate evacuation of nearby areas.	Localized

		Specialized detection, modeling, containment/mitigation, and safety equipment as well as training may be needed, depending on the type and volume of material. Responders will need to quickly identify the type of material and appropriate protocols to protect human health and safety, including their own, and the environment.	
Transportation	Low	Release of hazardous materials from a fixed site release, significant impacts on transportation are not expected. A significant release of petroleum products could impact transportation through loss of supply.	Localized or Regional

RECOMMENDATIONS

1. Perform site visits to the manufacturing facilities located in Union County. County Emergency Management should invite emergency service personnel and Emergency Management personnel from local and adjacent towns and city to attend manufacturing facility site visits.
2. Secure and review Emergency Plans for Risk Management Plan (RMP) facilities.
3. If warranted, prepare community evacuation plans for manufacturing facilities where a hazardous materials incident will most likely impact the surrounding community. Facilities that require Risk Management Plans should be targeted first.
4. Perform a fire hydrant inspection to ensure adequate water pressure and existing fire hydrants are located on the same roadside as hazardous materials facilities.

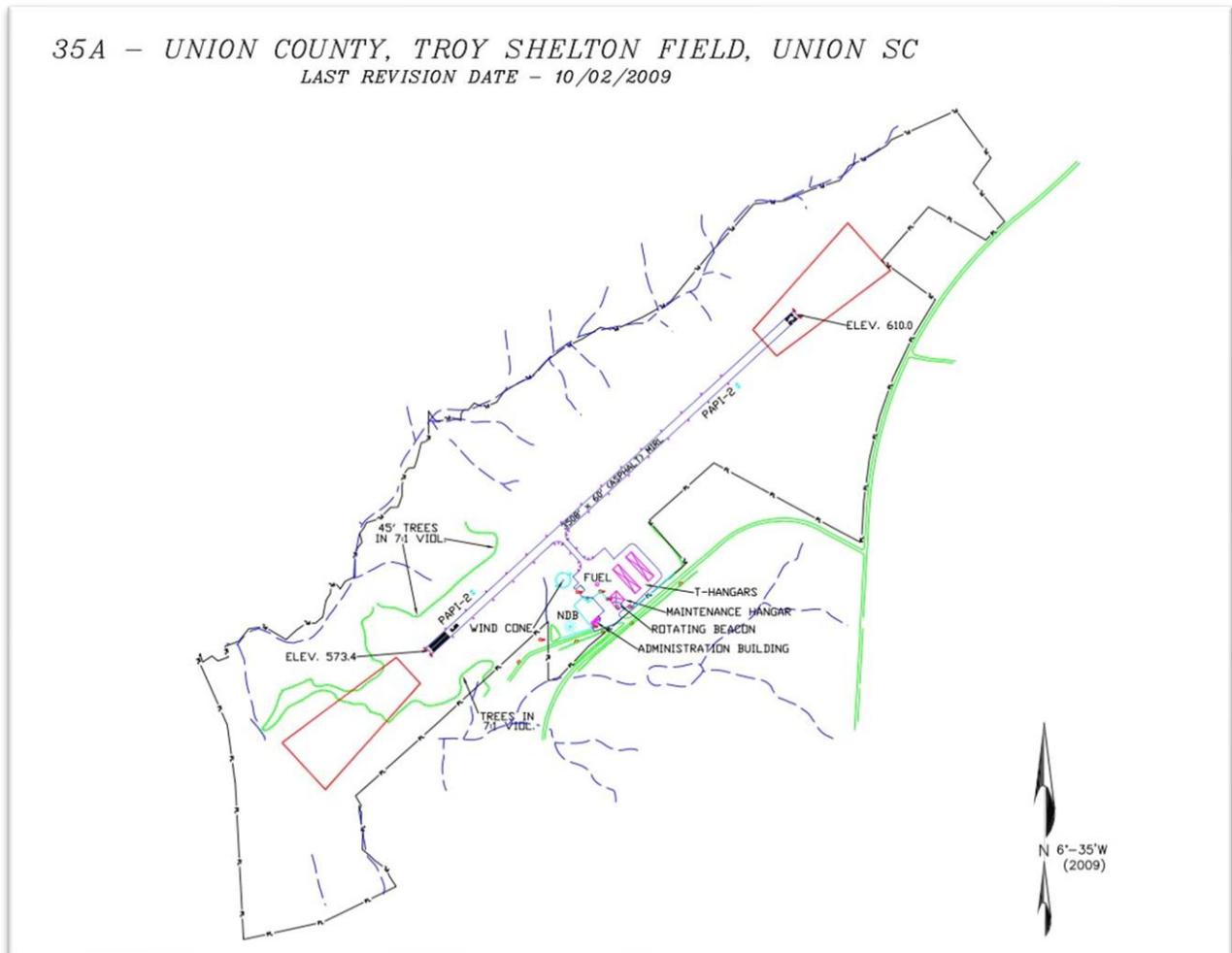
CHANGES TO THIS SECTION

- ✓ This entire section is new.

AIRPORTS AND FLIGHT PATH HAZARDS

DESCRIPTION

Union County, SC, has one airport called Troy Shelton Field. Troy Shelton Field is located off Sardis Road, one mile west of the Union city limits on Airport Road. The field has a 3,500-foot paved runway capable of handling twin-engine business aircraft. The airport is located 608 feet above sea level and has fuel and other service facilities available. The field and runway lights have a rotating beacon that can be turned on by radio from approaching aircraft.



Source: Union County

Other improvements at the airport site include two T-hangers, a Maintenance Hanger, and an administrative building. Troy Shelton Field has a self-serve fuel facility. Union County has adopted the Airport Zoning, Control of Hazards, and Noise Reduction ordinance under Chapter 6 Aviation and Airports

(Ord. No. 37, Part A, § 1, 7-1-80). The codes identify compatible land uses and height restrictions for airport safety/noise zones for the surrounding area around the airport.

According to the South Carolina Airports System Plan, Troy Shelton Field is a State Classification IV – Recreation/Local Service (SC-IV) airport. Recreation/Local Service airports typically demonstrate low activity and are forecasted to remain fairly level. They provide very limited airport facilities and services and may have safety or development constraints that limit their need and ability to expand.

Existing uses on the north and northeast sides of the airport include single-family dwellings. The southern and western sides of the airport remain primarily undeveloped.

Airplane accidents at takeoff and landing can occur. Large fuel volumes are also stored on site, which could pose a fire hazard.

Emergency landings could occur at the airport or surrounding areas from planes flying to other destinations. Since 2020, there have been three documented incidents/accidents at or near the Troy Shelton Field Airport.

HISTORICAL ACCIDENTS/INCIDENTS

1. September 27, 2020
Location: Union, South Carolina
Accident Number: ERA20LA335
Date & Time: September 27, 2020, 09:00
Local Registration: N33859
Aircraft: Piper PA28
Aircraft Damage: Destroyed
Defining Event: Fuel related
Injuries: 1 Serious
Flight Conducted Under: Part 91: General Aviation

Personal Analysis

The non-instrument-rated pilot departed into instrument meteorological conditions and returned to the airport about 20 minutes later, communicating to a witness via radio that he could not see the ground. The witness attempted to guide the pilot back to the airport; however, the pilot stated he was having “engine trouble” and the airplane impacted trees in the vicinity of the airport. A post-impact fire ensued, which consumed most of the fuselage. The propeller did not exhibit any rotational scoring and the carburetor air box was consumed by fire. There were no preimpact mechanical malfunctions or failures with the airplane or engine that would have precluded normal operation. Based on the temperature and dew point about the time of the accident, the conditions were favorable for serious carburetor icing at a cruise power setting. It is likely that the engine lost power as a result of carburetor icing, and since the pilot reported to the local mechanic that he never used carburetor heat, the carburetor icing likely continued to accumulate until the engine lost total power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A total loss of engine power due to carburetor icing. Contributing to the accident was the pilot's failure to use carburetor heat in conditions conducive to the development of carburetor icing.

(Source: National Transportation Safety Board)

2. August 12, 2021

Date: 12-AUG-21

Time: 13:26:00Z

Regis#: N183VB

Aircraft Model: A36

Event Type: Incident

Highest Injury: None

Aircraft Missing: No

Damage: None

Activity: Personal

Flight Phase: Emergency Descent (EMG)

Operation: 91

City: Union

State: South Carolina



Union South Carolina – Authorities say no one was injured on Thursday, August 12, when a plane was forced to make an emergency landing on a road in northern South Carolina.

The Union County Sheriff's Office said it was assisting the City of Union's public safety and fire departments following a landing in the city on what photos show was a four-lane road.

Citing the Union County Emergency Management Agency, CBS affiliate WSPA reports that the aircraft landed on Union Boulevard.

Details regarding exactly why the aircraft was forced to make the landing was unclear, but a photo does show the plane straddling two lanes with a car behind and two trucks in front. A fire truck can also be seen blocking traffic in the immediate distance. Despite coming down somewhere other than a runway, the pilot reported no injuries according to the Sheriff's office and the aircraft itself appears undamaged.

The Federal Aviation Administration has since identified the aircraft involved as a Beechcraft A36 Bonanza adding that the landing occurred just before 9:30a.m. The agency didn't provide additional information regarding the reason for the landing.

Tail number data does confirm, through FlighAware.com, that the flight had taken off Myrtle Beach at around 8:40a.m. It was scheduled to land in Knoxville, Tennessee around 10:40 a.m. (Source: WYFF4, Kathrynsreport.com, and other media sources)

3. April 23, 2022

Aviation Investigation Final Report Location: Union, South Carolina

Accident Number: ERA22LA201

Date & Time: April 23, 2022, 18:54

Local Registration: N737UY

Aircraft: Cessna 172

Aircraft Damage: Substantial

Defining Event: Loss of control on ground

Injuries: 2 Minor

Flight Conducted Under: Part 91: General aviation.

Personal Analysis

The pilot stated that he was practicing touch and go landings. After landing, during the landing roll, when raised the flaps and added full power, the airplane veered to the right. He applied left rudder to stop the right turn and overcorrected. Then the airplane veered to the left and continued off the runway into a ditch, which resulted in substantial damage to the engine mounts. The pilot reported no preimpact mechanical malfunctions or failures with the airplane that would have precluded normal operation.

Probable Cause and Findings

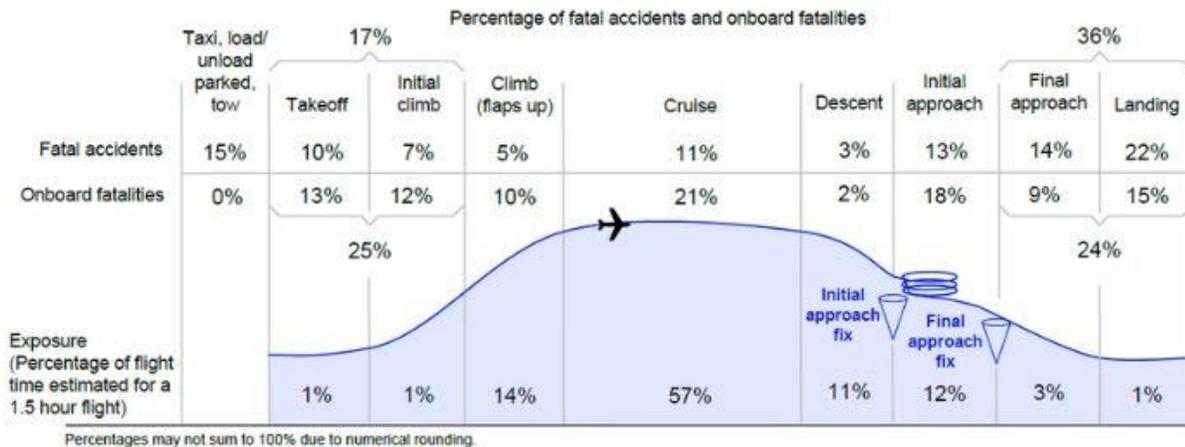
The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain directional control during the landing roll, which resulted in a runway excursion and impact with terrain.

(Source: National Transportation Safety Board)

COMMERCIAL PASSENGER AVIATION

Union County is located on the Atlanta to Charlotte Airport flight path. Many airplanes frequently fly overhead. Accidents could occur during the flight path that could require an emergency landing or emergency services after a crash. Commercial airline accidents are rare. In 2011, Boeing prepared a study identifying when accidents were most likely to occur during a flight. Accidents during the cruising stage of a flight are much lower percentage than during descent and final landing, where most accidents occur. The Boeing prepared percentage of fatal accidents and onboard fatalities chart is below.

Although the frequency of an aviation accident is very low, emergency responders should prepare to respond to such an accident. A quick response could save lives and improve outcomes for victims of an accident, as well as any impacted residents.



Percentage of fatal accidents and onboard fatalities by phase of flight-Worldwide commercial jet fleet-2001 through 2010 (BOEING, 2011)

Commercial cargo aviation also has flights over Union County. Aviation cargo could carry hazardous materials. The Hazardous Materials Action Plans should be employed for all commercial cargo aviation flight accidents. Such plans should include evacuation plans.

RISK

There is no local aviation crash ratio, only a national ratio. According to the U.S. General Safety Data prepared by the United States Department of Transportation Bureau of Transportation Statistics, in 2021, there were 5.25 accidents per 100,000 flight hours. In 2021, there were 5,109,420 flight hours. Nearly half of all aviation crashes happen during takeoff and landings.

LOCATION

The area surrounding the Troy Shelton Field is the most vulnerable to aviation accidents, particularly places by the ends of runways where take-offs and landings occur.

CLIMATE CHANGE

There is no indication of a direct relationship between climate change and aviation accidents. However, increases in temperature extremes and severe weather events could impact flights or facilities if the facility is located directly in the path of a severe storm, such as a tornado, hailstorm, thunderstorm, etc.

IMPACTS

A high consequence aviation accident scenario can have impacts on community lifelines. The table below describes the potential impacts a significant aviation accident scenario could have lifelines.

Community Lifeline Impacts

Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	Significant impacts are not anticipated other than potential increases in telecommunications volume. Potential impacts could include communication towers and poles being hit, which would have more impact on communication.	Localized
Energy	Medium	Significant impacts are not anticipated. If a plane or parts of a plane hit a transformer or other equipment, it could cause power outages.	Localized or Regional
Food, Water & Shelter	High	Release of hazardous materials such as fuel or hazardous cargo may result in the need to evacuate residential areas and may cause contamination of local food or water supply. Residents in affected areas may need emergency shelter and other support.	Localized or Regional
Hazardous Materials	High	A hazardous material release may damage or contaminate immediate facilities as well as nearby areas. This could cause public health and environmental risks. Damage could result in loss of material, causing economic loss. Site personnel may be injured or need to be evacuated. Operations related to the storage, production, or transport of the hazardous materials involved in the release may be disrupted or halted and supplies of the materials may be constrained.	Localized or Regional
Health and Medical	High	An aviation accident could cause a hazardous material release in the immediate area that could create health and safety hazards that necessitate evacuation of medical facilities and interruption of normal operations. A release may cause contamination that requires decontamination. Medical facilities can expect an influx of patients who have been exposed to the hazardous material or report symptoms. Hazardous conditions may result in closure or	Localized or Regional

		rerouting of transportation used to access facilities or locations where medical assistance is needed. In cases where no hazardous materials are released, hospitals can expect to triage aviation accident survivors.	
Safety and Security	Low	Cargo planes or airplanes leaking fuel could cause a hazardous material release in the immediate area could create health and safety hazards that necessitate evacuation of nearby areas. Specialized detection, modeling, containment/mitigation, and safety equipment as well as training may be needed, depending on the type and volume of material. Responders will need to quickly identify the type of material and appropriate protocols to protect human health and safety, including their own, and the environment. Aviation accidents with no hazardous material releases will have reduced safety and security risks to the community and responders.	Localized
Transportation	Low	Aviation accidents could disrupt airport facilities and local transportation routes, resulting in closures and disruptions to operations. Significant impacts on transportation are not expected for aviation accidents that occur over open land.	Localized or Regional

RECOMMENDATIONS

1. Continue to enforce the Union County Aviation Ordinance for Troy Shelton Airport.
2. Continue close communication between Troy Shelton Field and emergency response services.
3. Prepare or revise a response plan for a large-scale commercial passenger aviation accident.

CHANGES TO THIS SECTION

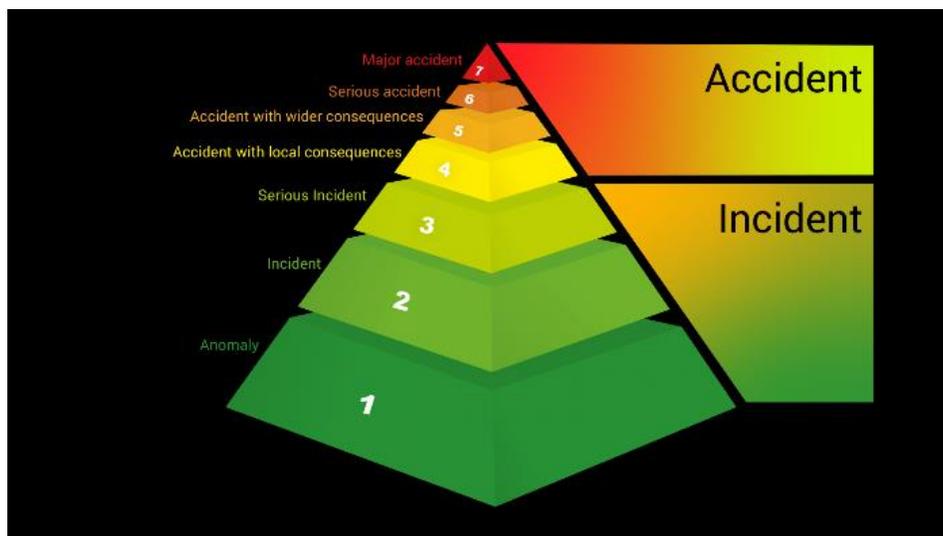
- ✓ This entire section is new.

NUCLEAR STATION DISASTER

DESCRIPTION

The International Atomic Energy Agency (IAEA) classifies a nuclear incident or accident as an event that has significant consequences for people, the environment, or the facility. Typically, the effects of an incident are the release of radioactive substances that can cause damaging impacts.

The IAEA uses a scale known as the International Nuclear and Radiological Event Scale (INES) to classify the level of impact that an event has on people and the environment.

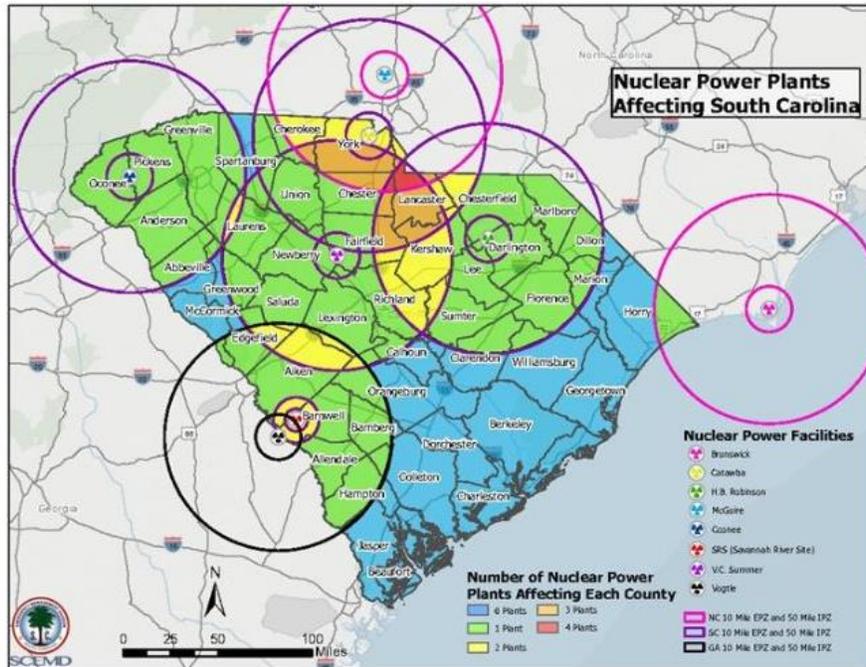


Source: International Atomic Energy Agency

Local and state governments, federal agencies, and electric utilities have emergency response plans in case of a nuclear power plant emergency. The plans define two “emergency planning zones.” One zone covers an area within a 10-mile radius of the plant. Direct radiation exposure can harm people within this 10-mile area. The second zone covers a broader 50-mile radius – where radioactive materials could contaminate water supplies, food crops, and livestock. The zones are not fixed and can be modified.

The Catawba Nuclear Station and V.C. Summer Nuclear Station are located within 50 miles of Union County. Both facilities have prepared Emergency Plans for nuclear disasters.

Union County has no areas within the 10-mile containment areas of both facilities. Nuclear disasters can impact areas outside of the 10-mile containment area. During a nuclear disaster event, first responders and the public should closely monitor the news and warnings as wind direction and changing conditions of the incident could make the containment area larger.



Source: South Carolina Emergency Management Department

Should the Catawba Nuclear Station have a nuclear emergency, impacts in Union County will most likely focus on food, crops, livestock, and water contamination issues. Union County residents could face restrictions on growing crops and livestock and on consuming such produce and animals. Impacts on farming would have a considerable effect on the local economy.

Union County is an active part of the Catawba Nuclear Station Emergency Plan. The Catawba Nuclear Station Emergency Plan has identified two public nuclear reception centers in Union County for a nuclear emergency. The purpose of a designated center is:

- a. Provides guidance related to registration, radiological monitoring, and decontamination, assistance in contacting others, directions to congregate care centers, reuniting of families, and other general information that the public may need during an evacuation. Congregate care centers provide shelter, food, water, showers/toilets, and emergency medical assistance. Service organizations, such as the American Red Cross, typically manage the congregate care centers.
- b. Removal of radioactive contamination on residents by washing. This process is known as decontamination. Decontamination is critical because it reduces radiation exposure.

The Catawba Nuclear Station Emergency Plan identifies First Baptist Church Family Life Center and Union County High School as public nuclear reception centers for a nuclear emergency. The First Baptist Church Family Life Center has dropped out as a public nuclear reception site.

Union County Emergency Management will have to coordinate with the Catawba Nuclear Facility and York County to identify a replacement public nuclear reception site. These changes should be

communicated to York County and Catawba Nuclear Facility as soon as possible so that pamphlets and online information can reflect the new conditions.

The Union County Emergency Manager will have to work in close coordination with the State and York County Emergency Management Departments. Union County Emergency Manager may also have to coordinate with the American Red Cross to identify locations for Congregate care centers to provide shelter, food, water, showers/toilets, and emergency medical assistance.

HISTORICAL OCCURRENCES

No historical occurrences for the Catawba Nuclear Station or the V.C. Summer Nuclear Station.

RISK

Nuclear power plant accidents are rare. According to Duke Power, an operator of nuclear power facilities, typical nuclear power plants have the following risks:

- There is about a one in 20,000 chance per year that a nuclear power plant will experience a serious accident and
- There is about one in 4 million chances per year that anyone in the public will die as a direct result of a nuclear accident.
- Although these statistics suggest that the chance of a serious accident is considered low, annual updates of emergency operation plans for nuclear power plant incidents and regular training exercises are required to provide for the safety of the public and the environment.

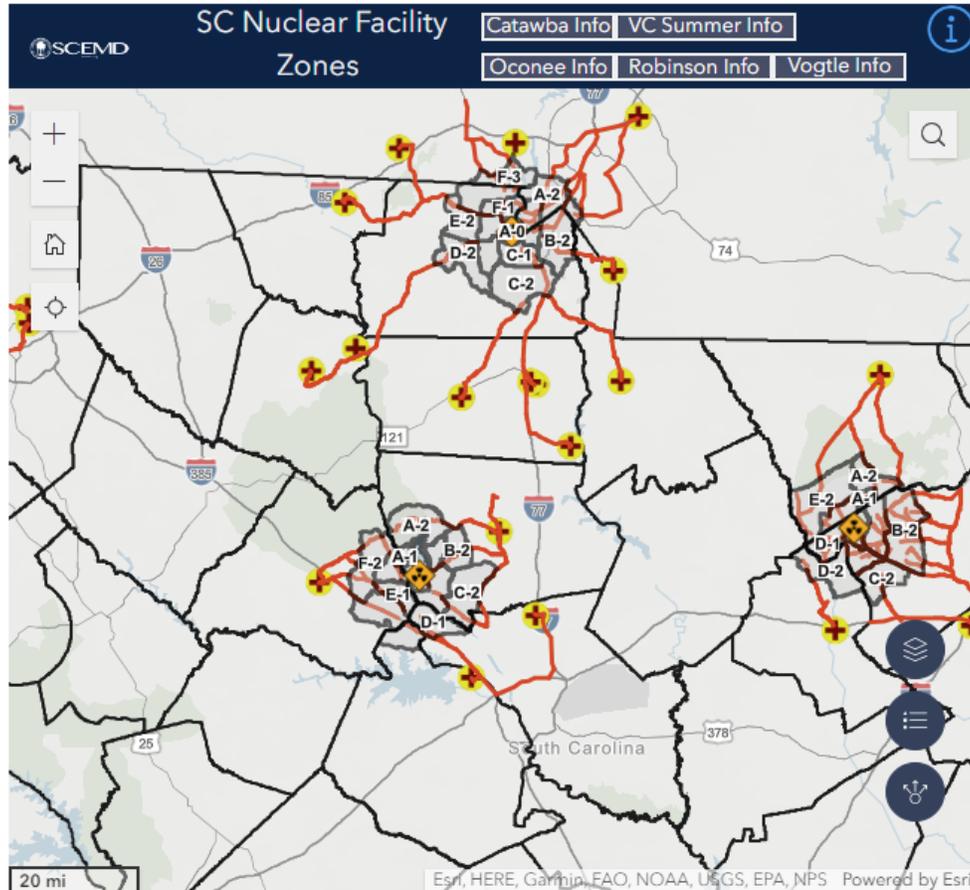
VULNERABILITY

There are no areas in Union County that are in the 10-mile ingestion pathway zones of the Catawba Nuclear Station or the V.C. Summer Nuclear Station. All of Union County is within the 50-mile ingestion pathway zone of both nuclear facilities.

A severe nuclear power plant accident that extends into the 50-mile ingestion pathway zone could impact all 29,881 residents of Union County. The level of impact will be based on the containment of the accident and wind patterns.

LOCATION

Areas that are located closest to the Nuclear Power plants will have a higher chance of becoming impacted from a severe nuclear disaster, however all of Union County is located within the 50-mile ingestion pathway zone.



Source: South Carolina Emergency Management Division

CLIMATE CHANGE

Climate change may have a secondary impact on the likelihood or severity of a nuclear incident. However, no current evidence on the type, location, or hazard type concludes with a direct link between climate change and the extent, frequency, intensity, or magnitude of a nuclear-related event.

IMPACTS

A nuclear facility incident can result in multiple potential impacts depending on the scale of the incident. The initial incident may begin a series of cascading events. The population within the 10-mile ingestion pathway zone (IPZ) will be most affected by a nuclear incident and, to a lesser extent, those within the 50-mile IPZ. The IPZs should not be considered static. The 10-mile IPZ could be extended into areas within the 50-mile IPZ zones depending on the variables mentioned below. These zones are identified for preparedness, planning, and public communication purposes based on the potential for radiation exposure. Radiation exposure can lead to irritation, burns, and, in severe cases, death. The physical landscape would be affected as radiation will contaminate air, land, and water within the affected area, rendering the area a contamination zone. Weather at the time of the incident plays a role in determining which areas are impacted. Wind speed and direction contribute to the size of the contamination zone.

A nuclear station disaster could impact the following community lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	Increased use/call volume could result in disruptions of service.	Regional
Energy	Low	Nuclear power generation and transmission could be disrupted.	Regional or Statewide
Food, Water & Shelter	High	Crops, stock animals, water, and shelter in the impact area and possibly surrounding areas may be contaminated with nuclear radiation. Emergency shelter and feeding operations outside the impact zone(s) will be needed. Agricultural products and livestock transportation will likely be embargoed, with affected livestock needing to be depopulated.	Local, Regional or Statewide
Hazardous Materials	High	Potential for hazardous nuclear materials or radiation to impact the surrounding area for an extended period. This could cause environmental, human, and animal health risks.	Local or Regional
Health and Medical	High	Medical facilities in the immediate area may need to evacuate, depending on the nature of the incident. Large numbers of people may need decontamination and treatment for radiation exposure.	Regional
Safety and Security	High	Personnel may be needed from other parts of the state or interstate mutual aid to contain the hazard area and support access control points, evacuation, shelter, and other activities. Response personnel would need specialized training, equipment, and protective gear, as well as decontamination.	Regional, possibly Statewide
Transportation	Medium	Transportation routes and modes could be interrupted because of evacuation and exclusion zones. Transportation equipment could be contaminated by radiation. Rail and air traffic may be impacted by flight restrictions and rail stoppage orders.	Regional

RECOMMENDATIONS

1. The Union County Emergency Manager must meet with York County to address the dropping out of First Baptist Church Family Life Center as a public nuclear reception center. Public documents and website information must remove this site as a public nuclear reception site. In addition, Union County must select a second site to replace the First Baptist Church Family Life Center.
2. The Union County Emergency Manager should meet with York County and State Emergency Managers to address the responsibilities required to set up the two public nuclear reception centers. The duties may or may not include purchasing supplies for the facilities before an incident, staffing the facilities, etc.
3. The Union County Emergency Manager should meet with the local representative of the American Red Cross and develop a relationship. Union County Emergency Manager should schedule the meeting or discussion annually to ensure that new staff members know each other's responsibilities should the establishment of congregate care centers be warranted due to a nuclear disaster.
4. Union County should install backup generators at both public nuclear reception centers, and if installed, checked, and maintained at a minimum annually.
5. The Emergency Manager and staff should familiarize themselves with the 2023 Emergency Preparedness Information for the Catawba Nuclear Station.
6. Emergency Management should develop a public, volunteer, and staff educational program to address nuclear disasters and emergency preparedness with live exercise training programs.

CHANGES TO THIS SECTION

- ✓ This entire section is new.

High Hazard Potential Dams

DESCRIPTION

The Department of Health and Environmental Controls (DHEC) inspects dams in South Carolina. DHEC also provides permits for the construction, repair, alteration, and removal of dams that are not exempt. Dams, if breached, can cause severe property damage, death, or severe bodily harm from a quick influx of fast-moving water. Union County has 29 dams, of which eight (8) are categorized as High Hazard Potential Dams and five (5) as Significant Hazard Potential Dams. Six (6) of the eight (8) High Hazard Potential Dams are privately owned, with three privately owned dams owned by Lockhart Power Company. DHEC does not provide inundation maps for utility dams.

DHEC classifies dams according to the following condition assessments:

Satisfactory

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the minimum applicable state or federal regulatory criteria or tolerable risk guidelines.

Fair

No existing dam safety deficiencies are recognized for normal operating conditions. Rare or extreme hydrologic or seismic events may result in a dam safety deficiency. The risk may be in the range to take further action. Note: Rare or extreme event is defined by the regulatory agency based on their minimum

Poor

A dam safety deficiency is recognized for normal operating conditions, which may realistically occur. Remedial action is necessary. Poor may also be used when uncertainties exist regarding critical analysis parameters that identify a potential dam safety deficiency. Investigations and studies are necessary.

Unsatisfactory

A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

Not Rated

The dam has not been inspected, is not under state or federal jurisdiction, or has been inspected but, for whatever reason, has not been rated.

Not Available

Dams for which the condition assessment is restricted to approved government users.

Based on the condition assessments and other factor's DHEC classifies dams according to the following Hazard Potential Classifications:

High

Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

Significant

Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be in areas with population and significant infrastructure.

Low

Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic or environmental losses. Losses are principally limited to the owner's property.

Undetermined

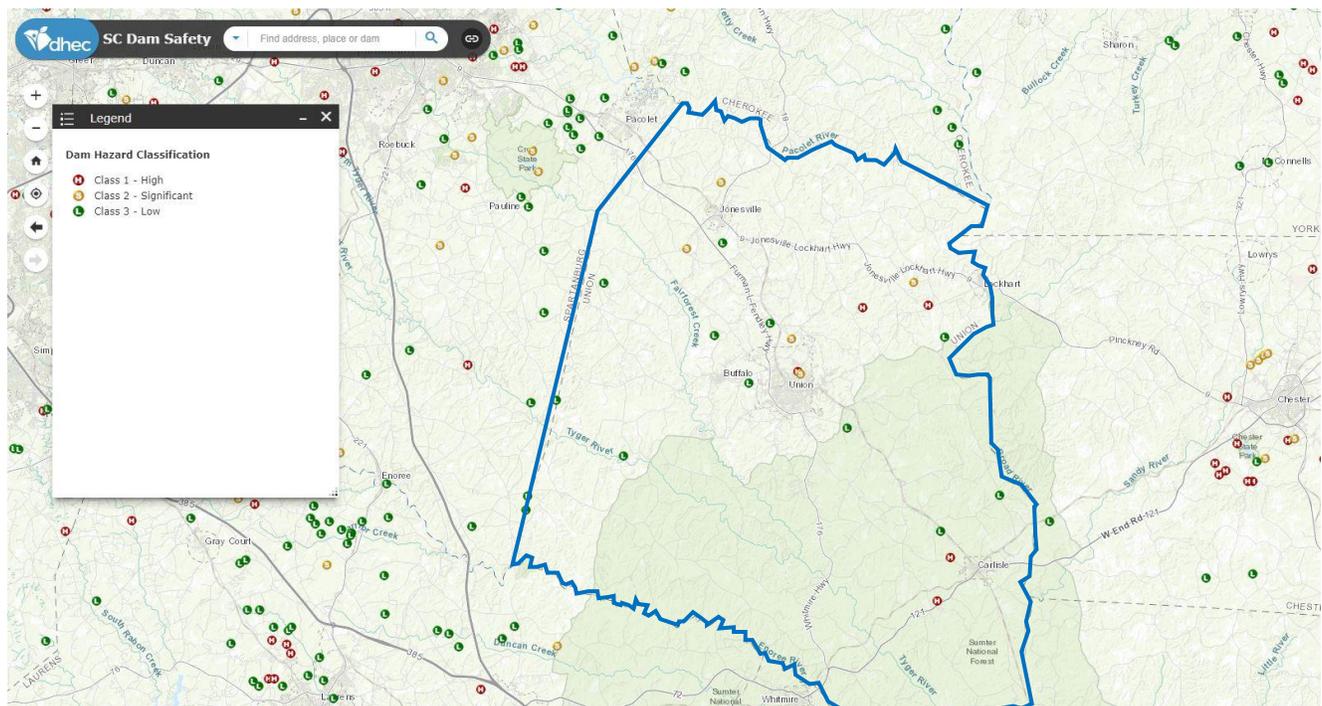
Dams for which a downstream hazard potential has not been designated or is not provided.

Not Available

Dams for which the downstream hazard potential is restricted to approved government users.

LOCATION OF SC DHEC-ENFORCED HIGH HAZARD DAMS IN UNION COUNTY

Map of SC DHEC Enforced High Hazard Dams in Union County



Source: SC Department of Health and Environmental Control

The National Inventory of Dams identified the following 29 Union County dams. High Hazard Dams are highlighted yellow.

Name	Type	Responsible Agency	Dimensions	Rating	Hazard Potential Classification	Emergency Action Plan
Neal Shoals	Dam	South Carolina Electric and Gas Company	Height 24', Length 1295', Max Storage (acre-ft) 1492, uncontrolled Spillway	Not Available (March 11, 2019, every 3 years)	Low	Yes (not required) – last updated 12/31/2020
Union Water Works Dam	Dam	City of Union	Height 22', Length 240', Max Storage (acre-ft) 67	Fair (June 24, 2020, every 2 years)	High	Yes (last updated 6/11/2019)
Macedonia Dam	Dam	Federal - USDA Forest Service	Height 22', Length 609', Max Storage (acre-ft) 99	Not rated (Oct 9, 2015, every 10 years)	Low	No (not required)
Foster Park Dam	Dam	City of Union	Height 36', Length 475', Max Storage (acre-ft) 87	Fair (June 24, 2020)	Significant	Yes (last updated 6/11/2019)
Cudds Pond Dam	Dam	Private – Tommy & Jewel Bethel Crumley Cudd	Height 20', Length 1150', Max Storage (acre-ft) 70	Poor (Sept 19, 2017, every 5 years)	Low	No
Lake John D. Long	Dam	SC Department of Natural Resources	Height 49', Length 1000', Max Storage (acre-ft) 2109	Fair (June 24, 2020, every 2 years)	High	Yes (last revised 11/09/1995)
John's Creek Dam	Dam	Federal – USDA Forest Service	Height 25', Length 400', Max Storage (acre-ft) 32, Uncontrolled spillway	Not Rated (Oct. 9, 2015, every 10 years)	Low	No (not required)
Sedalia Dam	Dam	Federal – USDA Forest Service	Height 26', Length 500', Max Storage (acre-ft) 121, Uncontrolled	Not Rated (Oct. 9, 2015, every 10 years)	Low	No (not required)
Lake Wineemoko Dam	Dam	Private – Janice K Mechlenburg	Height 36', Length 350', Max Storage (acre-ft) 500	Poor (Sept 21, 2007, every 5 years)	Low	No

Name	Type	Responsible Agency	Dimensions	Rating	Hazard Potential Classification	Emergency Action Plan
Brown's Creek WCD Dam 2	Dam	Private & local govnt – Charles C. Vaughan, John Hancock Life Insurance Company/Hancock Forest Management, Kennedy limited partnership, Union County Soil and Water Conservation District	Height 57', Length 1090', max storage (acre-ft) 2,229, uncontrolled spillway	Fair (Dec. 2, 2020, every 2 years)	High	Yes (last revised 11/18/1987)
Gus Jeter Lake Dam (Gilliam Dam)	Dam	Private – Charles R. Jeter	Height 28', Length 750', Max Storage (acre-ft) 159	Poor (Sept. 18, 2017, every 5 years)	Low	No
Turner's Pond Dam (Luther Arthur Dam)	Dam	Private – Luther G & Jane P Arthur	Height 21', Length 375', Max Storage (acre-ft) 56	Poor (Sept 21, 2017, every 5 years)	Low	No
Ophelias Dam (Edward Wilcox Dam)	Dam	Private – Thomas & Cynthia Weathers	Height 48', Length 160', Max Storage (acre-ft) 50	Poor (Sept 18, 2017, every 5 years)	Low	No
Jeff Sheehan Sod Farm Dam	Dam	Private – Airport Warehouse at Charlotte LLC	Height 32', Length 785', Max Storage (acre-ft) 135	Fair (June 28, 2017, every 5 years)	Low	No
Bogan Dam	Dam	Private – Robert Steve Bogan	Height 34', Length 1615', Max Storage (acre-ft) 300	Poor (Dec. 9, 2019, every 5 years)	Low	Yes – last updated 6/13/2019
Poplar Lake Dam	Dam	Private – Michael P. Nichols	Height 18', Length 700' Max Storage (acre-ft) 49	Fair (Jan 22, 2020, every 3 years)	Significant	Yes (last updated 6/11/2019)
Name	Type	Responsible Agency	Dimensions	Rating	Hazard Potential Classification	Emergency Action Plan
City of Jonesville Dam	Dam	Town of Jonesville	Height 32', Length 835', Max Storage (acre-ft) 345	Fair (Dec 9, 2019, every 3 years)	Significant	Yes (last revised 6/11/2019)

Name	Type	Responsible Agency	Dimensions	Rating	Hazard Potential Classification	Emergency Action Plan
White Pines Lake Dam	Dam	SC Dept. of Juvenile Justice	Height 16', Length 300', Max Storage (acre-ft) 94	Fair (Dec 9, 2019, every 3 years)	Significant	Yes (last updated 6/11/2019)
Union County Pond Dam	Dam	Union County	Height 29', Length 350', Max Storage (acre-ft) 50	Poor (Sept. 20, 2017, every 5 years)	Low	No
Lockhart East Canal Embarkment	Dam	Private – Lockhart Power Company	Height 20', Length 7350', Max Storage (acre-ft) 2400	Not available (Sept. 30, 2020, every year)	High	Yes (last updated 12/17/2020)
Lockhart West Canal Embarkment	Dam	Private – Lockhart Power Company	Height 20', Length 7350', Max Storage (acre-ft) 2400	Not available (Sept. 30, 2020, every year)	High	Yes (last updated 12/17/2020)
Reno Lake Dam	Dam	Private – Brian and Debra Pickett	Height 15', length 805', Max Storage (acre-ft) 87'	Poor (Sept 18, 2017, every 5 years)	Low	No
Lofmar/Jordan Dam	Dam	Private - Lockhart Power Company	Height 20', Length 7350', Max Storage (acre-ft) 2400	Not Available (Sept. 30, 2020, annually)	High	No
Charles Allen Dam	Dam	Private – Kyle F. Kiesau, Ann H. Kiesau	Height 34', Length 322', Max Storage (acre-ft) 100'	Poor (Sept 21, 2017, every 5 years)	Low	No
Adams Lake Dam	Dam	Private – Betty M. Pierce	Height 30', Length 450', Max Storage (acre-ft) 156	Poor (Jan 22, 2020, every 3 years)	Significant	Yes (last updated 6/11/2019)
Jeter Pond Dam	Dam	Private – Anthony B. Ramsey Jr.	Height 28' tall, length 315', max storage (acre-ft) 115	Poor (Jan 13, 2021, 2 years)	High	Yes (last updated 6/11/2019)
Dalton Lake Dam (also known as Hugh and Glenda Dalton Dam and Salinas Pond Dam)	Dam	Privately Owned – Hugh C & Glenda S Dalton	Height 26' tall, length 570', max storage (acre-ft) 120	Fair (Jan 20, 2020 last inspection, every 2 years)	High	Yes (last updated 6/11/2019)

Name	Type	Responsible Agency	Dimensions	Rating	Hazard Potential Classification	Emergency Action Plan
Lockhart Dam Powerhouse	Dam	Private – Lockhart Power Company	Height 60’, Length 70’, Max Storage (acre ft) 2,400	Not available (Sept 30, 2020, every 3 years)	Low	Yes – last updated 12/17/2020
Lockhart Dam	Dam	Private – Lockhart Power Company	Height 16’, Length 1299’, Max Storage (acre ft) 2,400	Not available (Sept 30, 2020, every 3 years)	Low	Yes – last updated 12/17/2020

Source: National Inventory of Dams

The South Carolina Department of Health and Environmental Control (DHEC) has provided breach inundation data for 19 dams. The Breach inundation data shows a complete breach on a sunny day with no additional rain flow. The appendix section of this report provides the list of the 19 dams and their inundation maps.

The table State-Regulated High Hazard Potential Dams as of January 1, 2023, in the South Carolina Hazard Mitigation Plan High Hazard Dam section identifies the following five dams as high hazard potential dams.

National Inventory of Dams (NID) ID	State ID	Dam Name	County	Coordinate (Latitude, Longitude)
Sc01515	D2154	Union Water Works Dam	Union	34.72723135,-81.61504213
Sc01518	D2157	Jeter Pond Dam	Union	34.56955174,-81.49888082
Sc01521	D2160	Dalton Lake Dam	Union	34.59933343,-81.48749441
Sc01523	D2162	Lake John D Long	Union	34.77327436,-81.5061828
Sc01524	D2163	Brown's Creek Wcd Dam 2	Union	34.77130289,-81.5608757

The South Carolina Department of Health and Environmental Control (DHEC) encourages a dam owner to repair or remove their dam. If a dam owner does not do either, then DHEC will resort to the issuance of an Inspection and Repair Order, which requires the dam owner to:

1. Hire a Professional Engineer to perform a detailed inspection of the dam and identify all deficiencies to state regulations.

2. Develop a permit application to repair the dam to address the identified deficiencies or remove the dam.
3. Execute the permit.

Suppose DHEC issues an Inspection and Repair Order, and the dam owner does not comply. In that case, DHEC will pursue enforcement of that order through the Court System, which means DHEC asks for a Judge to order the dam owner to comply with DHEC's Inspection and Repair Order. A dam owner's failure to comply with the Judge's Order would result in contempt of court.

In addition to enforcement issues, dam owners also have liability concerns when their dams remain in poor condition. Dam owners are responsible for any damage their dam causes when it fails.

HISTORICAL OCCURRENCES

No high hazard dam historical occurrences are known for the County of Union and its municipalities.

RISK

Dam failures have a low probability of occurrence but high consequences. Dam failures can cause loss of life, property damage, and other societal impacts (such as loss of power, recreation, etc.). Storm events do not always cause dam failures or partial failures. Most fall into one or more of the following categories:

1. **Structural failures** – Foundation defects, including settlement and slope instability or damage caused by earthquakes, have generated about 30% of all U.S. dam failures.
2. **Mechanical failures** – Malfunctioning gates, conduits, or valves can cause dam failure or upstream and downstream flooding.
3. **Hydraulic failures:** Overtopping of a dam is often a precursor of dam failure. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest accounts for approximately 34 of all U.S. dam failures.

Near failures include:

- Malfunction of dam components
- Partial dam breach
- Auxiliary spillway flow
- Principal spillway damage or malfunction
- Seepage problems

- Embankment damage or signs of distress (erosion, cracks, slides, sinkholes, settlements, or bulges)

Other dangers of dams include hazards from planned releases. Operation of spillways, both planned and in emergencies, can create flooding and public safety hazards, even in the absence of dam failure. During periods of extreme flow, dams may fill to capacity, necessitating emergency release that can flood downstream areas. People swimming and fishing downstream of dams have been caught in planned spillway releases at times with tragic results. Siren incorporation can warn the public of impending release.

Private dam owners are not eligible for federal or state grant funding to repair or remove dams on private property. Many private dam owners find the cost of inspecting and repairing dams prohibitive.

Just inspecting and preparing a plan to repair the dams could cost hundreds of thousands of dollars. Non-federal governments (i.e., state, county, municipal) or a 501c(3) non-profit organization are the only eligible entities that can serve as a sponsor for many state and federal programs that fund dam repairs and removals. Funding sources include the DHEC High Hazard Potential Grant Program, FEMA BRIC and HMGP programs, and U.S. Fish and Wildlife grants. The USDA also has dam programs for USDA-installed dams.

Many non-federal governments and nonprofits do not sponsor private owners since they incur risk. In addition, many rural communities do not have the funds to undertake such projects, as is the case for Union County communities.

IMPACTS

Many impacts associated with dam failure are the same as those associated with a flood event. However, the primary difference for members of the public in the case of a dam failure is that often, citizens whom a dam failure might impact may believe themselves to be protected from flood events because of the dam and, therefore, may not be anticipating the event. In the long run, public confidence may be impacted as citizens may view this as a failure of government institutions to regulate and control the dam properly. The public may view the incident as preventable, unlike a flood that occurs purely from natural causes. (2023 South Carolina Hazard Mitigation Plan)

As noted in the table below, a significant dam breach is expected to cause flooding and may impact Community Lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	Telecommunications and broadband equipment could be damaged if located in areas inundated by floodwater caused by a breach, which could result in disruption of communications	Regional
Energy	Medium	Fuel stations and energy transmission equipment/substations in dam breach-inundated areas may be damaged or inoperable. Energy disruptions could affect supply chains and have cascading impacts in other lifeline sectors.	Regional
Food, Water & Shelter	High	Evacuations and displacement because of high water and/or residential damage from floodwaters caused by a dam breach could require emergency shelter. Water treatment infrastructure could be negatively impacted by intrusion of stormwater or contaminated water, resulting in disruption of water supplies and wastewater systems, crops and animal stock could see damage from high water.	Localized, Regional
Hazardous Materials	Medium	Dam breaches may result in the release of hazardous materials that have been illegally dumped into streams and other waterways that have made their way to the dam area. The breach of the dam could cause these chemicals to move down stream into potential drinking supplies causing public health and environmental risks.	Localized
Health and Medical	Medium	Dam breaches could flood roadways and lead to access issues for medical staff. Access issues and transportation disruptions may result in delays in deliveries of supplies, in staffing shortages, and in patient movement. Injuries associated with flooding could result in increased patient numbers.	Regional
Safety and Security	High	Response personnel in the affected area will have challenges accessing inundated areas and may see increased safety risks from high-water conditions and water-borne debris. Need for search and rescue operations may stress available resources and increase risk to responders. Operational facilities may be damaged or inaccessible because of floodwaters.	Regional, possibly Statewide
Transportation	High	Roadways, bridges, and railroads facilities in and near flooded areas may see hazardous conditions, damage, and disruptions in service. Damage and inaccessibility may create broader disruptions in transportation and supply chains.	Localized or Regional

SELECTION OF MITIGATION ACTIONS

Mitigation actions were selected based on low cost high impact options. Many of the communities in Union County are rural communities with limited budgets. Union County and its municipalities indicated that they could not sponsor private owned dams due to the liability and cost. Mitigation Actions did not include dam repair of private dams. Since most of the dams were in the Union County non-incorporated areas recommendations for dam mitigation actions were provided for Union County. The County was asked to rank the dam mitigation action items as low, moderate or high and also assign an agent to be responsible for implementing the mitigation action. The County selected securing copies of Emergency Action Plans for the High Hazard Potential dams as a moderate priority. The county ranked items that were already implemented as low. Some of the flood hazard recommendations in the communities mitigation action charts also pertain to dam breaches.

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	High Hazard Dams, Flooding	Low	Work with SC DHEC on the monitoring of dams located in the county.	General Funds	Continue	Union County Emergency Management / Union County Government Services
Union County	High Hazard Dams, Flooding	Moderate	Acquire Emergency Management Plans for all dams the State identifies as High Hazard Dams.	General Funds	1 year	Union County Emergency Management

RECOMMENDATIONS

It is recommended that:

1. The Union County Emergency Manager should secure copies and review prepared Emergency Action Plans for most of the dams in Union County. Such requests should include the Emergency Action Plans prepared for the power utility companies. Union County should focus on the High Hazard Potential Dams and the Significant Hazard Potential Dams.
2. Request an update of the Emergency Action Plan for the Brown's Creek WCD Dam 2. The Emergency Action Plan was last updated in 1987.
3. Review updated data from the South Carolina Department of Health and Environmental Control for the High Hazard Potential Dams annually.
4. Identify houses and structures within the dam breach areas and notify owners that they should secure flood insurance. Union County should educate farmers with land in a dam breach area about crop insurance.

CHANGES TO THIS SECTION

- ✓ This entire section is new.

POWER OUTAGES

DESCRIPTION

Power outages significantly impact government entities, hospitals, schools, businesses, other industries, and the public. Power loss impacts range from loss of power to life-saving equipment, disruptions to government and first responder operations, damaged equipment, lost files, and loss of food. Companies that are unprepared for a power outage can suffer from lengthy downtimes, which can impact revenue and cause disruptions to essential daily operations. During extended power outages, company disruptions can cause supply chain problems and cause distress to the local economy.

Power Outages can be caused by

- natural events such as hurricanes, winter storms, etc.
- vehicular accidents
- act of terrorism
- construction incident
- Intentional blackouts

Union County has above-grade electric utility lines on utility poles. Many vehicular accidents throughout Union County have caused power outages. Other instances occur during construction when a construction company accidentally hits or cuts a line. The Town of Carlisle has many instances of power outages due mostly to car accidents.

Winter storms and other natural events depending on their severity can cause a week or more of power outage. Education about preparing for an extended power outage is vital to ensuring the public remains safe.

Power loss can impact those with medical conditions that require the use of medical equipment that utilizes power. Opening a shelter with backup generators is critical for these individuals. Shelters with backup generators are also important during extreme cold or hot events as heat and air conditioning are necessary for health reasons.

HISTORICAL OCCURRENCES

There is no inventory of power outages. However, events are common in Union County, particularly in the Town of Carlisle. The Union County Hazard Mitigation Plan committee has noted that Hurricane Hugo and some large snowstorm events have caused widespread power outage events.

LOCATION

The Town of Carlisle has power outages due to car accidents or construction incidents that cut power lines. Extended power outages are more likely to occur throughout the whole county rather than a small region. However, region wise, the Town of Lockhart is the most likely region in the County to have to deal with extended power outages due to flood damage.

FREQUENCY

There is no data source that tracks frequency per county. Frequency of a power outage in South Carolina is low (1-10%), however total duration of power outages can last for hours to days (US average 7 hours in 2021). In 2016, Hurricane Matthew increased the average South Carolina power outage total duration per customer for the year to 20 hours. This was the highest in the nation in 2016. (US Energy Information Administration) Most power outage events occur during extreme weather and summer months (due to high electrical use).

RISK

The risk of a significant power outage is low, however a power outage lasting more than a few days could have significant impacts to the community as noted under impacts.

IMPACTS

A power outage lasting for an extended period could have the following impacts to lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	High	Telecommunications and broadband equipment could be inoperable during a significant power outage.	Regional
Energy	High	Fuel stations and energy transmission equipment/substations will be inoperable. Energy disruptions could affect supply chains and have cascading impacts in other lifeline sectors.	Regional
Food, Water & Shelter	High	Loss of power could impact water and sewer treatment infrastructure. Most residents will not be able to access fresh water and bottled water will have to be provided to the public for an extended power outage. An extended power outage will also deplete food supplies, as food stores will have a difficult time keeping and restocking food.	Localized, Regional
Hazardous Materials	Medium	Hazardous material releases are not anticipated, however nuclear power stations due require electricity to safely	Localized

		operate facilities. It is anticipated that most businesses will shut down during the power outage period.	
Health and Medical	High	Health and medical facilities will be significantly impacted with an extended power outage. Health and medical facilities procedures and equipment are reliant on electricity. The shutdown of gas stations will also cause access issues for medical staff. Access issues and transportation disruptions (from nonoperating lights and potential traffic temporary modifications) may result in delays in deliveries of supplies, in staffing shortages, and in patient movement. Hospitals could see an influx of patients that require oxygen and other life sustaining equipment. Depending on the time of year, exposure to extreme temperature exposure could send patients to the hospital as most medical offices will be closed.	Regional
Safety and Security	High	Response personnel will need to provide safety and security for the public as many streetlights will not be operational. This will entail first responders to utilize staff and vehicles to manage intersections. Limited access to fuel will make it difficult to operate for extended periods.	Regional, possibly Statewide
Transportation	High	Roadways, railroads, and airport facilities rely on electricity to operate safely. Transportation detours and accidents could impact supply chains.	Localized or Regional

CLIMATE CHANGE IMPACTS

Climate change could increase the probability of future power outage events as a cascading hazard from other events such as increased chances of tropical storms, severe thunderstorms and other severe storm events. The increased severity of storms such as hurricanes could also cause prolonged power outages.

RECOMMENDATIONS

1. Install backup generators at shelters, hospitals, and other critical facilities.
2. Educate the public about how to prepare for extended power outages.
3. Create a voluntary registration process for individuals requiring special assistance for medical equipment, heating, and air conditioning needs.

CHANGES IN THIS SECTION

- ✓ This section is new.

TERRORISM

DESCRIPTION

Terrorism and mass violence pose a threat in South Carolina as they do in other locations in the United States and internationally. The Code of Federal Regulations defines terrorism as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.” (South Carolina Law Enforcement Division, 2020) According to the U.S. Department of Justice, mass violence is defined as “an intentional crime that results in physical, emotional, and or psychological injury to a sufficiently large number of people” (U.S. Department of Justice, 2006). Based on definitions in several federal laws, mass killings include incidents in which three or more people are killed, and mass shootings are those in which four or more people are killed.

Classification

Not all instances of mass violence are terrorism. Terrorism is determined based on definitions such as that noted above from federal law and regulations. Some but not all instances of mass violence are classified as terrorism based on the intent or purpose of the actor. Potential characteristics and tools associated with terrorism incidents include:

- ✓ Agriterrorism/agroterrorism: “the malicious use of plant or animal pathogens to cause devastating disease in the agricultural sector” (U.S. Department of Justice, 2006)
- ✓ Armed attack: “tactical assault or sniper attacks from a remote location” (South Carolina Law Enforcement Division, 2020)
- ✓ Arson/incendiary attack: “to unlawfully and intentionally damage or attempt to damage any real or personal property by fire or incendiary device” (South Carolina Law Enforcement Division, 2020)
- ✓ Biological agent: “Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits, and moving sprayers. May be directed at food or water supplies” (South Carolina Law Enforcement Division, 2020)
- ✓ Chemical agent: “Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions” (South Carolina Law Enforcement Division, 2020)
- ✓ Conventional Bomb/Improvised Explosive Device: “detonation of an explosive device on or near a target; via person, vehicle, or projectile” (South Carolina Law Enforcement Division, 2020)
- ✓ Cyberterrorism: “the convergence of cyberspace (the computer-based world of information) and terrorism (premeditated, politically motivated violence perpetrated against noncombatant targets by sub-national groups or clandestine agents)” (South Carolina Law Enforcement Division, 2020)

- ✓ Radiological agent: “Radioactive contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits, and moving sprayers” (South Carolina Law Enforcement Division, 2020)

The South Carolina Law Enforcement Division (SLED) oversees terrorism prevention activities for the state. SLED’s Office of Homeland Security fosters awareness for the state by providing capability developments through grants, guidance, equipment, training, and exercises for law enforcement, fire, EMS, and emergency management organizations to benefit communities throughout the state. (South Carolina Law Enforcement Division, 2014) SLED’s duties include coordinating the annual Threat Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) with other state agencies.

HISTORICAL EVENTS

South Carolina had six (6) terrorist events, mainly targeted at churches. None of the terrorism events were located in Union County.

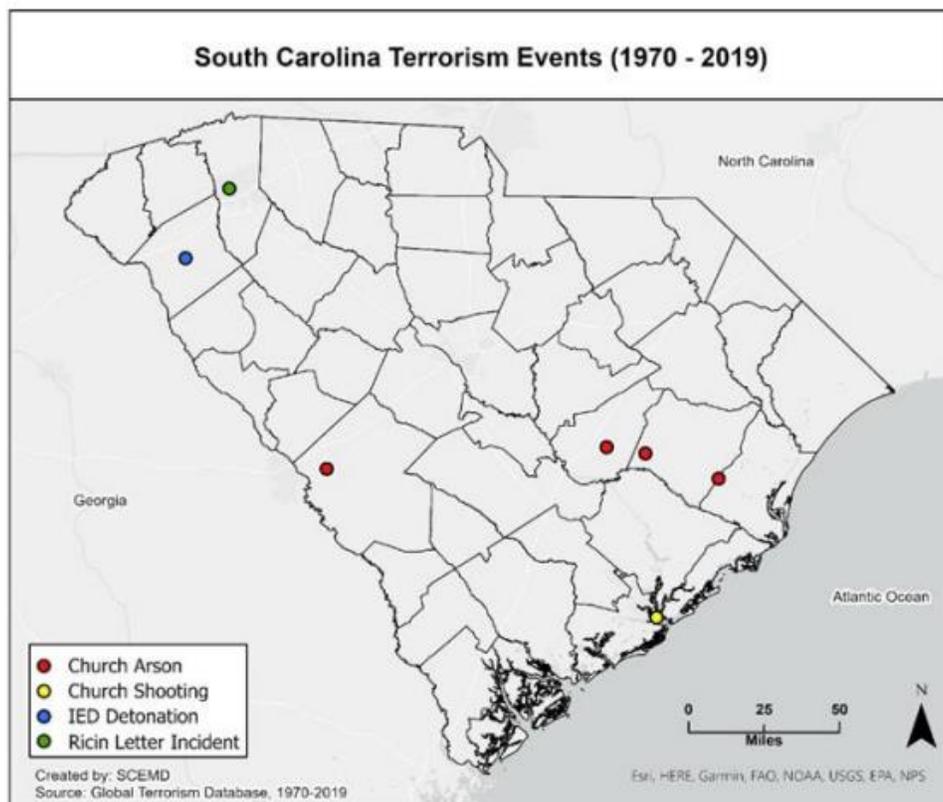


Figure 129: Terrorism events in South Carolina, 1970-2019

Source: South Carolina 2023 Hazard Mitigation Plan

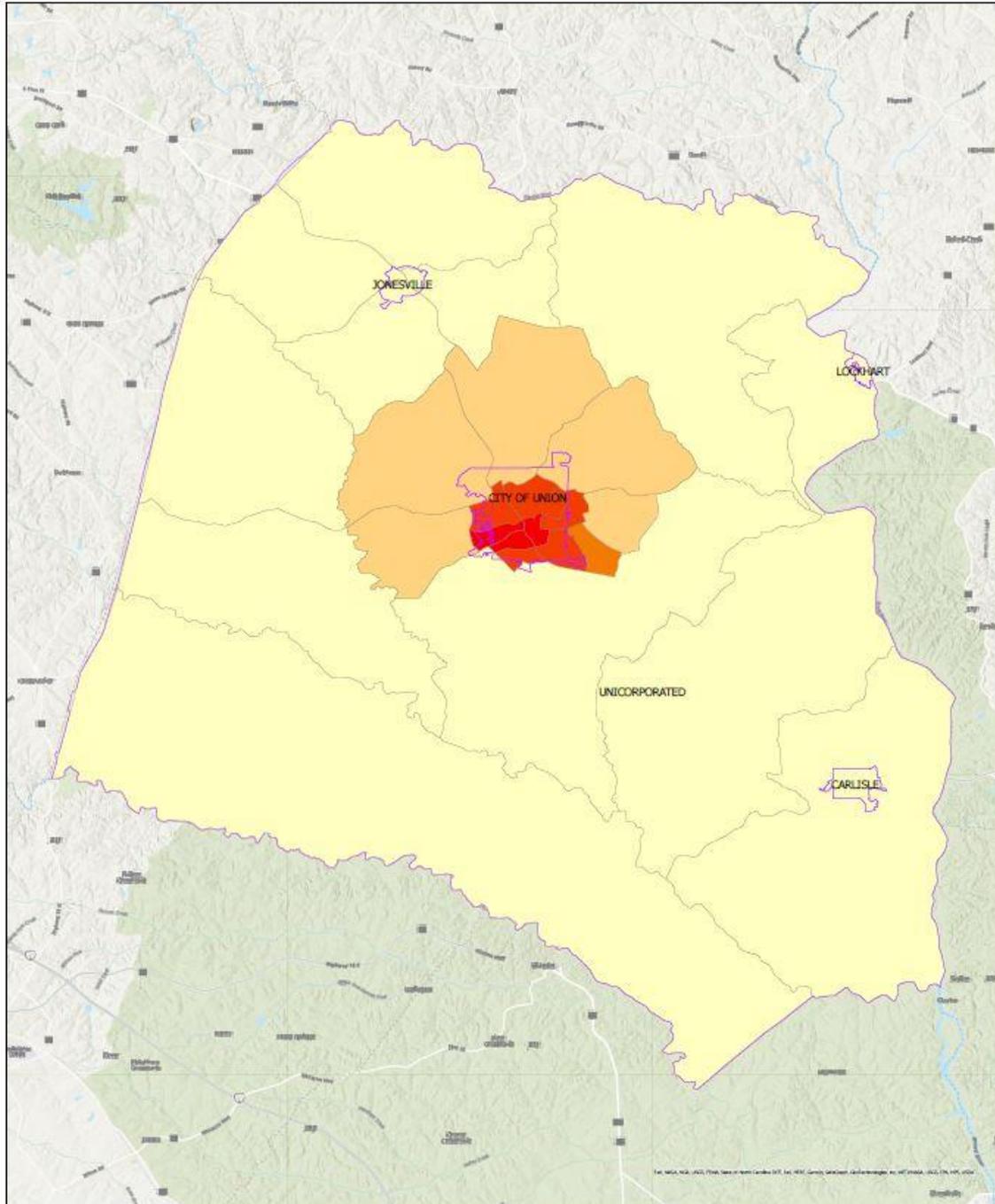
The most notable terrorist event in South Carolina is the 2015 Emanuel African Methodist Episcopal Church in Charleston. The mass shooter killed nine (9) black individuals and injured a 10th inside the church. The mass shooter was a white supremacist from North Carolina who was indicted for hate crimes, murder, and many other counts. His punishment was the death penalty, plus additional charges that amount to life in prison. This event remains the deadliest mass shooting in South Carolina.

LOCATION

Populated areas have a higher probability of having a terrorist event. However, terrorism can occur anywhere.

The City of Union and surrounding suburbs are the most densely populated areas. The densest area has a population density of 901.7 to 2,313.5 individuals per square mile. The Towns of Carlisle, Jonesville, and Lockhart have low population densities ranging from 79.7 to 241.4 individuals per square mile.

A population density map for Union County and municipalities has been provided on the next page.





Union County
Population Density Map
August 31, 2023

Municipal Boundary
 Union County Census Block Groups
 POP_SQMI
 10.6 - 79.7
 79.7 - 241.4
 241.4 - 399.2
 399.2 - 901.7
 901.7 - 2313.5



2.85 Miles

Map Produced by: Catawba Regional Council of Governments
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 crcog@catawbacog.org www.catawbacog.org

Catawba Regional COG disclaims any liability for damages that may arise from the use of this map or data. All efforts have been made to ensure accuracy.

FREQUENCY

Terrorism in general has a probability frequency of 1 to 10% annual chance of occurring annually.

CLIMATE CHANGE

Based on the societal and political nature of terrorism and mass violence, while climate change is not expected to directly impact the frequency or severity of incidents, it may have a secondary impact on terrorism and mass violence risk. No current evidence concludes a link between climate change and the extent, frequency, intensity, or magnitude of terrorism and mass violence-related events; however, it is possible that climate change effects such as extreme heat or scarcity of key supplies or resources could lead to civil unrest or violent behaviors focused on institutions or the public.

IMPACT

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

Explosive

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

Chemical

Chemical attacks can pose an immediate danger to life and health, depending upon the materials used. Chemicals are easy to access, low cost, and easy to deploy. Chemical terrorism can have high and persistent impacts on people and places. These types of attacks are probable and have enjoyed historical success.

Radiological

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

Biological

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

Nuclear

While yielding a very high impact, nuclear attacks are extremely rare since it is cost-prohibitive and technically difficult to achieve. However, this type of attack could be state-sponsored, making it viable.

Other

Terrorism Hazard Assessment must also account for modern trends and changes. An additional “OTHER” category includes small arms attacks, vehicle ramming attacks, edged weapon attacks, and incendiary attacks. Cyber-attacks and mass shootings should also be addressed in the other category.

Mass shootings have a low probability, as do school shootings. School shootings occur in confined spaces, which makes it harder for victims to escape. A subsection on school emergencies and a cyber security subsection have been included, which has become a concern in South Carolina.

Anticipated impacts on community lifelines are provided below.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Medium	Telecommunications and broadband systems may be damaged, or service interrupted by a cyber intrusion/attack or physical attack. Service disruptions could negatively impact public sector information sharing platforms. Large numbers of people attempting to make phone calls in response to the incident may overload communications systems.	Regional or Statewide
Energy	Medium	Power generation, transmission, and distribution equipment and systems as well as pipelines could be damaged, which may cause interruptions in service or fuel supplies.	Regional
Food, Water & Shelter	Low	Significant impacts are not anticipated unless the act targets water systems, food supplies, or residential areas. Depending on type and location of incident, emergency shelter may be needed.	Local, Regional or State
Hazardous Materials	High	Hazardous material sites or hazardous material in transit could be damaged by a cyber intrusion/attack or physical attack. Damage could result in hazardous material releases with impacts depending on type and volume of material released.	Local or Regional

Health and Medical	High	Healthcare facilities may see an increased number of patients seeking emergency care. Healthcare facilities could be directly damaged by a cyber intrusion/attack or physical attack. Mental health needs of the public and responders would increase based on an intentional attack	Regional or Statewide
Safety and Security	High	Community safety in the impacted area would be compromised. Safety and security entities and personnel would see increased demand for response and investigation. Specialized training, equipment, and personal protective gear may be needed to protect the health and safety of responders and the public. Facilities could be directly damaged, or service interrupted by a cyber intrusion/attack or physical attack. Response may require large-scale search and rescue operations.	Local or Regional
Transportation	Medium	Transportation could experience disruptions from direct damage to roadways, bridges, ports, or airports as well as from increased traffic because of evacuations or relocations or from rerouted traffic.	Local or Regional

RECOMMENDATIONS

1. Implement communication recommendations that impact All Hazards, hazardous materials, and power outage recommendations.

SCHOOL SHOOTINGS AND OTHER SCHOOL RELATED EMERGENCIES

There have been no active shooter incidents in the Union County school system. There have been numerous intimidation, bullying, and cyber bullying incidents in the school district, as noted below. The school district should address violence at schools to prevent active shooter incidents and students getting injured.

South Carolina Public Schools 2021-2021 Bullying Data				
District	School Name	Intimidation	Bullying	Cyber Bullying
Union 01	Sims Middle	3	4	0
Union 01	Union County High	4	0	0
Union 01	Buffalo Elem	1	0	0
Union 01	Foster Park Elem	1	1	0
Union 01	Jonesville Elementary and Middle	0	0	0
Union 01	Monarch Elem	0	0	0

Source: <https://ed.sc.gov/districts-schools/school-safety/discipline-related-reports/2020-21-bullying-incidents-by-district-and-schools/>

South Carolina Public Schools 2019-2020 Bullying Data				
District	School Name	Intimidation	Bullying	Cyber Bullying
Union 01	Sims Middle	3	4	0
Union 01	Union County High	4	0	0
Union 01	Buffalo Elem	1	0	0
Union 01	Foster Park Elem	1	1	0
Union 01	Jonesville Elementary and Middle	0	0	0
Union 01	Monarch Elem	0	0	0

Source: <https://ed.sc.gov/districts-schools/school-safety/discipline-related-reports/2019-20-bullying-incidents-by-district-and-schools/>

South Carolina Public Schools 2018-2019 Bullying Data				
District	School Name	Intimidation	Bullying	Cyber Bullying
Union 01	Sims Middle	0	4	0
Union 01	Union County High	0	1	2
Union 01	Buffalo Elem	0	1	0
Union 01	Foster Park Elem	0	3	0
Union 01	Jonesville Elementary and Middle	1	0	0
Union 01	Monarch Elem	0	0	0

Source: <https://ed.sc.gov/districts-schools/school-safety/discipline-related-reports/2018-19-bullying-incidents-by-districts-and-schools/>

South Carolina Public Schools 2017-2018 Bullying Data				
District	School Name	Intimidation	Bullying	Cyber Bullying
Union 01	Lockhart School			
Union 01	Sims Middle	1	4	
Union 01	Union County High		1	
Union 01	Buffalo Elem			
Union 01	Foster Park Elem			
Union 01	Jonesville Elementary and Middle			
Union 01	Monarch Elem			

Source: <https://ed.sc.gov/districts-schools/school-safety/discipline-related-reports/2017-18-bullying-incidents-by-district-and-school/>

The Union School system has had numerous precautionary lockdowns due to incidents within the surrounding area of the school. The Union County School District has prepared Emergency Action Plans for each school.

Some of the district schools function as emergency shelters.

RECOMMENDATIONS

1. Union County should prioritize the emergency shelter school locations for backup generator funding. The school district should install backup generators at the remaining schools.
2. Review existing Emergency Action Plans for each school and keep a copy in the Union County Emergency Management office.
3. Install or maintain backup generators at the schools, with first preference provided to schools that function as Emergency Shelters.

CYBER SECURITY

Cyberattacks are deliberate attacks on information technology systems to gain illegal computer access or purposely cause damage. As Union County and jurisdictions become more technologically advanced and dependent upon computer systems, the threat of cyberattacks is becoming increasingly prevalent. Also known as computer network attacks, cyberattacks are difficult to recognize and typically use malicious code to alter computer data or steal information. Mitigating and preparing for cyberattacks is challenging because of how diverse and complex attacks can be.

The FBI is the lead federal agency investigating cyberattacks by criminals, overseas adversaries, and terrorists. In South Carolina, the Department of Administration in the Information Security and Privacy division is the lead agency that maintains Cybersecurity and Risk Management resources.

Cyberattacks can happen in both the public and private sectors. A specific individual or group may carry the cyberattack out from afar. Many attacks attempt to steal money or to disturb normal operations.

Top 10 Cybersecurity Threats

 Vulnerabilities: Recently-discovered critical vulnerabilities in Microsoft Exchange and advances in phishing create new areas for MSPs to monitor.	 Data center attacks: These malicious activities are aimed at compromising the security of data centers, facilities which house computer systems and other critical IT infrastructure.
 Business email compromise: Once a cybercriminal gains access to a business email account, they can use it to send phishing emails, steal sensitive information, or use the account to launch attacks.	 Ransomware: This form of cyberattack has been around for decades, and hackers continue to evolve their delivery methods.
 Crime-as-a-service: This describes the provision of cybercriminal tools, services, and expertise through an underground, illicit marketplace.	 IoT device hacking: With many employees accessing sensitive company platforms and data from multiple scattered endpoints, hackers have more infiltration opportunities.
 Supply chain attacks: Hackers infiltrate supply chain technology to access source codes, build codes, and other infrastructure components of benign software apps.	 Insider threats: Once internal system users are compromised, they can become an even greater threat to the system than external attackers.
 Cloud-based attacks: With so many businesses using the cloud and cloud networks becoming more intricate, their infrastructure has become low-hanging fruit for digital threat actors.	 State-sponsored cyber warfare: Cyberattacks from one nation-state against another for strategic or military purposes, often carried out by well-funded and highly skilled teams of hackers or cyber soldiers.

LOCATION AND SPATIAL EXTENT

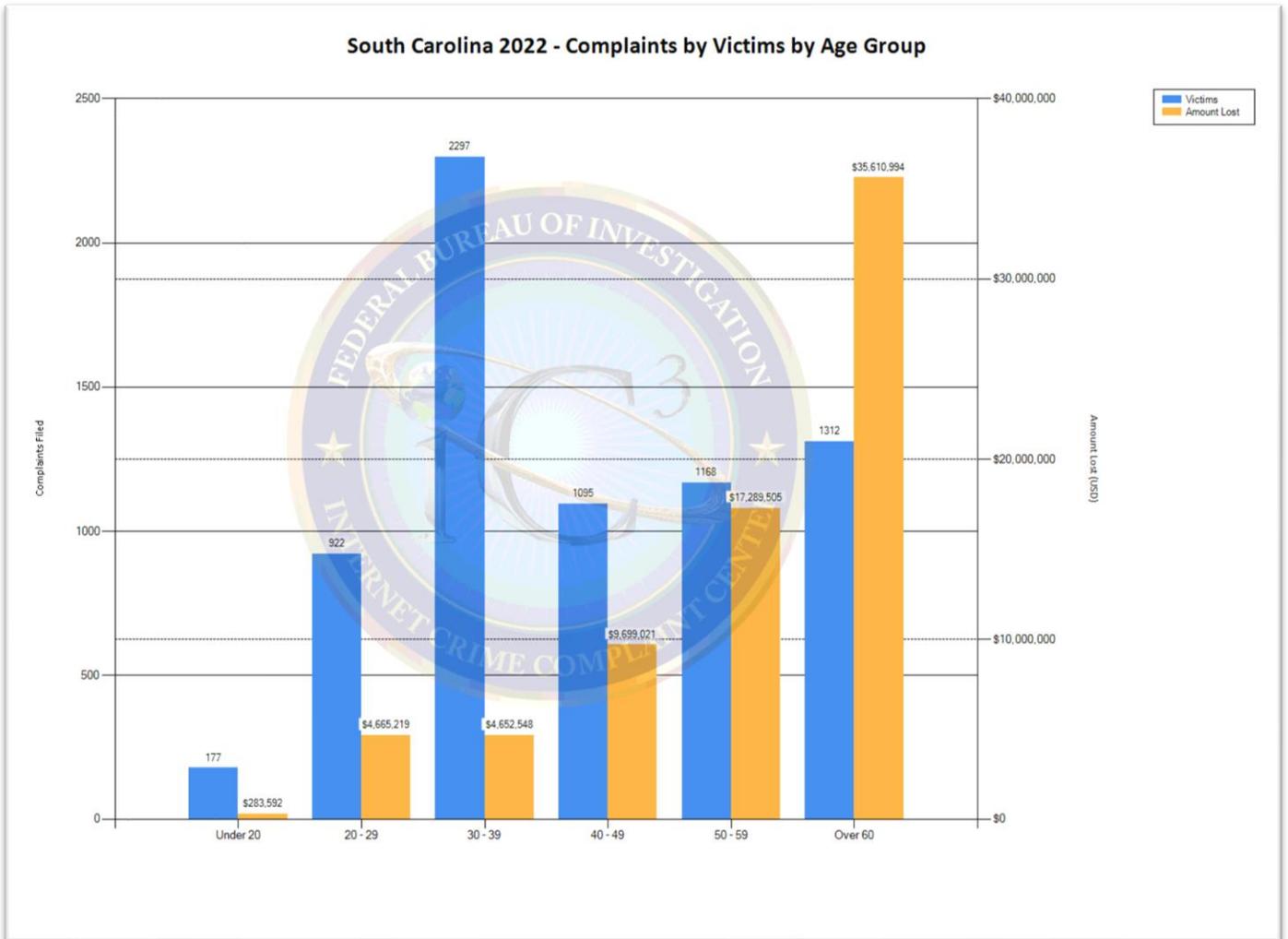
Cyberattacks happen worldwide and are not restricted to a specific locational boundary. They tend to affect the public and private industries. However, more resources are targeted to the public industry.

There have been no breaches in Union County, however, the neighboring County of Spartanburg was breached in the spring of 2023.

HISTORICAL OCCURRENCES

There is no known source that provides county level data. The Federal Bureau of Investigation manages an Internet Crime Compliant Center (IC3). Annual reports are prepared for each state. South Carolina ranks 20th out of 50 states and 7 US Territories with a total of 7,861 cyber security victims.

The 30-39 age group had the most internet crime victims with 2,297, while the over 60 age group had the most amount lost with \$35,610,994 for 1,312 victims.



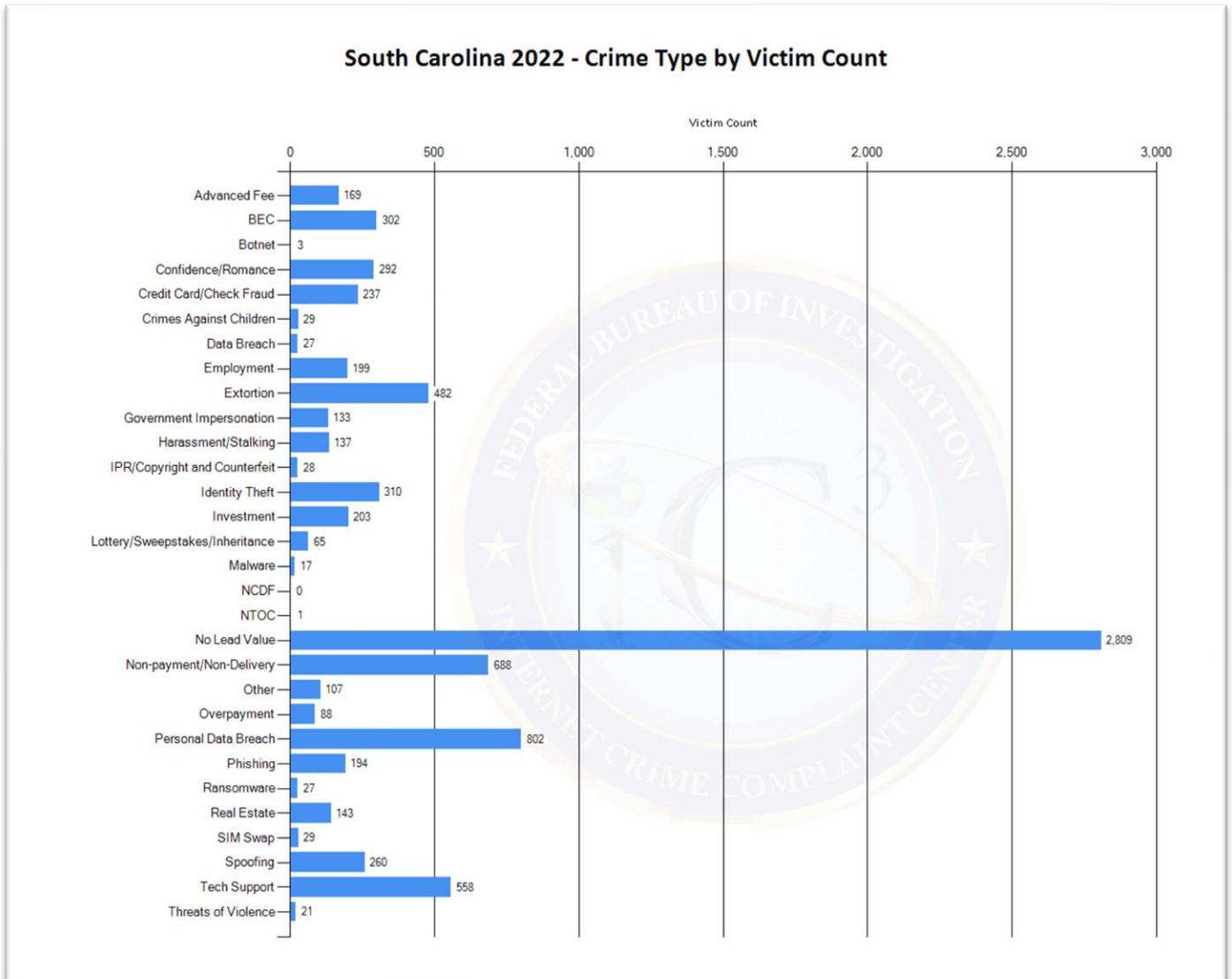
Source: Federal Bureau of Investigation 2020 Internet Crime Report for South Carolina

There were 2,809 cybercrimes with no lead value. Of the Cyber Crimes with lead values, Personal Data Breach had the highest value (802), followed by Nonpayment/ Non-Delivery (688) and Tech Support (558) as the Top three by Crime Type. The crime type is a descriptor related to the medium or tool used to facilitate the crime and or used by the IC# for tracking purposes.

A personal data breach is a leak/spill of personal data that the cybercriminal releases from a secure location to an untrusted environment. Personal data breaches also include security incidents in which an individual’s sensitive, protected, or confidential data is copied, transmitted, viewed, stolen, or used by an unauthorized individual.

Nonpayment/Non-delivery is goods or services shipped, and payment is never rendered (nonpayment). The purchaser sends payment, and goods or services are never received or are of lesser quality (non-delivery).

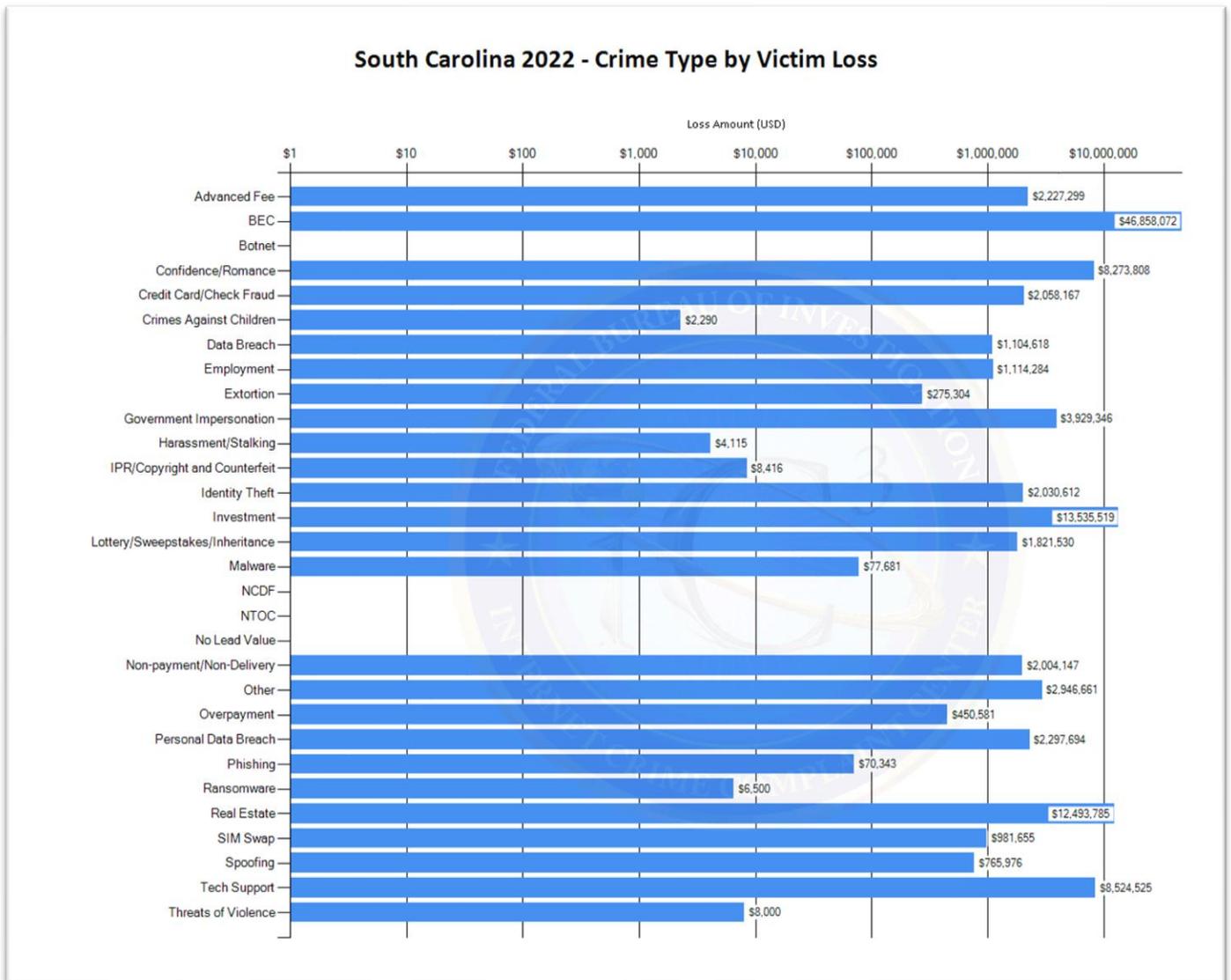
Tech support crime is when the cybercriminal poses as a technical or customer support/service to secure personal and account data.



Source: Federal Bureau of Investigation 2020 Internet Crime Report for South Carolina

Business Email Compromise (BEC), Investment, and Real Estate were the top three costliest internet crimes in South Carolina in 2022.

Business Email Compromise (BEC) is a scam targeting businesses or individuals working with suppliers or corporations regularly performing wire transfer payments. Fraudsters carry out these sophisticated scams by compromising email accounts and other forms of communication, such as phone numbers or virtual meeting applications, through social engineering or computer intrusion techniques to conduct unauthorized funds transfers.



Source: Federal Bureau of Investigation 2020 Internet Crime Report for South Carolina

The scheme has evolved from simple hacking or spoofing of business and personal email accounts and a request to send wire payments to fraudulent bank accounts. These schemes historically involved compromised vendor emails, requests for W-2 information, targeting of the real estate sector, and fraudulent requests for large amounts of gift cards. More recently, fraudsters are more frequently utilizing custodial accounts held at financial institutions for cryptocurrency exchanges or having victims send funds directly to cryptocurrency platforms where funds are quickly dispersed.

In 2022, the Internet Crime Compliant Center (IC3), on a national basis, “also saw a slight increase in targeting victims’ investment accounts instead of the traditional banking accounts. There was also an increasingly prevalent tactic by BEC bad actors of spoofing legitimate business phone numbers to confirm fraudulent banking details with victims. For one example, the victims report they have called a title company, realtor, etc., using a known phone number, and then find later the fraudster has spoofed the phone number. This increase in the tactic of “spoofed” phone numbers emphasizes the importance of leveraging two-factor or multi-factor authentication as an additional security layer. Union County should implement procedures to verify payments and purchase requests outside email communication. They can include direct phone calls but to a known verified number and not rely on information or phone numbers included in email communication. Other best practices include carefully examining the email address, URL, and spelling used in correspondence and not clicking on anything in an unsolicited email or text message asking you to update or verify account information.” (FBI Internet Crime Compliant Center 2022 Annual Report) BEC crimes contributed to a victim loss of \$46,858,072 in South Carolina.

Investment is a deceptive practice that induces investors to make purchases based on false information. These scams usually offer the victims large returns for minimal risk (Retirement, 401K, Ponzi, Pyramid, etc.). South Carolina victims lost \$13,535,519 from Investment Crimes.

Real Estate is the loss of funds from a real estate investment or fraud involving rental or timeshare property. South Carolina victims lost \$12,493,785 from Investment Crimes.

Union County and its jurisdictions have not reported any major catastrophic cyberattacks. The potential to experience one is unpredictable and can happen at any time. The neighboring County of Spartanburg suffered a cyber-attack in April of 2023. Cybercriminals have targeted other counties in South Carolina between 2021 and the present.

FREQUENCY

The probability of a cyberattack in Union County is considered unlikely, less than 1 percent annual probability. Although the probability is low, the impact on government operations and the surrounding community is significant, and the potential to experience one is unpredictable and can happen at any time.

RECOMMENDATIONS

1. County, city, towns, and Emergency Response Service providers should prepare, update, or review annually or more frequently Cyber Security Plans.
2. Have non-technology procedures in place for the operation of government facilities and Emergency Response services to cover a period when technology may be down in the Continuity of Operations Plans.
3. Have backup or alternative systems: Keep backup laptops, mifi devices, and any other needed device for emergencies.
4. Prepare recovery procedures (for example, backup server offsite and offline) and perform annual testing of recovery procedures, ensuring capabilities to restore systems and data.
5. Implement staff education and training to prevent breaches and reduce the number of computer viruses.
6. Deploy software and hardware through the IT Department or vendor to detect and eliminate viruses and malware while allowing and monitoring authorized access.
7. Perform vulnerability scanning.
8. Perform internal and external penetration testing by third-party providers.
9. Union County should consider joining the South Carolina Critical Infrastructure Cybersecurity Task Force (SC CIC) or continuing to participate in the task force if already a member. The SCIC program offers free services like training and system audits.

CHANGES TO THIS SECTION

- ✓ This entire section is new.

INFECTIOUS DISEASE

DESCRIPTION

Communicable or infectious diseases are conditions that result in clinically evident illnesses that are transmissible directly from one person to another or indirectly through vectors such as insects, air, water, blood, or other objects. The impact of communicable diseases can range from the mild effects of the common cold to the extreme lethality of pneumonic plague or anthrax. The United States developed a public health system as a response to the often urgent need to respond to or prevent outbreaks of infectious diseases. Through public health methods of disease reporting, vaccinations, vector control, and effective treatments, most infectious diseases are well controlled in the United States and across Union County and its municipalities. However, control systems can fail. When people come together from locations outside the state, outbreaks can occur, even in most modern communities.

A disease that occurs regularly in an area or within a community is endemic to that area or population. An epidemic is a widespread occurrence of an infectious disease affecting many individuals. A widespread disease affecting people in multiple countries or worldwide is considered a pandemic.

This section describes some of the more significant potential infectious disease concerns. The threats discussed in this section usually do not occur regularly, though some are more frequent. The diseases described herein do not originate from intentional exposure (such as through terrorist actions) but do present significant issues and concerns for the public health community. There are numerous infectious diseases that rarely, if ever, occur in the State of South Carolina, such as botulism or bubonic plague. The United States and other countries safely housed and controlled in laboratory settings some hazardous diseases such as anthrax, pneumonic plague, and smallpox. Terrorists could use these dangerous diseases as biological weapons. The Centers for Disease Control and Prevention (CDC) houses and controls hazardous diseases in the United States. Other diseases have not (yet) mutated into a form that can infect humans or otherwise lie dormant in nature.

There have been several significant viral outbreaks from emerging diseases in recent years of national and international importance. The Zika and West Nile viruses are typically passed to humans or animals by mosquitoes and made significant news as emergent disease threats. The United States has also identified diseases that are spread directly among human beings, such as Severe Acute Respiratory Syndrome (SARS) and Ebola, as serious threats. While these conditions caused great public health concern when the United States first identified them, the disease status has changed. SARS has virtually disappeared, and West Nile virus occurs with low frequency and causes severe disease in only a tiny percentage of cases. Ebola has been contained, and a vaccine is in development. Many people infected with Zika will not experience symptoms of the disease. The COVID-19 (SARS-CoV-2) virus caused a worldwide pandemic from 2019 to 2022, and worldwide populations still feel its ramifications today. There was a total of 6,956,173 deaths worldwide from Covid-19.

Other infectious diseases pose a much more frequent threat to the region's citizens. Some of the contagious diseases of greatest concern include influenza, particularly in a pandemic form, norovirus, and multiple antibiotic-resistant tuberculosis. Even in one of its normal year-to-year variants, influenza (commonly referred to as "flu") can result in severe illness and even death in young children, the elderly, and immune-compromised persons. But there is always the potential risk of the emergence of influenza in one of the pandemic H1N1 forms, such as in the "Spanish Flu" outbreak of 1918-19, which killed over 50 million people worldwide.

The table below shows the human deaths from infectious disease for South Carolina by area of the state from 1999 to 2019 along with COVID-19 deaths from January 2020 through December 2021. Death rates are per 100,000 people. COVID case and fatality data for South Carolina was compiled by USA Facts in coordination with the CDC and SCDHEC.

Region Name	2020 Regional Population	COVID-19 Deaths through January 10, 2022	Other Infectious and Respiratory Disease Deaths, 1999-2019	Total Deaths	Total Death Rate (per 100k)
Lowcountry	1,192,401	2,669	21,682	24,351	2,042
Midlands	1,413,121	3,273	27,040	30,313	2,145
Pee Dee	991,472	3,301	24,891	28,192	2,843
Upstate	1,521,431	5,393	36,248	41,641	2,737
State Total	5,118,425	14,636	109,861	124,497	2,432

Table 69 Infectious Disease Death Rates. Source USA Facts

Based on USA Facts data, through June 2023, South Carolina had seen 1,481,646 reported cases of COVID-19 and 17,869 COVID-19 deaths. COVID-19 case rates will be researched in the coming years to understand the spread of disease as well as impacts of population density, protective measures, and other factors. The figure below depicts case rates in the state for the first two years of the pandemic; it does not include data from subsequent spikes in cases related to variants of the initial virus.

Source: 2023 South Carolina Hazard Mitigation Plan

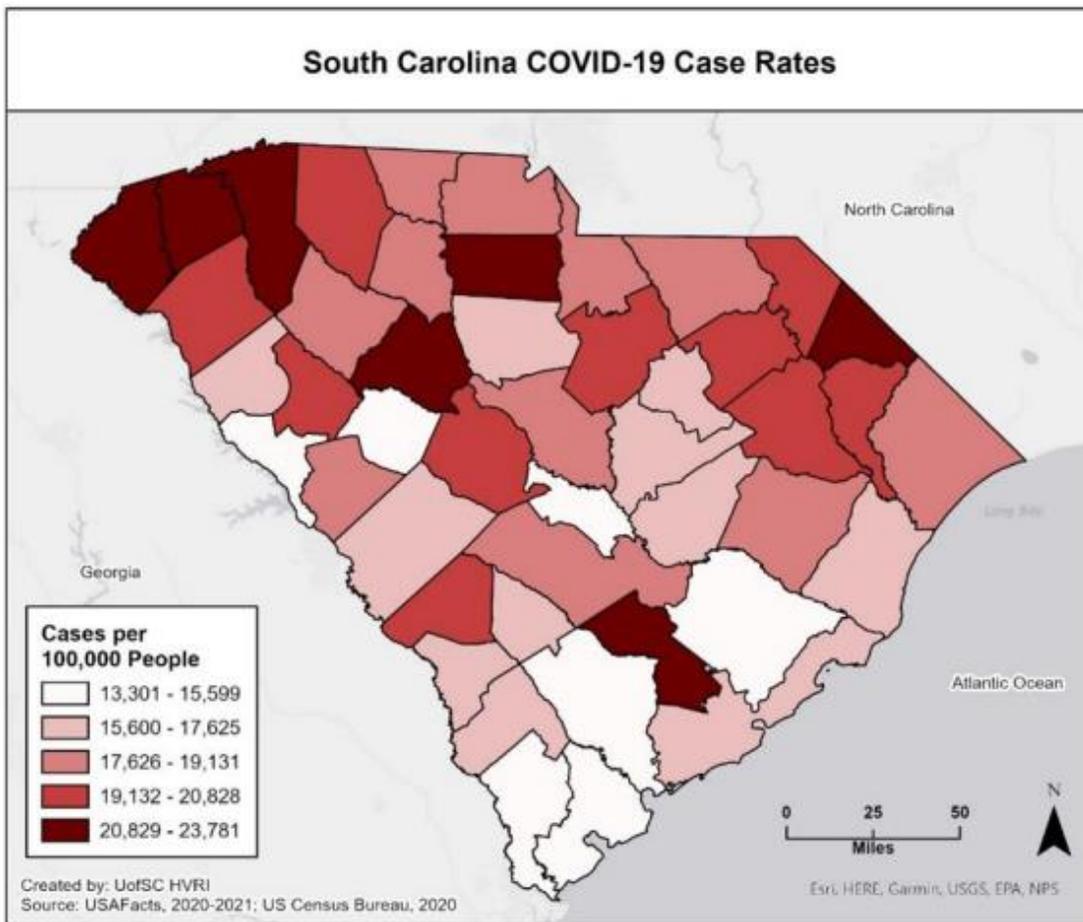


Figure 120: COVID-19 Case Rates in South Carolina Counties, January 22, 2020-January 10, 2022

Source: 2023 South Carolina Hazard Mitigation Plan

Union County had between 17,626 and 19,131 cases of Covid-19 per 100,000 people. Relative to other counties in the state, it was moderate-level case numbers.

Vector-Borne Diseases

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

Ticks can carry and transmit many pathogens that may result in contracting a tick-borne disease. Tick-borne diseases transmitted by these ticks include Anaplasmosis, Babesiosis, Lyme disease, Rickettsia Parkeri Rickettsiosis, Rocky Mountain Spotted Fever, Southern Tick-Associated Rash Illness (STARI), Ehrlichiosis, Powassan Virus Disease, Heartland Virus, and Tularemia. In addition to tick-borne diseases,

a toxin can be transmitted through the saliva of a tick bite that causes progressive paralysis, a condition known as "tick paralysis." Tick feeding also may result in mild to severe allergic reactions in some individuals. (South Carolina Department of Health and Environmental Control, Ticks Can Spread Disease)

According to the South Carolina Department of Health and Environmental Control, the most common diseases that could potentially be carried by mosquitoes in South Carolina include West Nile, Eastern Equine Encephalitis, La Crosse Encephalitis, Saint Louis Encephalitis Virus, and dog/cat Heartworm. Union County and its municipalities do not have a local mosquito control program.

According to the Centers for Disease Control and Prevention, fleas can cause Tungiasis, Bubonic Plague, Rickettsial Disease, Flea-borne Typhus, and Flea-Borne Spotted Fever.

HISTORICAL EVENTS

March 1918:

In 1918, the H1N1 Influenza Virus strain, later called "Spanish Flu," escalated into a global pandemic. South Carolina reported its first cases in the spring of that year. By autumn, approximately 50,000 cases were reported in the state, with about 14,250 deaths, primarily from pneumonia, by the time the pandemic ended the following year.

June 5, 1981:

In June 1981, California reported the first official report of a condition that would come to be known as Acquired Immune Deficiency Syndrome (AIDS). The first case in South Carolina was diagnosed in 1982 (University of South Carolina, 2011). The case was tied to the Human Immunodeficiency Virus (HIV) on January 11, 1985 (University of South Carolina, 2011). From 2008-2020, there were 9,324 new cases of HIV diagnosed in South Carolina. During that same period, there were 4,197 deaths attributed to complications related to HIV (CDC, 2022).

June 11, 2009:

On June 11, 2009, the World Health Organization (WHO) declared an influenza pandemic from a strain of the H1N1 influenza virus, commonly referred to as "Swine Flu," as the virus originated in pigs before mutating into a form transmissible from human to human. An estimated 927,000 human cases occurred in South Carolina, resulting in 1,091 hospitalizations and 49 deaths (Learner, Beasley, & Drociuk, 2010).

Recent Activity (2018–2022)

January 2020-present:

In early 2020, the WHO began tracking a respiratory illness emerging from Wuhan Province in the People's Republic of China. The virus was designated as novel coronavirus 2019, officially named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), shortened to COVID-19 in layperson's terms, and is the cause of an ongoing coronavirus pandemic in humans. On March 11, 2020, the WHO declared COVID-19 a global pandemic (World Health Organization, 2020). South Carolina detected the first case of COVID-19 on March 16, 2020 (SCDHEC, 2020). From that point through January 10, 2022, there were 975,320 diagnosed human cases of COVID-19 (Figure 122), with 14,636 fatalities for a mortality rate of 1.5%. Response and disease spread prevention costs tallied hundreds of millions of dollars.

April 2020:

In March 2020, South Carolina identified one farm with Low Pathogenic Avian Influenza (LPAI), while North Carolina identified eleven (11) commercial turkey farms in North Carolina with the disease. The following month, an additional farm in South Carolina confirmed LPAI, as well as some limited cases of Highly Pathogenic Avian Influenza. Over 360,000 birds were depopulated across multiple locations to contain the spread of disease and its threat (Youk S. L., 2020). As a result of this relatively contained outbreak, 55 countries imposed an international trade ban on some or all SC poultry and poultry products.

November 2022:

As of January 2023, South Carolina has confirmed 58 cases of zoonotic Eurasian Highly Pathogenic Avian Influenza (EA HPAI) in wild birds found in South Carolina (Clemson University Livestock Poultry Health, 2022). In October-November 2022, South Carolina identified HPAI in poultry on a community farm on an island in Beaufort County; 172 poultry were neutralized and composted. South Carolina did not report any cases in commercial farms. The same strain has infected commercial and backyard flocks in 38 other states, necessitating the depopulation of more than 40 million birds. The multi-state outbreak had significant economic impacts and created supply chain disruptions that directly and indirectly impacted South Carolina.

July 20, 2022:

As of July 20, 2022, there were 16 confirmed cases of Monkeypox, a zoonotic disease, in South Carolina. South Carolina did not report any deaths (Centers for Disease Control and Prevention, n.d.). On July 23, 2022, the World Health Organization declared Monkeypox a Public Health Emergency of International Concern (World Health Organization, 2022).

RISK & LOCATION

Union County and its municipalities are rural communities. All of Union County is at risk for infectious diseases. “Although rural areas may be less vulnerable to diseases passed by human-to-human transmission than urban areas because of lower population density, they may be at higher risk for exposure to zoonotic diseases than urban areas.” (2023 South Carolina Hazard Mitigation Plan) The City of Union is the most densely populated area in Union County and will have a higher risk of human-to-human transmission.

CLIMATE CHANGE

According to the 2023 South Carolina Hazard Mitigation Plan, climate change could increase infectious disease outbreaks. “Changes in climate patterns may result in changes in plant and animal success and in supplies of food and water, which could impact human health. Warmer temperatures may be more favorable to some disease agents. In the event that climate change was to spur the migration of people or vectors into new areas because of a loss of livable areas or habitats, there is the potential for increased population density and interaction between humans and wildlife, either of which may lead to increased incidents of exposure to infectious disease.” (2023 South Carolina Hazard Mitigation Plan)

IMPACTS

“Infectious diseases result in human illness and death and can cause agricultural and economic losses as well as disruption of vital services because of personnel shortages. COVID-19 has provided a harsh example of the human health and medical costs of infectious diseases. The U.S. federal government has spent or committed more than \$4 trillion in funding to support COVID-19 response and economic recovery. In terms of deaths, in the two years from January 2020 (the start of the COVID-19 pandemic in the U.S.) through January 10, 2022, COVID-19 caused 14,636 deaths in South Carolina, according to data assembled by USA Facts, which is an average of 5,854 deaths per year. As a means of comparison, other infectious diseases caused an average of 1,302 deaths per year between 1999 and 2019, based on CDC data.” (2023 South Carolina Hazard Mitigation Plan)

Infection diseases can impact Community Lifelines. The Table below shows how severe infectious disease crises, such as health pandemics, may impact community lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	Minimal impacts expected to communications infrastructure. Staff availability to operate and maintain communications equipment and systems may be reduced by infection, exposure, or public health guidance to minimize exposure. Extensive use of remote work and education approaches, if needed, may stress broadband networks.	Regional or Statewide
Energy	Low	No significant impacts are anticipated. Staff availability to operate and maintain equipment and systems may be reduced by infection, exposure, or public health guidance to minimize exposure.	Regional
Food, Water & Shelter	Medium	Food supply chains could be disrupted because of disease spread or public health guidance to minimize exposure. Public concern could lead to panic buying/hoarding of food and water supplies.	Regional or Statewide
Hazardous Materials	High	No significant impacts are anticipated. Staff availability to operate and maintain equipment and systems may be reduced by infection, exposure, or public health guidance to minimize exposure.	Regional or Statewide
Health and Medical	High	Medical staff and personnel will be overwhelmed by a significant hazard event. Staff availability may be reduced by infection, exposure, or public health guidance to minimize exposure. The medical supply chain could be stressed as demand for supplies increases. Fatality management could be a concern if the infectious disease has a high case fatality rate. Large numbers of people seeking care for the infectious disease could lead to increased wait times at emergency rooms.	Regional or Statewide
Safety and Security	High	Response personnel may see an increase in calls for emergency care or for public incidents. Responders may need specialized training and	Regional or Statewide

		protective gear to protect health and safety. Staff availability may be reduced by infection, exposure, or public health guidance to minimize exposure.	
Transportation	Medium	No significant impacts are anticipated. Staff and driver availability to continue operations may be reduced by infection, exposure, or public health guidance to minimize exposure.	Regional or Statewide

RECOMMENDATIONS

1. Follow State and National guidelines for infectious disease outbreaks.
2. Maintain plans, documents, procedures, and lessons learned from the Covid-19 Pandemic.

CHANGES IN THIS SECTION

- ✓ This section is new.

LOCAL ECONOMIC HAZARDS

DESCRIPTION

Economic shocks/disruptions to the economic base of an area or region occur in three ways:

- Downturns or other significant events in the national or international economy that impact demand for locally produced goods or consumer spending.
- Downturns in particular industries that constitute a critical component of the region's economic activity or
- Other external shocks (a natural or man-made disaster, military base closure, major employer exit, climate change impacts, etc.)

Union County's municipalities were mill communities. The City of Union and the Towns of Lockhart, Jonesville, and Carlisle were all communities constructed to operate textile mills. The textile mills that were in these communities have closed. The City of Union has a more diverse economy, which limited the impact of the closing of the textile mills. The Towns of Lockhart, Jonesville, and Carlisle continue to face population declines and job losses from the closure of the Mills.

The Town of Lockhart's Mill closed in 1994 (617 employees) and its Hope Hospital (6 employees) in 2004. Supporting Industries such as gas stations and restaurants also closed. During a 2018 special meeting, the Union County School Board of Trustees approved a motion to close the Lockhart School. The Union County school district reassigned thirty-plus faculty and staff members to other positions. Only the Lockhart Hydroelectric company remains in the Town of Lockhart. In 2023, the Town of Lockhart prepared an economic, strategic plan to direct the economic growth of its community.

The textile mills in the Town of Jonesville closed around the turn of the 21st century. The Town of Jonesville has prepared strategic plans to revive its downtown. In 2023, the Town of Jonesville received the South Carolina Infrastructure Investment Program (SCIIP) and South Carolina Rural Infrastructure Authority (RIA) grants to install sewer infrastructure extensions connecting the existing sewer line to the City of Union's sewer infrastructure. The new infrastructure improvements will allow the Town of Jonesville more capacity to serve existing residents and businesses better and permit the construction of new developments. The town has also received Community Development Block Grant (CDBG) funding to improve the downtown streetscape. The community continues to work with partners to strengthen the community to become a thriving community again.

Carlisle Finishing Textile Mill, located in the Town of Carlisle, closed in 2020. The textile mill constructed and operated the town's sewer system. Once the mill was closed, the new owner did not want to continue operating the sewer system. The South Carolina Department of Health and Environmental Control stepped in to ensure the town would continue to have sewer service until the town could build a new sewer line to connect the Town of Carlisle to the City of Union Sewer System. The new sewer line has received South Carolina grant funding, with construction will be completed in 2023. The loss of jobs

has severely impacted the community. At one point, Carlisle Finishing was the County’s largest employer, with over 1,000 jobs. In addition to job losses, the former Carlisle Finishing plant could contaminate the broad river and impact the City of Columbia’s drinking water.

In addition to the loss of industry, Union County businesses have dealt with the COVID-19 pandemic Federal Emergency (2020 -2023) impacts and South Carolina natural disaster impacts from Hurricane Ian (2022).

Economic Resiliency for the area can be improved by:

- Engaging in comprehensive planning efforts that involve extensive involvement from the community to define and implement a collective vision for resilience that includes the integration or alignment of other planning efforts (e.g., hazard mitigation plans) and funding sources.
- Undertaking efforts to broaden the industrial base with diversification initiatives, such as targeting the development of emerging clusters or industries that (a) build on the region’s unique assets and competitive strengths and (b) provide stability during downturns that disproportionately impact any single cluster or industry.
- Adapting business retention and expansion programs (e.g., economic gardening or other enterprise supports) to assist firms with economic recovery post-disruption.
- Building a resilient workforce that can better shift between jobs or industries when their core employment is threatened through job-driven skills strategies and support organizations.
- Maintaining geographic information systems (GIS) that link with municipal business licenses, tax information, and other business establishment databases to track local and regional “churn” and available development sites. The County could integrate GIS data with hazard information to make rapid post-incident impact assessments.
- Ensuring redundancy in telecommunications and broadband networks to protect commerce and public safety in the event of natural or manmade disasters.
- Promoting business continuity and preparedness (i.e., ensuring businesses understand their vulnerabilities—including supply chains—in the face of disruptions and are prepared to take actions to resume operations after an event) and
- Employing safe development practices in business districts and surrounding communities. Strategies include locating structures outside of floodplains, preserving natural lands that act as buffers from storms, and protecting downtowns and other existing developments from the impacts of extreme weather.

Involving the Union County Chamber of Commerce and Union County Economic Development Board to educate businesses about incorporating strategies to keep their businesses resilient to hazards would greatly assist the local economy.

Strategies to mitigate business disruption include:

1. Finding a suitable site not located in a flood zone or other hazard zone.

2. Providing uninterruptible power supplies (UPS) and an emergency standby generator for critical equipment.
3. Back up technology data offsite and off-company servers to ensure business continuity after a data breach.
4. Develop a business continuity plan with recovery strategies to mitigate risk from business disruption. Plans should include a list of current suppliers and other companies that can supply needed materials and equipment to continue business operations. Supplier interruption was a significant problem for businesses during the COVID-19 pandemic emergency.
5. Develop a recovery strategy for information technology so technology can be restored in time to meet the needs of the business. Manual workarounds should be part of the IT plan so business can continue while computer systems are restored.
6. Purchasing insurance is a way to reduce the financial impact of a business interruption, loss, or damage to a facility or equipment.

Insurance companies provide coverage for property damage, business interruption, workers' compensation, general liability, automobile liability, and many other losses. Insurers only pay when a policy insures the peril (i.e., hazard) that caused the loss. Standard property insurance policies may not cover losses caused by floods, earthquakes, terrorism, or pollution. Businesses can purchase Flood insurance coverage for a facility located within a flood zone through the National Flood Insurance Program. Businesses can also purchase earthquake, terrorism, and pollution coverage separately or as an endorsement of an existing policy. Coverage for other hazards, such as mold, may be provided as part of the basic property insurance, but insurance companies may limit the amount of loss payable under the policy.

Business interruption coverage is available to reimburse profits during the business shutdown and certain continuing expenses. Contingent business interruption coverage is available to reimburse losses caused by a supplier failure. Endorsements to standard policies can cover extra expenses, such as the additional costs for expedited delivery of replacement machinery following an insured loss.

Review your insurance policies with your agents, brokers, or directly with your insurers to determine whether your insurance policies adequately cover your potential losses. Consider the following recommendations.

- Review the risk assessment and the identified hazards and potential impacts to your business.
- Use the business impact analysis to quantify potential financial impacts.
- Examine any scenario that results in impacts to multiple facilities. Evaluate whether the limits of insurance are adequate.

- Compile an inventory of properties and assets and determine whether insurable values reflect inflation costs over time.
- Review whether property insurance policies cover actual cash value or replacement cost.
- Be sure you understand deductibles, waiting periods before coverage begins, and procedures for notification of insurers when a loss occurs.

IMPACTS

Business closures can have a significant impact on communities. The public may feel both short-term and long-term impacts from an economic crisis. The public may only feel the long-term impacts once a decade or more has elapsed. For instance, a large manufacturing plant can lead to mass layoffs. Workers may find jobs out of the area and eventually relocate closer to their new jobs. The population decline will lead to a decline in the need for services. If enough population moves, the supportive businesses (gas stations, grocery stores, etc.) will shut down due to a lack of demand and significant profit loss. Diversification of the local economy and immediate action to develop plans to rebuild after a company shutdown is essential for maintaining local economic health.

Economic Hazards can impact Community Lifelines, although not always immediately after the economic crisis. The table below shows how economic hazards, such as a large company closure, may impact community lifelines.

Community Lifeline Impacts			
Community Lifeline	Level of Impact	Description of Impacts	Area of Impact
Communications	Low	No significant impacts are anticipated unless a company that closes provides broadband or other communication services to the area. Broadband and communication companies are accountable to state and federal agencies.	Regional or Statewide
Energy	Low	No significant impacts are anticipated unless a power-generating company shuts down. Energy companies are accountable to state and federal agencies.	Regional
Food, Water & Shelter	Low	Food supply chains could be disrupted if a food producer company ceased operations. Mass layoffs can create a need for food assistance programs and potentially utility assistance. Future poverty could lead to housing deterioration. No significant impacts are anticipated with water and sewer	Local, Regional or Statewide

		infrastructure due to company closures, as most is publicly maintained.	
Hazardous Materials	Low	No significant impacts are anticipated.	Regional or Statewide
Health and Medical	Low	No significant impacts are anticipated unless the hospital closes. Company closures can reduce the community's population, thereby potentially reducing the number of hospital clients.	Regional or Statewide
Safety and Security	Low	No significant impacts are anticipated	Regional or Statewide
Transportation	Low	No significant impacts are anticipated	Regional or Statewide

RECOMMENDATIONS

1. Encourage the Union County Chamber of Commerce and Union County Development Board to educate local businesses about actions they can take to mitigate loss from natural and manmade hazards, as noted in this section.
2. Find and pursue funding sources to develop an Economic Resiliency Plan for the Town of Carlisle. The Economic Resiliency Plan should identify potential sites for future economic development, industries to pursue, actions to take, and compile an economic task force to implement the plan.
3. Pursue funding sources to assist the Town of Jonesville implement the ideas presented in the Strategic Plan for the downtown and Jonesville Market Study. Implementation ideas include planning studies such as preparing Comprehensive Plans, Zoning Ordinances, Redevelopment Studies, and project-specific concepts.
4. Pursue funding sources to assist the Town of Lockhart implement recommendations identified in its recently completed 2023 Strategic Plan.

CHANGES TO THIS SECTION

- ✓ This entire section is new.

CONCLUSIONS ON HAZARD RISK

This section summarizes the hazards identified in the prior section (Hazard Identification and Profiles) for Union County and the jurisdictions within Union County. Specifically, the hazards extent and Priority Ranking are addressed in this section. It consists of the following subsections:

- ◆ Hazard Extent
- ◆ Priority Ranking

EXTENT OF HAZARDS IN UNION COUNTY

Extent of Hazards in Union County and Jurisdictions	
Natural Hazards	
Flooding	Flood extent can be measured by the amount of land and property in the floodplain, flood height, and velocity. The amount of land in the floodplain accounts for nearly 7 percent of the total land area in Union County. The United States Geological Survey stream gages record flood depth and velocity throughout the region. While a gauge does not exist for each participating jurisdiction, three (3) are on the Broad River in Union County. The greatest peak discharge recorded for the area was reported on December 31, 2015. Water reached a discharge of 44,400 cubic feet per second.
Hurricanes/Tropical Storms	The Saffir-Simpson Scale defines hurricane extent by classifying hurricanes into Category 1 through 5. The greatest hurricane classification to travel directly through Union County was H3 Unnamed Hurricane in 1916, which carried tropical force winds of 45 knots per hour.
Tornados	The Fujita/Enhanced Fujita Scale measures tornado hazard extent and by tornado occurrences in the US provided by FEMA. The FEMA National Risk Index indicates that 18 tornados have been recorded in Union County between 1950 and 2021 (72 years). The highest magnitude reported in Union County was an F3 (reported on 8/16/1994). A greater frequency or stronger tornado could impact the county in the future.
Severe Winter Storms	The National Weather Service of the United States generally classifies heavy snowfall as 6 inches or more in 12 hours. The National Oceanic and Atmospheric Administration has recorded ten (10) events in which heavy snowfall occurred within Union County and 6 Ice events. There were 27 winter weather events between 2005 and 2021 (16 years).

Severe Thunderstorms	According to the FEMA National Risk Index and National Weather Service, there were a total of 196 severe thunderstorm events, 1313 lightning events, and 202 hail events.
Wildfires	From 1978 to 2022, Union County had 2407 Wildfires, resulting in 14611.3 acres burned. The average is 32 fire events per year and 192 acres burned yearly. These numbers may increase in future years depending on wildfire susceptibility in the county.
Earthquakes	The Modified Mercalli Intensity (MMI) scale measures earthquake extent. The county has relatively limited seismic activity. Six (6) historical earthquake events have been recorded within Union County between 1698 and 2023, with the most significant magnitude being 5.5 in 1913. Future events may exceed this, although there has been no historical incident that indicates this is likely.
Drought	The South Carolina Drought Monitor defines drought extent with the following classifications: Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (in ascending order). According to the South Carolina Drought Monitor Classifications, Exceptional is the most severe drought condition. Union County was in an Exceptional Drought condition in 2008 for 35 days.
Extreme Heat (Excessive Heat)	The maximum temperature reached is how the extent of excessive heat is measured. The highest temperature recorded in Union County is 110-degree Fahrenheit (reported in 1925)
Windstorms	According to SHELDUS data, there were 120 windstorm events in Union County from 1960 to 2022, resulting in over \$28,000,000 (2021 inflation-adjusted) in damages with five (5) injuries and no deaths. The highest recorded wind by the National Oceanic and Atmospheric Association is 50 KTS (Knots).
Other Hazards	
Dam Failure	The South Carolina Health and Environmental Control defines Dam Classifications. High-hazard dams are the most at risk of a dam failure. Union County has five (5) high-hazard dams.
Aviation Hazards	Union County has one airport. The Department of Transportation tracks all transportation incidents. Three aviation incidents have occurred at Troy Shelton Airport.
Hazardous Materials	According to USDOT PHMSA, the most significant hazardous materials incident reported in the region is a train derailment on State Route 176 in Union County on June 11, 1993, that caused the release of 1. Ethylene Glycol, 2. Hydrochloric acid solution (18,000 gallons leaked), 3. Methyl Alcohol (5,000 gallons leaked) and Phosphatic Fertilizer. Union County should note that more significant events are possible.
School Emergencies	There have been no school emergencies.
Power Outages	There is no classification of power outages. However, the Union County Hazard Mitigation Plan committee has noted that Hurricane Hugo caused a significant power outage.
Cyber Security	Union County, the City of Union, or the Towns of Carlisle, Jonesville, and Lockhart have no reported history of cyber-attack incidents.

	Technology usage, however, is increasing. A cyber-attack could devastate the region’s economy and have lasting negative impacts.
Health Pandemics	The most current pandemic was Covid-19, a worldwide health pandemic that caused between 17,626 and 19,131 cases of Covid-19 per 100,000 people in Union County.
Nuclear Disaster	Although there is no history of a nuclear accident at the Catawba Nuclear Stations or V.C. Summer Nuclear Station, other events across the globe and in the United States indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Catawba or V.C. Summer Nuclear Station is possible.

PRIORITY RANKING INDEX

The results of the hazard profiling process were used to generate countywide hazard classifications according to a “Priority Risk Index” (PRI). The PRI aims to categorize and prioritize all potential hazards for Union County and participating jurisdictions as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allow for the prioritization of those high-hazard risks for mitigation planning purposes and, more specifically, the identification of hazard mitigation opportunities for the jurisdictions in Union County and participating jurisdictions to consider as part of their proposed mitigation strategy.

The PRI is not scientifically based but is meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in Union County and participating jurisdictions based on standardized criteria. Applying the PRI results in numerical values that allow identified hazards to be ranked against one another (the higher the PRI value, the greater the hazard risk).

PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk has been assigned a value (1 to 4) and an agreed-upon weighting factor of 30, as summarized in the Priority Risk Index Table. The PRI for a given hazard was calculated by multiplying the assigned risk value for each category by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

$$\text{PRI VALUE} = [(\text{PROBABILITY} \times .30) + (\text{IMPACT} \times .30) + (\text{SPATIAL EXTENT} \times .20) + (\text{WARNING TIME} \times .10) + (\text{DURATION} \times .10)]$$

According to the weighting scheme and point system, the highest possible value for any hazard is 4.0. The probability of how frequently the event will occur utilized data from the Risk Index provided for the natural hazards by FEMA.

When Catawba Regional staff applied the PRI scheme to Union County and its jurisdictions, the highest PRI value was 3.1 (Health Pandemics). Severe Winter Weather has the highest natural disaster PRI value,

with a value of 2.7. Before being finalized, PRI values for each identified hazard were reviewed and accepted by the Union County Emergency Manager and the Regional Hazard Mitigation Planning Team members.

PRIORITY RISK INDEX				
PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Only minor property damage and minimal disruption on quality of life	1	30%
	Limited	Minor injuries only. More than 10% of property in affected areas is damaged or destroyed. Complete shutdown of critical facilities for more than one day	2	
	Critical	Multiple deaths/injuries are possible. More than 25% of property in the affected area is damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths/injuries are possible. More than 50% of property in the affected area is damaged or destroyed. Complete shutdown of critical facilities for 30 days or more	4	

PRIORITY RISK INDEX (continued)				
PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self-explanatory	1	10%
	12 to 24 hours	Self-explanatory	2	
	6 to 12 hours	Self-explanatory	3	
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	10%
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

The Summary of PRI Results Table summarizes the degree of risk assigned to each category for hazards based on the application of the priority risk index. Catawba Regional Council of Governments established the risk levels for the hazard profiles with input from the Regional Hazard Mitigation Planning Team. The risk level results were used to calculate PRI values and make final risk assessment determinations.

Summary of PRI Results

Hazard	Sub-hazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Flooding		Unlikely	Limited	Moderate	6 to 12 hours	Less than 1 week	2.1
Hurricanes	Tropical Storms	Unlikely	Critical	Large	More than 24 hours	Less than 24 hours	2.3
Tornados		Unlikely	Limited	Moderate	6 to 12 hours	Less than 24 hours	2
Severe Winter Storms		Possible	Critical	Large	More than 24 hours	Less than one week	2.7
Severe Thunderstorms	Lightening, Hail	Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.5
Wildfires		Likely	Minor	Small	Less than 6 hours	More than 1 week	2.4
Earthquakes		Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	1.7
Drought		Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Extreme Heat		Unlikely	Minor	Large	More than 24 hours	More than 1 week	1.9
Windstorms		Possible	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.2
Other Hazards							
Dam Failure		Unlikely	Critical	Moderate	Less than 6 hours	Less than 24 hours	2.4

Aviation Hazards		Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	2.1
Hazardous Materials		Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	2.1
Terrorism	School Emergencies, Cyber Security	Unlikely	Critical, minor	Small, Large	Less than 6 hours	Less than 6 hours, less than 1 week	2.1
Power Outages		Likely	Minor	Large	Less than 6 hours	Less than 6 hours	2.5
Infectious Disease	Health Pandemics	Likely	Critical	Large	More than 24 hours	More than a week	3.1
Nuclear Disaster		Unlikely	Critical	Large	Less than 6 hours	More than 1 week	2.8

FINAL DETERMINATION

The conclusions drawn from the hazard profiling process for Union County and its four jurisdictions, including the PRI results and input from the Union County Hazard Mitigation Planning Task Force, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk. For these classifications, the Catawba Regional Council of Governments (CRCOG) expresses the risk relative to a hazard's estimated impact on human life and property throughout Union County. Although CRCOG classifies some hazards as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases. Union County will reevaluate the hazard classification during plan updates.

The CRCOG has performed a separate quantitative analysis to estimate potential dollar losses for each hazard. The Vulnerability Assessment section of this report describes how CRCOG performed the quantitative analysis.

The table below ranks the hazards CRCOG assessed in the Hazard Mitigation Plan update. CRCOG renamed some of the hazards to be consistent with the State of South Carolina Hazard Mitigation Plan. The Union County Emergency Manager reviewed the hazard classification final determination and concurred with the findings.

2023 CONCLUSIONS ON HAZARD RISK FOR UNION COUNTY AND JURISDICTIONS

Risk Level	Hazard
High Risk	Flooding
	Hurricanes
	Tornados
	Severe Winter Storms
Moderate Risk	Severe Thunderstorms
	Wildfires
	Drought
	Windstorms
	Dam Failure
	Hazardous Materials
Low Risk	Extreme Heat
	Terrorism
	Earthquakes
	Aviation Hazards
	Power Outages
Infectious Disease	
Nuclear Disaster	

CHANGES TO THIS SECTION

- ✓ This section is new.

VULNERABILITY ASSESSMENT

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

- ◆ Overview
- ◆ Methodology
- ◆ Explanation of Data Sources
- ◆ Asset Inventory
- ◆ Vulnerability Assessment Results
- ◆ Conclusions on Hazard Vulnerability

FEMA requires that risk assessments include the following:

44 CFR Requirement 44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction’s vulnerability to the hazards described in paragraph (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community.

The plan should describe vulnerability in terms of:

(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

(B) An estimate of the potential losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.

(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

OVERVIEW

This section builds upon the Hazards Priority Ranking by identifying and characterizing an inventory of assets in Union County.

Additionally, the Catawba Regional Council of Governments (CRCOG) assessed each identified hazard, including the potential impact and expected amount of damage it may cause. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, Union County and participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions. This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the asset inventory compiled for Union County jurisdictions. The remainder of this section focuses on the results of the assessment conducted.

METHODOLOGY

Catawba Regional Council of Governments (CRCOG) conducted this vulnerability assessment using three distinct methodologies:

- (1) A stochastic risk assessment.
- (2) a geographic information system (GIS-based) analysis; and
- (3) a risk modeling software analysis. Each approach estimates the potential impact of hazards using a standard, systematic framework for evaluation, including historical occurrence information provided in the Hazard Identification and Hazard Profiles sections.

A brief description of the three different approaches is provided below.

STOCHASTIC RISK ASSESSMENT

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

- ◆ Flooding
- ◆ Hurricanes
- ◆ Tornadoes
- ◆ Severe Winter Storms
- ◆ Ice Storms
- ◆ Severe Thunderstorms
- ◆ Hail
- ◆ Lightening
- ◆ Wildfires
- ◆ Earthquakes
- ◆ Drought
- ◆ Extreme Heat
- ◆ Windstorms

The above-mentioned hazards are considered natural and can affect all current and future buildings and all populations.

For all hazards, annualized loss estimates were determined using the best available data on historical losses from sources, including SHELDUS data records, the previous Union County Hazard Mitigation Plan, and local knowledge. FEMA's National Risk Index data provided annualized loss estimates. FEMA calculated the expected annual loss by totaling the amount of property damage over the time records were available. Given the standard weighting analysis, losses can be readily compared across hazards, providing an objective approach for evaluating mitigation alternatives.

Union County Expected Annual Loss for Natural Hazard Types				
Hazard Type	Sub Hazard Type	Expected Annual Loss Rating	Expected Annual Loss Value	Score
Flooding		Very Low	\$28,136	13.1
Hurricanes		Very Low	\$546,126	61.1
Tornados		Relatively Moderate	\$2,061,022	70.9
Severe Winter Storms		Very Low	\$2,876	8.1
	Ice Storms	Relatively High	\$818,697	93.3
Severe Thunderstorms				
	Hail	Relatively Low	\$196,347	66.7
	Lightening	Relatively Low	\$128,608	62.1
Wildfires		Very Low	\$9,153	26.4
Earthquakes		Relatively Low	\$444,271	69.9
Drought		Very Low	\$459	20.9
Extreme Heat		Relatively Low	\$66,285	49.6
Windstorms		Relatively Moderate	\$561,665	69.0

Source: FEMA National Risk Index

For the dam failure, aviation hazards, hazardous materials, terrorism, power outages, infectious disease, and nuclear disaster, no data with historical property damages was available. Therefore, the Catawba Regional Council of Governments (CRCOG) could not complete a detailed vulnerability assessment for these hazards.

Below is a table providing information about all Union County improved properties vulnerable to these hazards.

Improved Property in Union County				
Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	18,560	\$86,318,750	11,391	\$631,186,830
Union County (Unincorporated)	12,671	\$45,189,350	7298	\$402,006,280
City of Union	4510	\$36,943,100	3,293	\$203,695,950
Town of Carlisle	414	\$1,493,700	163	\$6,028,200
Town of Jonesville	605	\$2,257,200	395	\$14,762,900
Town of Lockhart	360	\$435,400	242	\$4,693,500

Source: Union County CAMA Parcel Data

Note: Total Assessed Value of Parcels is the assessed land value of the parcel. Total assessed value for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly owned buildings and facilities. It should be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area. It should also be noted that parcels that were partially located in a town or city were counted towards town or city parcels and value counts. The number of buildings for each county is based on the number of parcels with an improved building value greater than 0.

There are no public facilities located in a wetland or a flood zone. The Lockhart municipal building is not located in a flood zone, wetland, or required wetland buffer; however, it is in the “flats” of Lockhart, a flood-prone location.

Critical Facility Inventory in Union County					
Location	Fire/EMS Stations	Law Enforcement	Medical Care Facilities	Schools	Other**
Union County	16 /1	4	14	13	95
Union County (unincorporated)	12/1	1	3	4	35
City of Union	1/0	2*	11	8	53
Town of Carlisle	1/0	0	0	0	1
Town of Jonesville	1/0	1	0	1	3
Town of Lockhart	1/0	0	0	1 (closed in 2021)	3

Note: Law Enforcement consists of Police Stations, Sherriff’s Office, and Union County Detention Facility.

*Sherriff’s Office is located in the City of Union but is under the jurisdiction of Union County.

**Some buildings are counted more than one as they may serve more than one function (ex: town hall – govenment, shelter, water)

GEOGRAPHIC INFORMATION SYSTEM ANALYSIS

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

- ◆ Flooding
- ◆ Hazardous Materials

The GIS-based analysis determined the estimated vulnerability of critical facilities and populations for the identified hazards in Union County using the best available geospatial data. Catawba Regional Council of Governments (CRCOG) collected digital data for hazards and buildings from local, regional, state, and national sources. When available, CRCOG collected data from local tax assessor records for individual parcels and buildings and georeferenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.). CRCOG used ESRI® ArcGIS™ 10.8.1 to assess vulnerability utilizing digital hazard data and local building data. CRCOG quantified Hazard vulnerability by estimating the assessed building value for parcels and buildings in identified hazard areas.

Digital Census 2020 data by census tract was obtained and supplemented with current US Census Bureau population estimates to estimate vulnerable populations in hazard areas. CRCOG overlaid the data with hazard areas to determine exposed population counts. The analysis results provided an estimate of the number of people and critical facilities and the assessed value of parcels and improvements determined to be potentially at risk to those hazards with delineable geographic hazard boundaries.

Flooding GIS Analysis

Improved Property in Flood Zones Other than X in Union County				
Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	1582	\$308,635,340	426	\$31,802,600
Union County (Unincorporated)	1424	\$297,627,790	378	\$22,939,100
City of Union	123	\$7,245,250	42	\$3,389,100
Town of Carlisle	8	\$1,431,100	0	\$0
Town of Jonesville	11	\$1,493,700	1	\$9,900
Town of Lockhart	16	\$837,500	5	\$232,000

Note 1: Used Union County GIS Data that included tax assessor data. Total assessed value of improvements = total market value², Total assessed value of parcels = total market value¹

Note 2: If parcels partially fell into a municipality the total value of the parcel and improvements were included for the municipality.

Catawba Regional Council of Governments (CRCOG) used a GIS-based analysis to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data combined with local tax assessor records for Union County and its municipalities. CRCOG calculated The determination of assessed value-

at-risk (exposure) by summing the total assessed building values for only those improved properties confirmed to be within an identified floodplain.

CRCOG then overlaid the community facilities over the flood-prone areas in GIS. Flood-prone areas are sites in a flood zone other than X.

Lifeline community facilities located in flood zones other than x:

The Fire House at 263 Philippi Church Road is in a flood-prone area.

The following three food supply critical facilities are in flood zones:

- Coyote Bee Company – 301 Bennett Street
- Hereford Hills Ranch - 1141 Pineland Road
- Fowken Farm – 328 Fowken Road

All other community facilities are not in a flood-prone areas.

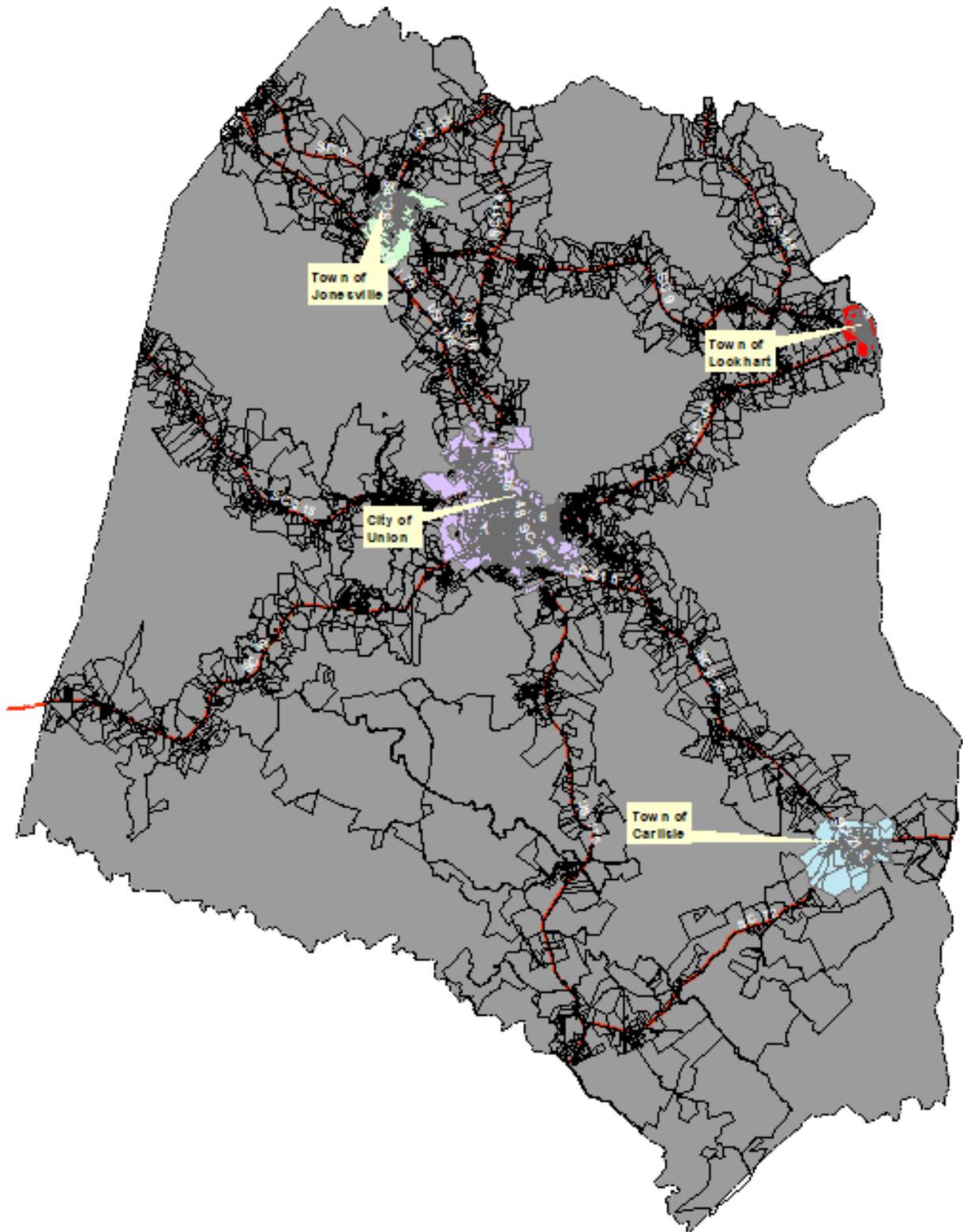
The facilities in Lockhart are not in flood-prone flood zones. However, they are located in the “Flats,” an area which is known to flood.

HAZARDOUS MATERIALS ANALYSIS

Truck Routes

Catawba Regional Council of Governments (CRCOG) performed a GIS-based analysis to estimate exposure to Hazardous materials from truck routes at a half-mile and 1-mile buffer in combination with local tax assessor records for Union County and its municipalities. CRCOG calculated the assessed value-at-risk (exposure) by summing the total assessed building values for only those improved properties confirmed to be within the half-mile or 1-mile buffer truck route area.

Map of Parcels Located Within ½ Mile Buffer of Truck Routes



Improved Property within Half-Mile of Truck Routes

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	12,566	\$730,361,630	8,088	\$450,656,730
Union County (Unincorporated)	7074	\$466,862,830	4,371	\$244,542,580
City of Union	4,063	\$227,200,300	2,906	\$179,902,050
Town of Carlisle	410	\$10,158,000	162	\$6,007,000
Town of Jonesville	625	\$19,836,600	398	\$15,284,400
Town of Lockhart	394	\$6,303,900	251	\$4,920,700

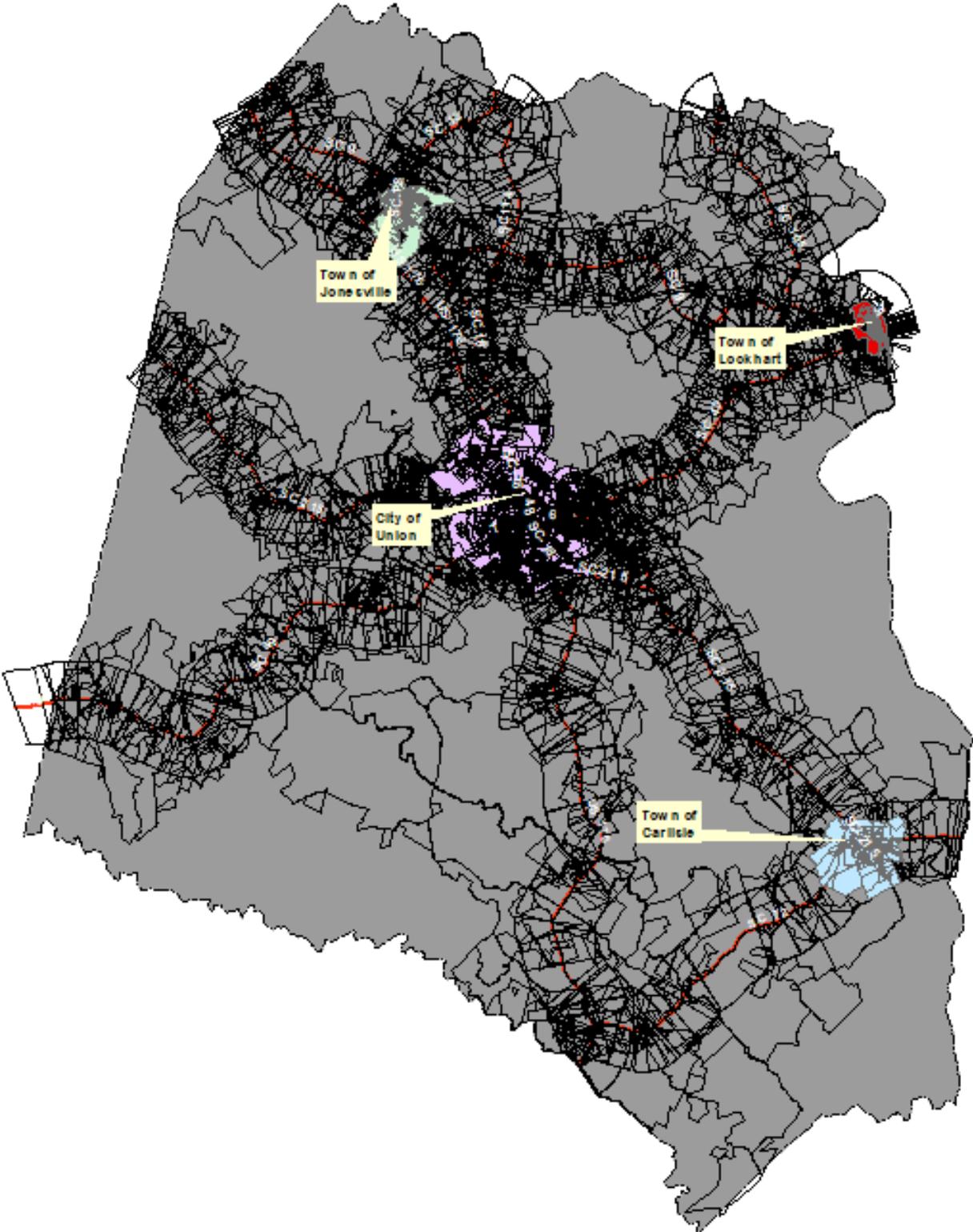
Note 1: Used Union County GIS Data that included tax assessor data. Total assessed value of improvements = total market value², Total assessed value of parcels = total market value¹

Note 2: If parcels partially fell into a municipality the total value of the parcel and improvements were included for the municipality.

Fifty-two out of fifty-six community facilities are within the truck routes' half-mile buffer.

People’s Grocery	Jonesville Fire Dept.	Foster Park Elementary School	Union County Council on Ageing
Union County Senior Citizen’s Center	Monarch Fire Dept.	Wachovia	Community Actions
WBCU Radio	University of South Carolina Union	Courthouse	Monarch School
Department of Social Services	Salvation Army Family Thrift Store	Union County	City of Union
Union Public Safety Department Fire Station	Union Co Museum	Santuck Hebron Water Company Inc.	Coyote Bee Company
Meansville Riley Road Water Co.	Southside Fire Dept.	Union County Vehicle Maintenance	Sims Middle School
Buffalo Fire District Headquarters – Union Co. Station 200	Tyger River Ranger Station	Advanced Technology Center	Detention Center
Union School Maintenance Shop	Buffalo School	Brown’s Creek Water Company	Philippi Volunteer Fire Dept.
Union Christian Day School	Carlisle Town Hall	Lockhart Town Hall	Lockhart Fire Dept.
Cross Keys Fire Dept.	Fowken Farm	Buffalo Fire Dept. Station No. 2	Dollar General – Dist
Mon Aetna Church	Jonesville K-8	Carlisle Fire Dept	Kelly Kelton Fire Dept
SC Probation, Pardon & Parole	Soil Conservation Office	Magistrate Office	Family Court
Union County Voters Registration	Union County Building Safety Department	Jonesville Town Hall	Bonham Fire Dept.

Map of Parcels Located Within 1 Mile Buffer of Truck Routes



Improved Property within 1-Mile of Truck Routes				
Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	14,942	\$915,055,380	9,498	\$529,404,730
Union County (Unincorporated)	8,985	\$627,743,480	5,446	\$303,150,480
City of Union	4,486	\$250,090,400	3224	\$199,592,350
Town of Carlisle	444	\$10,908,600	171	\$6,316,400
Town of Jonesville	633	\$20,009,000	406	\$15,424,800
Town of Lockhart	394	\$6,303,900	251	\$4,920,700

Fifty-four out of fifty-six community facilities are located within the truck routes' 1 mile buffer.

People's Grocery	Jonesville Fire Dept.	Foster Park Elementary School	Union County Council on Ageing
Union County Senior Citizen's Center	Monarch Fire Dept.	Wachovia	Community Actions
WBCU Radio	University of South Carolina Union	Courthouse	Monarch School
Department of Social Services	Salvation Army Family Thrift Store	Union County	City of Union
Union Public Safety Department Fire Station	Union Co Museum	Santuck Hebron Water Company Inc.	Coyote Bee Company
Meansville Riley Road Water Co.	Southside Fire Dept.	Union County Vehicle Maintenance	Sims Middle School
Sheepley Publishing LLC.	Buffalo Fire District Headquarters – Union Co. Station 200	Tyger River Ranger Station	Hereford Hills Ranch
Advanced Technology Center	Detention Center	Union School Maintenance Shop	Buffalo School
Brown's Creek Water Company	Philippi Volunteer Fire Dept.	Union Christian Day School	Carlisle Town Hall
Lockhart Town Hall	Lockhart Fire Dept.	Cross Keys Fire Dept.	Fowken Farm
Buffalo Fire Dept. Station No. 2	Dollar General – Dist	Mon Aetna Church	Jonesville K-8
Carlisle Fire Dept	Kelly Kelton Fire Dept	SC Probation, Pardon & Parole	Soil Conservation Office
Magistrate Office	Family Court	Union County Voters Registration	Union County Building Safety Department
Jonesville Town Hall	Bonham Fire Dept.		

Rail and Freight Routes

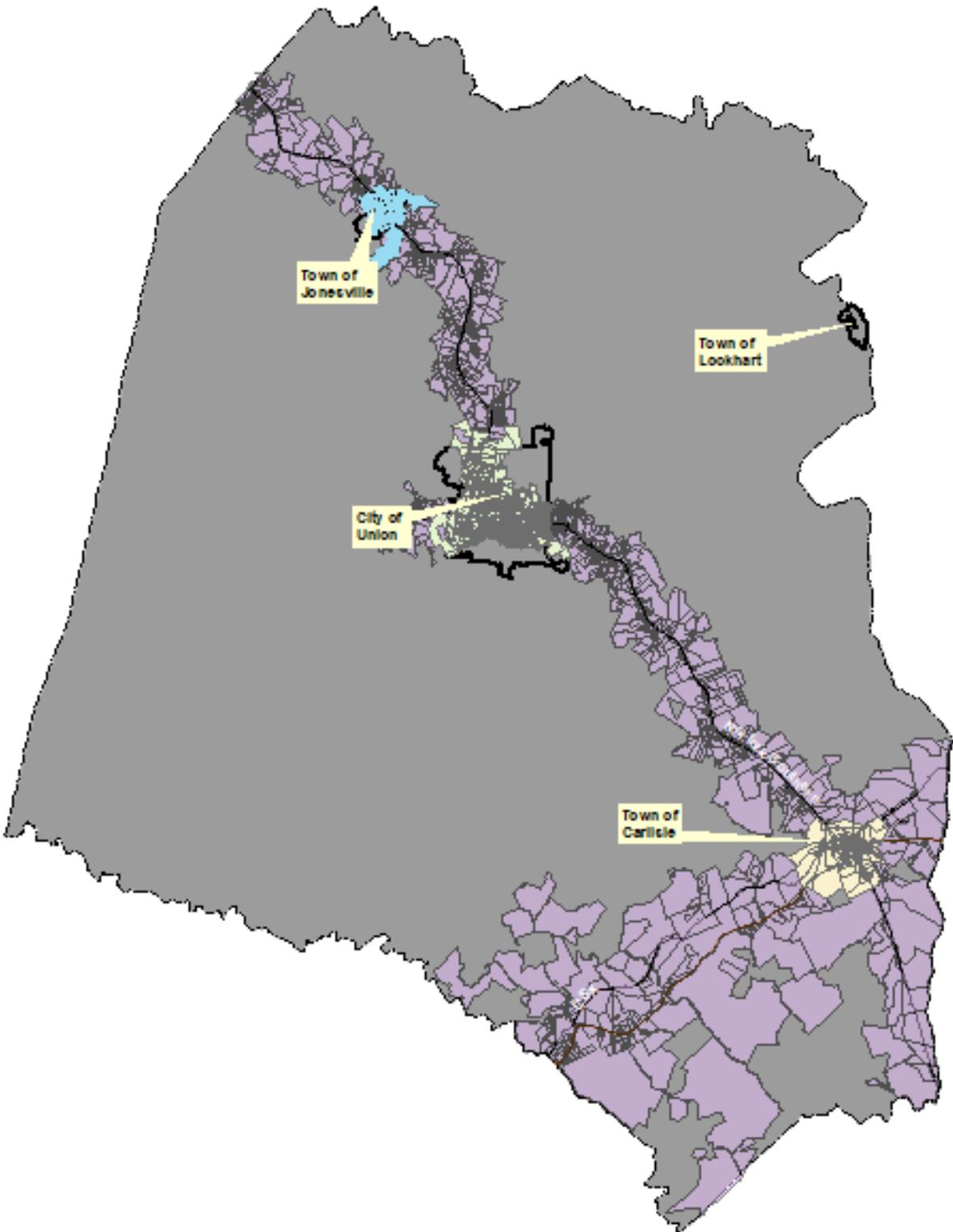
Catawba Regional Council of Governments (CRCOG) performed a GIS-based analysis to estimate exposure to Hazardous materials from railroad tracks and freight lines at a half-mile and 1-mile buffer combined with local tax assessor records for Union County and its municipalities. CRCOG calculated assessed value-at-risk (exposure) by summing the total assessed building values for only those improved properties confirmed to be within the half-mile or 1-mile buffer of railroad tracks and freight lines.

Improved Property within Half-Mile of Railroad Tracks and Freight Lines				
Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	6,744	\$342,542,930	4,265	\$229,178,430
Union County (Unincorporated)	2,686	\$147,529,580	1,564	\$78,464,880
City of Union	3,012	\$165,685,350	2,146	\$129,754,050
Town of Carlisle	444	\$10,908,600	171	\$6,316,400
Town of Jonesville	602	\$18,419,400	384	\$14,643,100
Town of Lockhart	0	\$0	0	\$0

Thirty-two out of fifty-six community facilities are within the half-mile buffer of railroad tracks or freight lines.

People's Grocery	Jonesville Fire Dept.	Foster Park Elementary School	Union County Council on Ageing
Union County Senior Citizen's Center	Monarch Fire Dept.	Wachovia	Community Actions
WBCU Radio	University of South Carolina Union	Courthouse	Monarch School
Department of Social Services	Salvation Army Family Thrift Store	Union County	City of Union
Union Public Safety Department Fire Station	Union Co Museum	Santuck Hebron Water Company Inc.	Detention Center
Union School Maintenance Shop	Buffalo School	Carlisle Town Hall	Dollar General – Dist
Mon Aetna Church	Carlisle Fire Dept	SC Probation, Pardon & Parole	Soil Conservation Office
Magistrate Office	Family Court	Jonesville Town Hall	Bonham Fire Dept.

Map of Parcels Located Within Half-Mile Buffer of Rail and Freight Lines



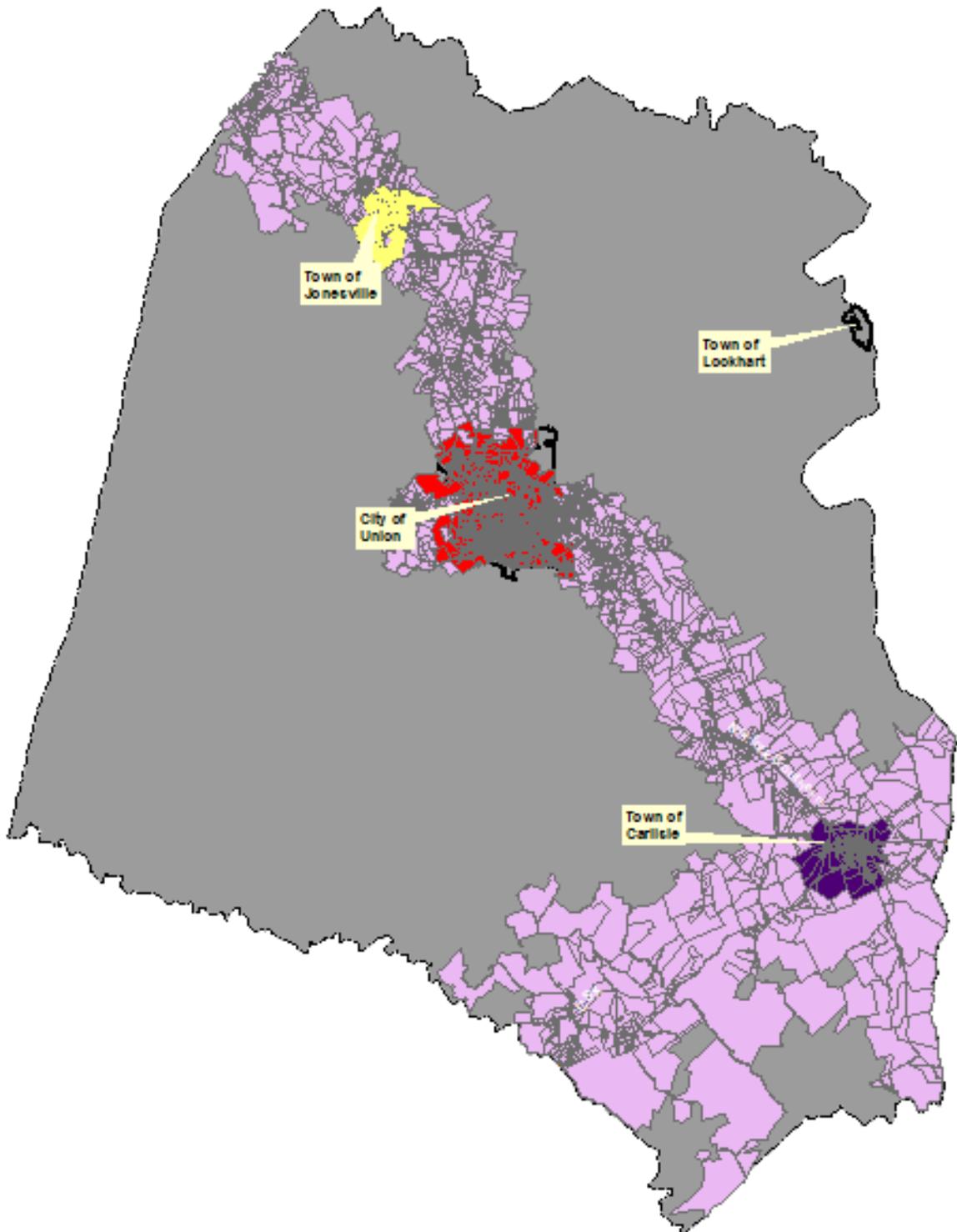
Improved Property within 1-Mile of Railroad Tracks and Freight Lines

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	9,438	\$514,084,730	6,067	343,907,330
Union County (Unincorporated)	3,945	\$235,801,130	2,302	\$124,310,380
City of Union	4,417	\$247,366,000	3,188	\$197,855,750
Town of Carlisle	444	\$10,908,600	171	\$6,316,400
Town of Jonesville	632	\$20,009,000	406	\$15,424,800
Town of Lockhart	0	\$0	0	\$0

Thirty-two out of fifty-six community facilities are within the half-mile buffer of railroad tracks or freight lines.

People’s Grocery	Jonesville Fire Dept.	Foster Park Elementary School	Union County Council on Ageing
Union County Senior Citizen’s Center	Monarch Fire Dept.	Wachovia	Community Actions
WBCU Radio	University of South Carolina Union	Courthouse	Monarch School
Department of Social Services	Salvation Army Family Thrift Store	Union County	City of Union
Union Public Safety Department Fire Station	Union Co Museum	Santuck Hebron Water Company Inc.	Coyote Bee Company
Sheepley Publishing LLC.	Hereford Hills Ranch	Advanced Technology Center	Detention Center
Union School Maintenance Shop	Buffalo School	Union Christian Day School	Carlisle Town Hall
Fowken Farm	Dollar General – Dist	Mon Aetna Church	Carlisle Fire Dept
SC Probation, Pardon & Parole	Soil Conservation Office	Magistrate Office	Family Court
Jonesville Town Hall	Bonham Fire Dept.		

Map of Parcels Located Within Half-Mile Buffer of Rail and Freight Lines



Fixed Location Hazardous Facility Site Analysis

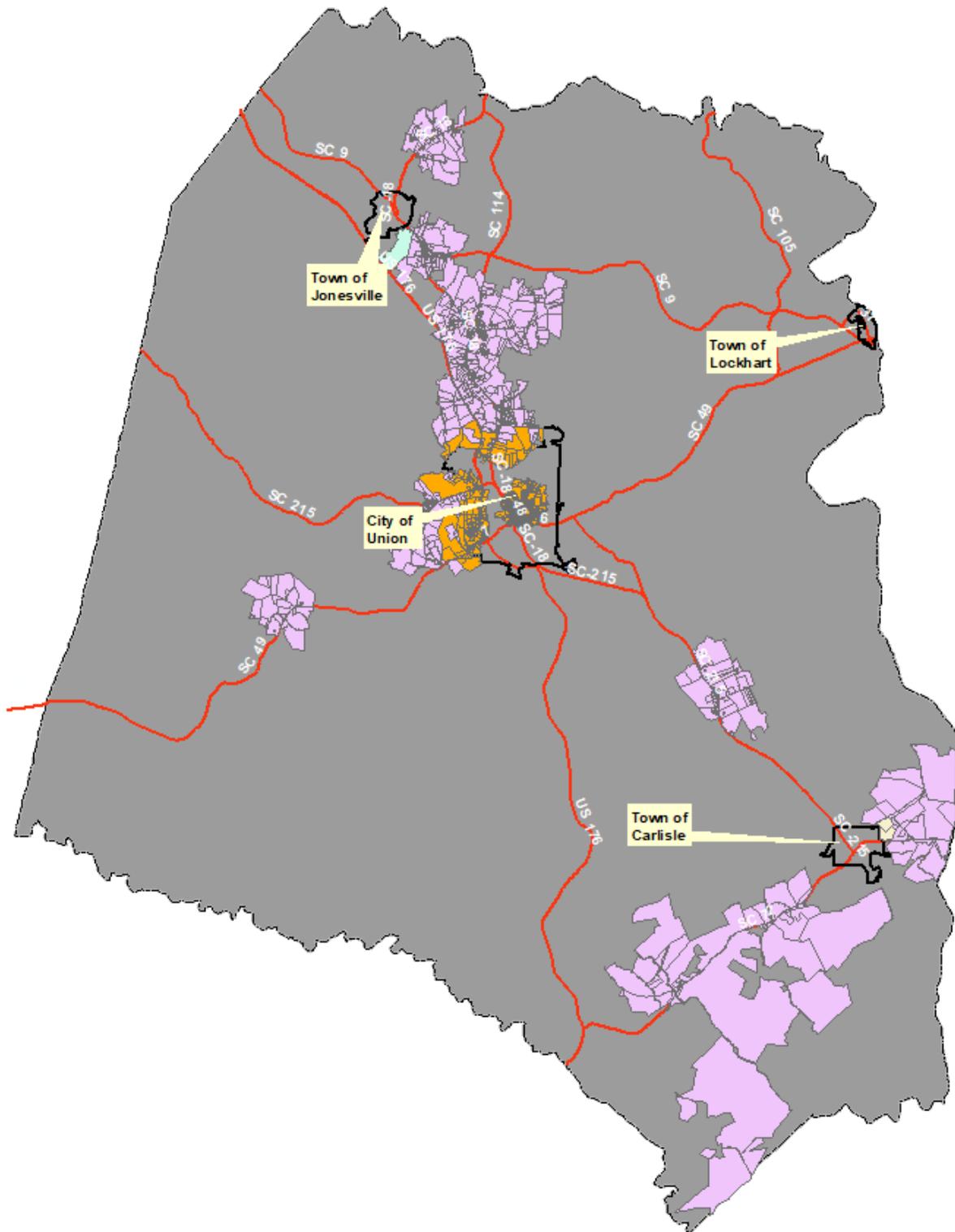
Catawba Regional Council of Governments (CRCOG) performed a GIS-based analysis to estimate exposure to hazardous materials from fixed hazardous facilities, such as manufacturing facilities, at a half-mile and 1-mile buffer in combination with local tax assessor records for Union County and its municipalities. CRCOG calculated assessed value-at-risk (exposure) by summing the total assessed building values for only those improved properties confirmed to be within the half-mile or 1-mile buffer hazardous facility area.

Improved Property within Half-Mile of Hazardous Facilities				
Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	2,112	\$178,563,680	1,328	\$111,904,330
Union County (Unincorporated)	1010	\$82,591,730	578	\$43,454,880
City of Union	1,098	\$95,098,850	750	\$68,449,450
Town of Carlisle	3	\$206,100	0	\$0
Town of Jonesville	1	\$667,000	0	\$0
Town of Lockhart	0	\$0	0	\$0

Twenty-three out of fifty-six community facilities are within the half-mile buffer of fixed hazardous facilities.

Foster Park Elementary School	Union County Council on Ageing	Union County Senior Citizen’s Center	Wachovia
Community Actions	WBCU Radio	University of South Carolina Union	Courthouse
Department of Social Services	Salvation Army Family Thrift Store	City of Union	Union Public Safety Department Fire Station
Hereford Hills Ranch	Advanced Technology Center	Detention Center	Union School Maintenance Shop
Buffalo School	Union Christian Day School	SC Probation, Pardon & Parole	Soil Conservation Office
Magistrate Office	Family Court	Bonham Fire Dept.	

Map of Parcels Located Within Half- Mile Buffer of Hazardous Facilities

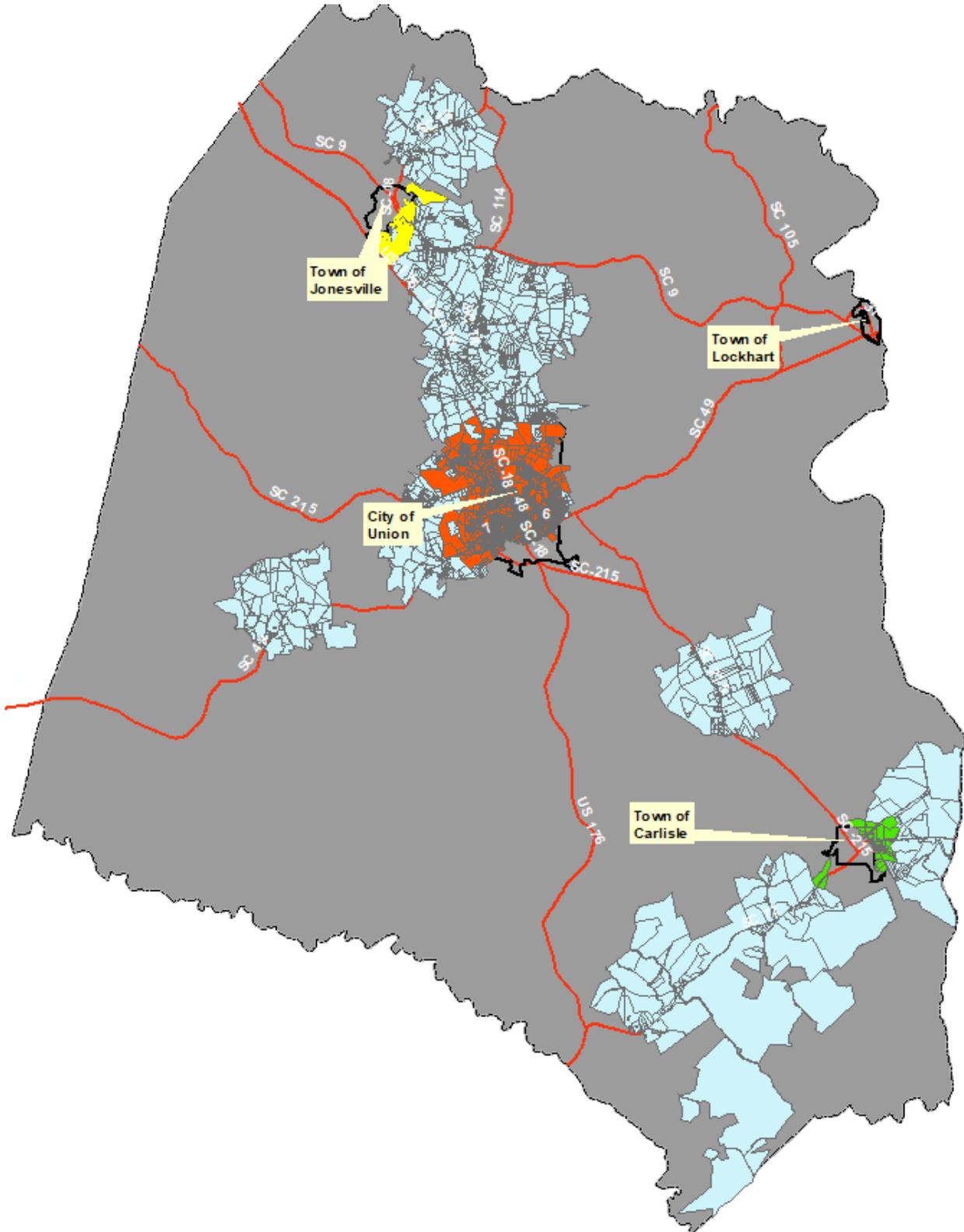


Improved Property within 1-Mile of Hazardous Facilities				
Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Union County (All of County)	5,942	\$368,439,680	3,943	\$246,907,630
Union County (Unincorporated)	2,027	\$146,619,980	1,145	\$73,797,280
City of Union	3,743	\$215,620,700	2,711	\$170,104,350
Town of Carlisle	86	\$1,985,600	27	\$750,700
Town of Jonesville	86	\$4,213,400	60	\$2,219,300
Town of Lockhart	0	\$0	0	\$0

Thirty out of fifty-six community facilities are within the half-mile buffer of fixed hazardous facilities.

Foster Park Elementary School	Union County Council on Ageing	Union County Senior Citizen's Center	Union County High School
Wachovia	Community Actions	WBCU Radio	University of South Carolina Union
Courthouse	Department of Social Services	Salvation Army Family Thrift Store	Union County
City of Union	Union Public Safety Department Fire Station	Union Co Museum	Coyote Bee Company
Meansville Riley Road Water Co.	Sheepley Publishing LLC.	Hereford Hills Ranch	Advanced Technology Center
Detention Center	Union School Maintenance Shop	Buffalo School	Union Christian Day School
Mon Aetna Church	SC Probation, Pardon & Parole	Soil Conservation Office	Magistrate Office
Family Court	Bonham Fire Dept.		

Map of Parcels Located Within 1- Mile Buffer of Hazardous Facilities



RISK MODELING

HAZUS is a nationally standardized risk modeling methodology. FEMA distributes HAZUS as free GIS-based desktop software with a collection of inventory databases for every U.S. state and territory. HAZUS identifies areas with high risk for natural hazards and estimates the physical, economic, and social impacts of earthquakes, hurricanes, floods, and tsunamis.

HAZUS can quantify and map risk information such as:

- ◆ **Physical damage** to residential and commercial buildings, schools, critical facilities, and infrastructure.
- ◆ **Economic loss**, including lost jobs, business interruptions, and repair and reconstruction costs.
- ◆ **Social impacts**, including estimates of displaced households, shelter requirements, and populations exposed to floods, earthquakes, hurricanes, and tsunamis.
- ◆ **Cost-effectiveness** of common mitigation strategies, such as elevating structures in a floodplain or retrofitting unreinforced masonry buildings.

Catawba Regional Council of Governments modeled Earthquakes, Floods, and Hurricanes. Tsunamis were not modeled for Union County because Tsunamis are not a threat to Union County. Union County is an inland located county west of Columbia, SC.

Earthquake Modeling

The Catawba Regional Council of Governments modeled the 1913 City of Union historic earthquake (magnitude 5.5) in HAZUS for all census blocks in Union County.






Building Stock Exposure By General Occupancy

December 01, 2023 *All values are in thousands of dollars*

	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
South Carolina								
Union	3,862,123	1,570,991	462,535	10,664	132,299	461,105	239,372	6,739,089
Total	3,862,123	1,570,991	462,535	10,664	132,299	461,105	239,372	6,739,089
Region Total	3,862,123	1,570,991	462,535	10,664	132,299	461,105	239,372	6,739,089



Transportation System Dollar Exposure

December 01, 2023

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Runway	Total
South Carolina									
Union									
Segments	808,541	193,982	0						800,523
Bridges	238,767	46,585	0						285,352
Tunnels	0	0	0						0
Facilities		0	0	0	0	0	5,300	2,471	5,300
Total	845,307	240,567	0	0	0	0	5,300	2,471	1,093,646
Total	845,307	240,567	0	0	0	0	5,300	2,471	1,093,646
Region Total	845,307	240,567	0	0	0	0	5,300	2,471	1,093,646



Utility System Dollar Exposure

December 01, 2023

All values are in thousands of dollars

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
South Carolina							
Union							
Facilities	92,002	255,963	0	0	129,631	4,551	482,148
Pipelines	128,229	74,327	0	170,542			373,099
Total	220,231	330,291	0	170,542	129,631	4,551	855,247
Total	220,231	330,291	0	170,542	129,631	4,551	855,247
Region Total	220,231	330,291	0	170,542	129,631	4,551	855,247

The model indicates that the earthquake will produce the following damage:

A 5.5 magnitude earthquake could cause injuries to 475 individuals ranging from severity level 1 to severity level 4. The earthquake could displace 380 households, with approximately 228 people requiring short-term shelter, and produce 193 thousand tons of debris.



Shelter Summary Report

December 01, 2023

	# of Displaced Households	# of People Needing Short Term Shelter
South Carolina		
Union	380	228
Total	380	228
Region Total	380	228



Debris Summary Report

December 01, 2023

All values are in thousands of tons.

	Brick, Wood & Others	Concrete & Steel	Total
South Carolina			
Union	83	111	193
Total	83	111	193
Region Total	83	111	193

Direct Economic Losses For Buildings

December 1, 2023

All values are in thousands of dollars

	Capital Stock Losses				Loss Ratio %	Income Losses				Total Loss
	Cost Structural Damage	Cost Non-struct. Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
South Carolina										
Union	99,562	365,165	175,644	12,092	6.90	75,763	30,364	47,816	37,387	843,793
Total	99,562	365,165	175,644	12,092	6.90	75,763	30,364	47,816	37,387	843,793
Region Total	99,562	365,165	175,644	12,092	6.90	75,763	30,364	47,816	37,387	843,793

Direct Economic Loss For Transportation

December 01, 2023

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Total
South Carolina								
Union								
Segments	0	0	0					0
Bridges	6,347	7	0					6,354
Tunnels	0	0	0					0
Facilities		0	0	0	0	0	2,125	2,125
Total	6,347	7	0	0	0	0	2,125	8,478
Total	6,347	7	0	0	0	0	2,125	8,478
Region Total	6,347	7	0	0	0	0	2,125	8,478



Direct Economic Loss For Utilities

December 01, 2023

All values are in thousands of dollars

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
South Carolina							
Union							
Facilities	33,662	57,492	0	0	23,041	1,880	116,074
Pipelines	45	68	0	0			114
Total	33,707	57,560	0	0	23,041	1,880	116,188
Total	33,707	57,560	0	0	23,041	1,880	116,188
Region Total	33,707	57,560	0	0	23,041	1,880	116,188

Catawba Regional Council of Governments (CRCOG) attempted hurricane and flooding modeling. The HAZUS modeling could not use the 2008 DEM data for Union County, as it indicated that it covered only some of the area. HAZUS version 6.0 would not open the Hurricane map to run the analysis.

CRCOG performed a stochastic risk assessment for hurricanes and flooding and a Geographic Information System Analysis for flooding.

CHANGES TO THIS SECTION

- ✓ This section is new and replaced the prior Vulnerability Section in the 2019 Hazard Mitigation Plan approved by FEMA in 2020.

CAPABILITY ASSESSMENT

This section of the Plan discusses the Union County communities' capability to implement hazard mitigation activities. It consists of the following four subsections:

- ◆ What is a Capability Assessment?
- ◆ Conducting the Capability Assessment
- ◆ Capability Assessment Findings
- ◆ Conclusions on Local Capability

WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects.

As in any planning process, it is essential to establish which goals, objectives, and actions are feasible based on understanding 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, number of fiscal resources, and current political climate.

Capability assessment has two primary components:

- 1) an inventory of a local jurisdiction's relevant plans, ordinances, or programs already in place and
- 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability.

A capability assessment also highlights the positive mitigation measures already in place or implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts. The capability assessment completed for Union County and its municipalities is a critical planning step and an integral part of the foundation for designing an effective hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation into the Mitigation Strategy portion of the Hazard Mitigation Plan. It helps establish the goals and objectives for the region to pursue under this Plan and ensures that those goals and objectives are realistically achievable under given local conditions.

CONDUCTING THE CAPABILITY ASSESSMENT

To facilitate the inventory and analysis of local government capabilities within Union County, Catawba Regional Council of Government staff requested the completion of a detailed Capability Assessment Survey for each participating jurisdiction based on the information found in existing hazard mitigation plans and local government websites. The survey questionnaire compiled data on “capability indicators,” such as existing local plans, policies, programs, or ordinances that contribute to or hinder the region’s ability to implement hazard mitigation actions. Other indicators included information on the communities’ fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation. The current political climate, an important consideration for any local planning or decision-making process, was also evaluated concerning hazard mitigation.

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

CAPABILITY ASSESSMENT FINDINGS

PLANNING AND REGULATORY CAPABILITY

Planning and regulatory capability is the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment responsibly while maintaining the community's general welfare. It includes emergency response and mitigation planning, comprehensive land use and transportation planning, enforcement of zoning or subdivision ordinances, building codes that regulate how land is developed and structures are built, and protecting of the community's environmental, historical, and cultural resources.

Although conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision-making process.

Catawba Regional Council of Governments designed this assessment to provide a general overview of the critical planning and regulatory tools and programs in place or under development for the jurisdictions in Union County, along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses, or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Planning and Regulatory Capability

Municipality	Hazard Mitigation Plan	Emergency Operations Plan (EOP)	Disaster Recovery Plan	Evacuation Plan	Continuity of Operations Planning (COOP)	National Flood Insurance Program (NFIP)	NFIP-Community Rating System (CRS)	Floodplain Regulations	Floodplain Management Plan	Zoning Regulations	Subdivision Regulations	Comprehensive Land use Plan (or General, Master or Growth Management Plan)	Open Space Management Plan	Stormwater Mgmt. Plan/Ordinance	Natural Resource Protection Plan	Capital Improvements Plan	Economic Dev. Plan	Historic Preservation Plan	Farmland Preservation	Building Code	Fire Code	Firewise	Storm Ready	other
Town of Carlisle	x					x		x												x	x			
Town of Lockhart	x					x		x												x	x			
Town of Jonesville	x																			x	x			
City of Union	x				x	x		x		x	x	x								x	x			
Union County	x	x				x		x												x	x		x	

Emergency Management Planning

Hazard Mitigation Plan

A hazard mitigation plan represents a community’s blueprint for reducing the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- ◆ Union County and its municipalities have previously adopted a hazard mitigation plan.
- ◆ Union County and its municipalities have been actively engaged in the preparation of this plan update.

Emergency Operations Plans

The emergency operations plan (EOP) details what the facility or agency will DO during a disaster (incident command implementation, command center location, activities, specific department plans, etc.).

- ◆ The Union County Emergency Management Department and the Union County School District have prepared Emergency Operations Plans.

Disaster Recovery Plan

A disaster recovery plan guides the physical, social, environmental, and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans to capitalize on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and the enactment of ordinances following a hazard event.

- ◆ There are no known Disaster Recovery Plans.
- ◆ The Town of Lockhart should consider preparing a Disaster Recovery Plan to address flooding in the “flats” section of town.

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. In addition to general preparedness, communities can realize many benefits from having a COOP. For example, communities will have a greater capability to adapt to rapid changes in the operational environment and improve the overall effectiveness of their governance by identifying essential functions, processes, and communication methods among various agencies and people within the governing structure.

- ◆ The City of Union has a continuity Plan.
- ◆ Union does not have a continuity Plan and should consider preparing one.

StormReady®

Union County is a Storm Ready Community.

Storm Ready is a program the National Weather Service (NWS) established to help communities prepare for severe weather events. The NWS collaborates with the South Carolina Emergency Management Division (SCEMD) to implement the program. To be considered a "Storm Ready Community," a community must meet criteria including:

- 1) have a severe weather annex within the county Emergency Operations Plan (EOP) or other response plan,
- 2) have numerous ways in which to receive and disseminate weather and flood warnings,
- 3) have a team of trained storm spotters within the community and

4) participate in weather-related public education seminars and exercises, including the statewide tornado drill for public schools.

The program also requires participants to have NOAA weather radios in all public buildings. The program's benefits include being better prepared for severe weather events, which could lead to fewer casualties, and the community receiving credit under the Community Rating System (CRS) to help lower flood insurance premiums.

GENERAL PLANNING

Implementing hazard mitigation activities involves agencies and individuals beyond the emergency management profession. The Capability Assessment Survey also asked about general planning capabilities and how communities have integrated hazard mitigation into other ongoing planning efforts in Union County and its towns.

Comprehensive Land Use Plan

A comprehensive land use plan establishes the overall vision for what a community wants to be and guides future governmental decision-making. Typically, a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. The preparation of a Comprehensive Plan allows a community to prepare and implement zoning. Given the broad nature of the plan and its regulatory standing in many communities, integrating hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- ◆ Union County and the City of Union have adopted Comprehensive Plans.
- ◆ The Town of Lockhart has prepared a Master Plan, and the Town of Jonesville has prepared a strategic plan to guide economic redevelopment in the communities.

Capital Improvement Plan

A capital improvements plan guides the scheduling of spending on public improvements. A capital improvement plan can be essential 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.

- ◆ There are no known capital improvement plans approved by Union County or its municipalities.

Historic Preservation Plan

A historic preservation plan assists communities in preserving historic structures or districts.

- ◆ Union County and its municipalities do not have historic preservation plans.
- ◆ The SC State Historic Preservation Office has prepared a Historic Preservation Plan “Sustaining Historic Places in Changing Times Historic Preservation Plan for South Carolina 2020-2026”
- ◆ The City of Union preserves its historic properties and districts with implementation of Section 22-29 (Bailey Bill), Section 9.5-21 (General – definition of historic structure, Section 9.5-53 (Historic Structures Variance procedures) and Section 19-33 of the City’s Code.

Zoning Ordinance

Zoning represents the primary means by which local governments control land use. As part of a community’s police power, jurisdictions that maintain zoning authority use zoning to protect public health, safety, and welfare. Jurisdictions implement zoning through a zoning ordinance mechanism.

- ◆ The City of Union has a Zoning Ordinance.

Land Use (Subdivision) Ordinance

A subdivision ordinance regulates 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.

- ◆ The City of Union has a Land Use Ordinance.

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 needed both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk a community faces.

- ◆ Union County and the City of Union have building departments. The towns of Carlisle and Jonesville have adopted building ordinances granting Union County authority to implement the building codes within their communities.

Open Space Management Plan

An open space management plan preserves, protects, and restores largely undeveloped lands in their natural state and expands or connects 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 preserving wetlands or other flood-prone areas in their natural state in perpetuity.

- ◆ There are no known Open Space Management Plans.

Stormwater Management Plan

A stormwater management plan addresses flooding associated with stormwater runoff. The stormwater management plan focuses on design and construction measures that can reduce the impact of more frequently occurring minor urban flooding.

- ◆ There are no known Stormwater Management Plans.

NFIP, Flood Ordinance and Flood Management Ordinances are discussed in this report's Flooding Natural Risk section.

ADMINISTRATIVE AND TECHNICAL CAPABILITY

Administrative and technical capability is the ability of a local government to develop and implement mitigation projects, policies, and programs and its capacity to direct staff time and resources for that purpose. A community's administrative capability determines how the community assigns mitigation-related activities to local departments and whether adequate personnel resources exist to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for successfully implementing proposed mitigation activities. Technical capability is local government employees' knowledge and technical expertise, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and evaluate community hazard vulnerability. The Capability Assessment Survey captured administrative and technical capability information by identifying available staff and personnel resources.

Administration and Technical Capability

Municipality	Planners (with land use/land development Knowledge)	Planners or engineers (with natural and/or human caused hazards knowledge)	Engineers or professionals trained in building and/or infrastructure construction practices	Emergency Manager	NFIP Floodplain Administrator	Land Surveyors	Scientists or staff familiar with the hazards of the community	Personnel skilled in GIS and/or FEMA's HAZUS program	Grant writers or fiscal staff to handle large/complex grants	Staff with expertise or training in benefit-cost analysis	Other
Town of Carlisle					X		X				
Town of Lockhart					X		X				
Town of Jonesville							X				
City of Union	X				X		X				
Union County	X			X	X		X				

The municipalities in Union County are rural communities with limited staff and tax ratables. Union County and the City of Union have the most staff and capabilities. Some Union County communities have limited grant writing/grant management capabilities. However, they all can contract with the Catawba Regional Council of Governments for such services when needed. CROG can also provide planning and GIS mapping capabilities.

FISCAL CAPABILITY

The ability of a local government to act is often closely associated with the amount of money available to implement policies and projects. Fiscal capability may be 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 related to creating and monitoring a program. In other instances, direct expenses are linked to an actual project, such as acquiring flood-prone homes, which can require a substantial commitment from local, state, and federal funding sources. The Capability Assessment Survey captured information on the region’s fiscal capability by identifying locally available financial resources.

Fiscal Capability Assessment										
Municipality	Capital Improvements Program	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other
Town of Carlisle					X			X	X	
Town of Lockhart					X			X	X	
Town of Jonesville		*			X			X	X	
City of Union		*		X	X			X	X	
Union County					X			X	X	

*The City of Union and the Town of Jonesville have received CDBG grant funds from the State program for brownfield and streetscape improvement projects. Catawba Council of Governments has managed the grants for both communities.

POLITICAL CAPABILITY

One of the most challenging capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority or may conflict with or impede other community goals, such as growth and economic development. Therefore, the Catawba Regional Council of Governments (CROG) considered the local political climate in designing mitigation strategies as it could be the most challenging hurdle to overcome in their adoption and implementation.

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

- ◆ Local governments seemed fully onboard with supporting hazard mitigation actions; however, local budgets were a limiting factor. The towns ranged in size from 300 to 900 residents, with a limited older housing stock. Lower-cost implementation items will be the easiest for the communities to implement. Pooling resources for items such as public education about hazards would be beneficial to the communities.
- ◆ Grant resources are essential to implement higher-cost item actions.

SOCIAL VULNERABILITY AND COMMUNITY RESILIENCE

The FEMA Risk Index has identified all of Union County as having a very high social vulnerability (85.7 out of 100) and a relatively low community resilience (38.4 out of 100). Social vulnerability is the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Community resilience is the ability of a community to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruption.

CHANGES TO THIS SECTION

- ✓ This section is new and replaced the prior Vulnerability Section in the 2019 Hazard Mitigation Plan that was approved by FEMA in 2020.

MITIGATION STRATEGY

In formulating the Mitigation Strategy for Union County and its municipalities, the Catawba Regional Council of Governments (CRCOG) considered various activities to help achieve the established mitigation goals and address any specific hazard concerns. CRCOG discussed these mitigation activities during the third Union County Hazard Mitigation Plan Task Force meeting. All activities considered by the Union County Hazard Mitigation Plan Task Force Committee are classified under one of the following six broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

PREVENTION

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

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

PROPERTY PROTECTION

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

- ◆ Acquisition
- ◆ Relocation

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

NATURAL RESOURCE PROTECTION

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

- ◆ Floodplain protection
- ◆ Watershed management
- ◆ Riparian buffers
- ◆ Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- ◆ Erosion and sediment control
- ◆ Wetland preservation and restoration
- ◆ Habitat preservation
- ◆ Slope stabilization

STRUCTURAL PROJECTS

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

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

EMERGENCY SERVICES

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

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

PUBLIC EDUCATION AND AWARENESS

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

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

SELECTION OF MITIGATION TECHNIQUES

To determine the most appropriate mitigation techniques for the communities in Union County, the Union County Hazard Mitigation Plan Task Force Committee members thoroughly reviewed and considered the findings of the Capability Assessment and Risk Assessment to determine the best activities for their respective communities. Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, Catawba Regional Council of Governments staff evaluated the mitigation actions identified in the previous version of the regional hazard mitigation plan to determine their 2023 implementation status.

It was hard to determine if the 2019 mitigation actions had been implemented, as the prior Emergency Manager is deceased and could not provide the status of the actions. CRCOG found no records indicating if the County had completed the mitigation actions. CRCOG has assumed that the County still needs to complete the mitigation actions and has included them as new actions in this 2023 Hazard Mitigation Plan.

To prevent a similar situation from occurring in the future, this Hazard Mitigation Plan includes a recommendation that the Emergency Manager be responsible for preparing an annual report on the status of the mitigation actions to ensure continuity.

MITIGATION ACTIONS

There are six categories of mitigation techniques: emergency services, prevention, natural resource protection, structural projects, public education and awareness, and property protection.

At the 3rd committee meeting, the Union County communities indicated that many of the communities in Union County had limited resources, and that was kept in mind when selecting mitigation actions. High impact, low- medium cost solutions were selected for the communities to review for each hazard. A section titled Potential Funding Sources has also been added to this report to assist communities in finding funding sources for the higher cost recommended mitigation actions.

Catawba Regional Council of Governments (CRCOG) added a recommendations subsection under each Hazard Risk Section. The recommendations subsection identifies mitigation actions the communities can undertake to address the hazard risk. Catawba Regional Council of Governments compiled the recommendations from each hazard section into one list broken down by jurisdiction. CRCOG also included mitigation actions identified in the 2018 Union County Hazard Mitigation Plan in the list of mitigation actions.

Mitigation action tables were created for the Towns of Carlisle, Jonesville, and Lockhart, the City of Union, and Union County.

Each mitigation action table was provided to each community at the third task force meeting. At the third meeting Communities were asked to review each action item and to rank them as High, Medium, and Low or remove items that they did not agree with. Officials from the County, Town of Lockhart, and Town of Jonesville provided their rankings at the meeting, as well as noted action items for removal or modification. The City of Union sent an official to the meeting but requested to provide rankings after meeting with the City Administrator. High ranked items were items that were important to the community and had a more significant impact. Communities tended to rank items as low when the item had been completed, was ongoing, or did not impact their community significantly. Medium ranked actions fell in between.

The Town of Carlisle did not have a member present at the meeting. The Carlisle Mitigation Action items were emailed to the Town of Carlisle for their input. Lee Brannon, Union County Emergency Manager, sat down with the City of Carlisle to assist with their ranking review.

Community rankings are included next to each mitigation action item. Each community provided a responsible agent to be assigned for the mitigation action to ensure the action is implemented. The agent is also provided on the same row as the mitigation action in the mitigation action tables.

Hazard Mitigation Recommendations for Town of Carlisle

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Town of Carlisle	All Hazards	High	Advocate for cell service and phone line improvements to state and utility Companies.	Town General Funds	1-3 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	All Hazards	High	Construct public cell tower.	State Homeland Grant Program (HSGP) for State Homeland Security Program (SHSP) funding	1-5 years, contingent on receiving grant funding	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	All Hazards	High	Purchase and install backup generators at shelters and critical street intersections.	Hazard Mitigation Grant Funding & General Funds Capital for Match	1-5 years, contingent on receiving grant funding	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	All Hazards	High	Purchase portable generators for use at gas stations for access to fuel for emergency vehicle use.	Hazard Mitigation Grant Funding & General Funds Capital for Match	1-5 years, contingent on receiving grant funding	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	Hazardous Materials	Moderate	First Responders schedule tours of nearby manufacturing facilities and their chemical hazards.	First Responder Funds (Fire, EMS & Police)	1-3 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	All Hazards	High	Continue to test and monitor all hazard warning sirens.	First Responder Funds (Fire, EMS & Police)	continue	Carlisle Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Town of Carlisle	All Hazards	High	First Responders educate the public about the sound of the All Hazard Siren, tornados, floods, and other hazards, locations of shelters, and emergency plans and emergency supplies.	First Responder Funds (Fire, EMS & Police)	1-3 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	Strong Winds & Severe Winter Storms	High	Coordinate with Electric companies to trim and assess the health of trees next to power lines to minimize down-wired hazards and power loss.	General Funds	1-5 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	Flooding	Moderate	Continue NFIP participation and, when necessary, adopt new FEMA FIRM maps.	General Funds	Continue	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	All Hazards	Moderate	Continue to enforce the International Building Code (IBC) and International Residential Code (IRC) and ensure enforcement through a shared service agreement with the County.	General Funds	Continue	Carlisle Governing Body with Assistance from Union County Emergency Manager
Town of Carlisle	Local Economy, All Hazards	High	Find and pursue funding sources to develop an Economic Resiliency Plan for the Town of Carlisle.	EDA grants, Rural Economic Grants	1-5 years	Carlisle Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Wildfires	High	Educate the public about the Home Ignition Zone Program, which includes simple steps from roof to foundation to make a home safer from embers and radiant heat. (provide handouts to the public)	General funds	1-5 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
All	Wildfires	High	Develop a program to remove or thin vegetation to mitigate wildfire Hazards	General Funds	1-5 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
All	Lightning	High	Protect critical facilities and infrastructure from lightning damage by installing lightning protection devices and methods, such as lightning rods and grounding on communications infrastructure and other critical facilities and install and maintain surge protection on critical electronic equipment.	General Funds	1-5 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
All	Severe Winter Storms	Moderate	Educate and encourage farmers to purchase Crop Insurance.	General Funds, Insurance Companies	1-5 years	Carlisle Governing Body with Assistance from Union County Emergency Manager
All	Earthquakes	High	Educate the public about earthquake insurance and that homeowner's insurance does not cover earthquake damage.	General Funds, Insurance Companies	1- 5 years	Carlisle Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	All Hazards	High	Replace or purchase new fire, police, EMS, or other emergency equipment to adequately address all hazards.	General Funds, First Responder Funds, Assistance to Fire Fighter's grants, Staffing for Adequate Fire and Emergency Response (SAFER) grant, and Fire Prevention and Safety grant	as needed	Carlisle Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	High	Provide a voluntary Emergency Management Registration form for older adults, individuals with special medical needs, homeless, and other vulnerable populations (partner with County)	General Funds and First Responder Funds	1 year, Ongoing	Carlisle Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	High	Schedule and participate in Hazard Mitigation Task Force-review actions identified in the Hazard Mitigation Plan annually. Identify mitigation activities that have been completed and items to pursue in the new year.	General Funds	1 year, Ongoing	Carlisle Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	High	Prepare a plan for a two-week or more extended power outage event. The plan should address items identified under recommendation three (3) noted in this report's Hurricanes/Tropical Storms section.	General Funds and First Responder Funds	1 year, ongoing	Carlisle Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Wildfires	Moderate	Adopt or continue to enforce the International Fire Code (International Code Council 2021) or the NFPA 1 Fire Code (National Fire Protection Association 2021)	General Funds and First Responder Funds	1 year, Ongoing	
All	Terrorism (cyber security)	Moderate	County, City, and Towns and Emergency response services providers should prepare, update, or review a Cyber Security Plan annually or more frequently. The Cyber Security Plan should include recommendations in the Cyber Security subsection of the Terrorism Hazard section.	General Funds	1-5 years, ongoing	
All	Terrorism (cyber security)	Moderate	Prepare a Continuity of Operations Plan that includes non-technology procedures for the operation of government facilities and Emergency Response Services to cover a period when technology may be down for an extended time.	General Funds	1-5 years, ongoing	

Hazard Mitigation Recommendations for Town of Jonesville

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Town of Jonesville	All Hazards	High	Purchase and install 3-5 backup generators for Town Hall and water and sewer operations.	Hazard Mitigation Grant Funding & General Funds Capital for Match	1-3 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
Town of Jonesville	Flooding	Low	Consider joining NFIP to ensure sewer and water infrastructure in flood-prone areas can be insured from flood damage.	Town General Funds	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
Town of Jonesville	Flooding	Low	Adopt a Flood Prevention Ordinance.	Town General Funds	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
Town of Jonesville	Hazardous Materials	High	First Responders schedule tour of nearby manufacturing facilities and their chemical hazards.	First Responder Funds (Fire, EMS & Police)	1-3 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
Town of Jonesville	All Hazards	Moderate	Continue to test and monitor all hazards warning sirens.	First Responder Funds (Fire, EMS & Police)	continue	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
Town of Jonesville	All Hazards	High	First Responders educate the public about All Hazards, Siren sounds, tornados, floods, and other hazards, locations of shelters, emergency plans, and emergency supplies.	First Responder Funds (Fire, EMS & Police)	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Town of Jonesville	High Winds, Severe Winter Storms	Moderate	Coordinate with Electric companies to trim and assess the health of trees next to power lines to minimize down-wired hazards and power loss.	Town General Funds	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
Town of Jonesville	All Hazards	High	Continue to enforce the Internal Building Code (IBC) and International Residential Code (IRC) and ensure they are enforced through a shared service agreement with the County.	General Funds	Continue	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
Town of Jonesville	Local Economy , All hazards	High	Pursue funding sources to implement recommendations in the Strategic Plan	Various funding sources as noted in Market Analysis	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	Wildfires	Moderate	Educate the public about the Home Ignition Zone Program, which includes simple steps from roof to foundation to make a home safer from embers and radiant heat. (provide handouts to the public)	General funds	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	Wildfires	Low	Develop a program to remove or thin vegetation to mitigate wildfire Hazards	General Funds	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	Lightning	Low	Protect critical facilities and infrastructure from lightning damage by installing lightning protection devices and methods, such as lightning rods and grounding on communications infrastructure and other critical facilities, and install and maintain surge protection on critical electronic equipment.	General Funds	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Severe Winter Storms	Low	Educate and encourage farmers to purchase Crop Insurance.	General Funds, Insurance Companies	1-5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	Earthquakes	Low	Educate the public about earthquake insurance and that homeowner's insurance does not cover earthquake damage.	General Funds, Insurance Companies	1- 5 years	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	High	Replace or purchase new fire, police, EMS, or other emergency equipment to adequately address all hazards.	General Funds, First Responder Funds, Assistance to Fire Fighter's grants, Staffing for Adequate Fire and Emergency Response (SAFER) grant, and Fire Prevention and Safety grant	as needed	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	High	Provide a voluntary Emergency Management Registration form for older adults, individuals with special medical needs, homeless, and other vulnerable populations (partner with County)	General Funds and First Responder Funds	1 year, Ongoing	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	All Hazards	Moderate	Schedule and participate in Hazard Mitigation Task Force- review actions identified in the Hazard Mitigation Plan annually. Identify mitigation activities that have been completed and items to pursue in the new year.	General Funds	1 year, Ongoing	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	Moderate	Prepare a plan for a two-week or more extended power outage event. The plan should address items identified under recommendation three (3) noted in this report's Hurricanes/Tropical Storms section.	General Funds and First Responder Funds	1 year, ongoing	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	Wildfires	Moderate	Adopt a new Fire Code that can also address prescribed burn permits.	General Funds and First Responder Funds	1 year, Ongoing	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	Earthquakes and all hazards	High	Seek funding to demolish vacant, dilapidated buildings to protect the health and safety of residents.	CDBG funds	as needed	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager
All	Terrorism (cyber security)	Moderate	County, City, and Towns and Emergency response services providers should prepare, update, or review a Cyber Security Plan annually or more frequently. The Cyber Security Plan should include recommendations in the Cyber Security subsection of the Terrorism Hazard section.	General Funds, SLED Grant	1-5 years, ongoing	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Terrorism (cyber security)	Moderate	Prepare a Continuity of Operations Plan that includes non-technology procedures for the operation of government facilities and Emergency Response Services to cover a period when technology may be down for an extended time.	General Funds	1-5 years, ongoing	Town of Jonesville Governing Body with Assistance from Union County Emergency Manager

Hazard Mitigation Recommendations for Town of Lockhart

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Town of Lockhart	Hazardous Materials	Low	First Responders schedule tours of nearby manufacturing facilities and their chemical hazards.	First Responder Funds (Fire, EMS & Police)	1-3 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
Town of Lockhart	All Hazards	High	Continue to test and monitor all hazard warning sirens.	First Responder Funds (Fire, EMS & Police)	continue	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
Town of Lockhart	All Hazards	High	First Responders educate the public about the sound of the All Hazard Siren, tornados, floods, and other hazards, locations of shelters, emergency plans and emergency supplies.	First Responder Funds (Fire, EMS & Police)	1-3 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
Town of Lockhart	Strong Winds and Severe Winter Storms	High	Coordinate with Electric companies to trim and assess the health of trees next to power lines to minimize down-wired hazards and power loss.	General Funds	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
Town of Lockhart	Flooding	High	Adopt a Flood Prevention Ordinance.	Town General Funds	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
Town of Lockhart	Flooding	High	Develop a Post Disaster Plan for a 1986 type flooding event.	Emergency Management Performance Grant (EMPG)	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Town of Lockhart	All Hazards	Moderate	Continue to enforce International Building Codes (note: May want to adopt Jonesville's ordinance, which has a shared service agreement with Union County to enforce building codes)	Town General Funds	Continue	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
Town of Lockhart	Local Economy, All Hazards	Moderate	Pursue funding sources to implement Lockhart Strategic Plan recommendations.	Various funding sources as noted in report	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	Wildfires	High	Educate the public about the Home Ignition Zone Program, which includes simple steps from roof to foundation to make a home safer from embers and radiant heat. (provide handouts to the public).	General funds	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	Wildfires	High	Develop a program to remove or thin vegetation to mitigate wildfire Hazards.	General Funds	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	Lightning	High	Protect critical facilities and infrastructure from lightning damage by installing lightning protection devices and methods, such as lightning rods and grounding on communications infrastructure and other critical facilities and install and maintain surge protection on critical electronic equipment.	General Funds	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Severe Winter Storms	Low	Educate and encourage farmers to purchase Crop Insurance.	General Funds, Insurance Companies	1-5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	Earthquakes	Moderate	Educate the public about earthquake insurance and that homeowner's insurance does not cover earthquake damage.	General Funds, Insurance Companies	1- 5 years	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	High	Replace or purchase new fire, police, EMS, or other emergency equipment to adequately address all hazards.	General Funds, First Responder Funds, Assistance to Fire Fighter's grants, Staffing for Adequate Fire and Emergency Response (SAFER) grant, and Fire Prevention and Safety grant	as needed	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	Moderate	Provide a voluntary Emergency Management Registration form for older adults, individuals with special medical needs, homeless, and other vulnerable populations (partner with County).	General Funds and First Responder Funds	1 year, Ongoing	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	All Hazards	Moderate	Schedule and participate in Hazard Mitigation Task Force- review actions identified in the Hazard Mitigation Plan annually. Identify mitigation activities that have been completed and items to pursue in the new year.	General Funds	1 year, Ongoing	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	All Hazards	High	Prepare a plan for a two-week or more extended power outage event. The plan should address items identified under recommendation three (3) noted in this report's Hurricanes/Tropical Storms section.	General Funds and First Responder Funds	1 year, ongoing	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	Earthquakes and all hazards	High	Seek funding to demolish vacant, dilapidated buildings to protect the health and safety of residents.	CDBG funds	as needed	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager
All	Terrorism (cyber security)	High	County, City, and Towns and Emergency response services providers should prepare, update, or review a Cyber Security Plan annually or more frequently. The Cyber Security Plan should include recommendations in the Cyber Security subsection of the Terrorism Hazard section.	General Funds	1-5 years, ongoing	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Terrorism (cyber security)	Moderate	Prepare a Continuity of Operations Plan that includes non-technology procedures for the operation of government facilities and Emergency Response Services to cover a period when technology may be down for an extended time.	General Funds	1-5 years, ongoing	Town of Lockhart Governing Body with Assistance from Union County Emergency Manager

Hazard Mitigation Recommendations for City of Union

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
City of Union	All Hazards	Low	Continue to test and monitor all hazards warning sirens.	First Responder Funds (Fire, EMS & Police)	continue	Fire Commander
City of Union	Hazardous Materials	Moderate	First Responders schedule tours of nearby manufacturing facilities and their chemical hazards.	First Responder Funds (Fire, EMS & Police)	1-3 years	Fire Commander
City of Union	Strong Winds & Severe Winter Storms	High	Coordinate with Electric companies to trim and assess the health of trees next to power lines to minimize down-wired hazards and power loss.	General Funds	1-5 years	Utility Director
City of Union	Strong Winds, Tornados, & Severe Winter Storms	Low	Consider modifying the Zoning Ordinance to require the installation of electrical wires underground rather than overhead on poles for new developments.	General Funds	1- 5 years	City Administrator
City of Union	Strong Winds, Tornados, & Severe Winter Storms	Low	Consider adopting standards from the International Code Council (ICC) - 600 Standard for Residential Construction in High-Wind Regions.	General Funds	1-5 years	Building Official
City of Union	All Hazards	High	Continue to enforce the International Building Code (IBC) and International Residential Code (IRC).	General Funds	Continue	Building Official

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
City of Union	Drought and High Heat	Moderate	Review water use measures to prioritize or control water use during drought events.	Water Service collection funds, General funds	Continue	Utility Director
City of Union	Drought and High Heat	Moderate	Plan to encourage Citizens to take water-saving measures during drought events.	Water Service collection funds, General funds	Continue	Utility Director
All	Wildfires	Low	Educate the public about the Home Ignition Zone Program, which includes simple steps from roof to foundation to make a home safer from embers and radiant heat. (provide handouts to the public).	General funds	1-5 years	Fire Commander
All	Wildfires	Low	Develop a program to remove or thin vegetation to mitigate wildfire Hazards.	General Funds	1-5 years	Fire Commander
All	Lightning	Moderate	Protect critical facilities and infrastructure from lightning damage by installing lightning protection devices and methods, such as lightning rods and grounding on communications infrastructure and other critical facilities and install and maintain surge protection on critical electronic equipment.	General Funds	1-5 years	Fire Commander / Information Technology Coordinator
All	Severe Winter Storms	Low	Educate and encourage farmers to purchase Crop Insurance.	General Funds, Insurance Companies	1-5 years	US Forestry

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Earthquakes	Low	Educate the public about earthquake insurance and that homeowner's insurance does not cover earthquake damage.	General Funds, Insurance Companies	1- 5 years	Insurance Providers / Public Safety
All	All Hazards	Moderate	Replace or purchase new fire, police, EMS, or other emergency equipment to adequately address all hazards.	General Funds, First Responder Funds, Assistance to Fire Fighter's grant, Staffing for Adequate Fire and Emergency Response (SAFER) grant, and Fire Prevention and Safety grant	as needed	City Administration / Mayor / City Council
All	All Hazards	Moderate	Provide a voluntary Emergency Management Registration form for older adults, individuals with special medical needs, homeless, and other vulnerable populations (partner with County).	General Funds and First Responder Funds	1 year, Ongoing	City Administration
All	All Hazards	High	Schedule and participate in Hazard Mitigation Task Force- review actions identified in the Hazard Mitigation Plan annually. Identify mitigation activities that have been completed and items to pursue in the new year.	General Funds	1 year, Ongoing	City Administration / Police Chief / Fire Commander

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	All Hazards	Moderate	Prepare a plan for a two-week or more extended power outage event. The plan should address items identified under recommendation three (3) noted in this report's Hurricanes/Tropical Storms section.	General Funds and First Responder Funds	1 year, ongoing	City Administration / Utilities Director
All	Wildfires	Low	Adopt or continue to enforce the International Fire Code (International Code Council 2021) or the NFPA 1 Fire Code (National Fire Protection Association 2021).	General Funds and First Responder Funds	1 year, Ongoing	Mayor /City Council
All	Earthquakes and all hazards	High	Seek funding to demolish vacant, dilapidated buildings to protect the health and safety of residents.	CDBG funds	as needed	Building Officials
All	Terrorism (cyber security)	Low	County, City, and Towns and Emergency response services providers should prepare, update, or review a Cyber Security Plan annually or more frequently. The Cyber Security Plan should include recommendations in the Cyber Security subsection of the Terrorism Hazard section.	General Funds	1-5 years, ongoing	Information Technology Coordinator

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Terrorism (cyber security)	Moderate	Prepare a Continuity of Operations Plan that includes non-technology procedures for the operation of government facilities and Emergency Response Services to cover a period when technology may be down for an extended time.	General Funds	1-5 years, ongoing	City Administration / Police Chief

Hazard Mitigation Recommendations for Union County

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	All Hazards	Moderate	Install backup generators at shelters, County facilities, and County fuel storage facilities.	Hazard Mitigation Grant Funding & General Capital for Match	3-5 years	Union County Government Services
Union County	All Hazards	High	Emergency Management and First Responders educate the public about sounds from All Hazards Siren, tornados, floods, and other hazards, locations of shelters, and emergency plans and emergency supplies (currently utilizing Facebook and smartphones).	First Responder Funds (Fire, EMS & Police), General Funds, Duke Energy Foundation, AARP, and National Realtor's Association	Continue	Union County Emergency Management / Local Fire Departments
Union County	All Hazards	High	Switch all County Fire Departments to the Palmetto 800 communication system.	Hazard Mitigation Grant Funding & General Capital for Match / Potential Source: FY 2021-2022 Appropriation Act 6% match to purchase equipment if still active	1-3 years	Union County Government Services
Union County	All Hazards	High	Designate six (6) official emergency shelters for the County, one per municipality, and two (2) additional. (Union County Emergency Management)	General Funds, Emergency Management	1-3 years	Union County Emergency Management

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	All Hazards	High	Emergency Management update Operations Plan.	General Funds, Emergency Management	Ongoing	Union County Emergency Management
Union County	All Hazards	Low	Union County Emergency Management should develop a mobile educational display to be used at public events and for permanent display.	General Funds, Duke Energy Foundation, AARP, and National Realtor's Association	1-5 years	Union County Emergency Management
Union County	All Hazards	Low	Continue to inspect and maintain emergency shelters.	General Funds	continue	Union County Emergency Management
Union County	All Hazards	Low	Continue to review local building codes and ensure they are enforced appropriately.	General Funds	Continue	Union County Building Inspection
Union County	All Hazards	Low	Continue to test and monitor all hazard warning sirens.	First Responder Funds (Fire, EMS & Police)	continue	Union County Emergency Management / Union County Emergency Services
Union County	All Hazards	Moderate	Create and fund the Deputy Emergency Manager position.	General Funds	1-5 years	Union County Government Services
Union County	All Hazards	High	Prepare a Memorandum of all Hazard Mitigation Actions Completed by the County, City, and Towns annually for continuity. (Emergency Manager – Annual Report)	General Funds	1 year, Ongoing	Union County Emergency Management
Union County	All Hazards	Low	Identify areas with emergency evacuation shelter deficiencies.	General Funds	Completed	Union County Emergency Management/ Union County Government Services

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	All Hazards	Low	Continue Incident Command training and practice for emergencies.	General Fund, First Responder funds	Continue	Union County Emergency Management
Union County	All Hazards	Low	Continue to utilize media resources to warn the public about hazardous events.	General Funds	Continue	Union County Emergency Management / Union County Emergency Services
Union County	Flooding	High	Modify Flood Prevention Ordinance Language to reflect new flood maps and future map updates.	General Funds	1-3 years	Union County Emergency Management
Union County	Tornados	Low	Educate the public about Tornado emergencies and how to stay safe, focusing on finding safe locations on the 1st floor of their home or buildings and vacating mobile homes. Encourage residents of Mobile Homes to evacuate to shelters.	General Funds, AARP grant, Duke Foundation Grant, National Realtor's Association grant	1-5 years	Union County Emergency Services / Local Fire Departments
Union County	Tornado, High Winds	Moderate	Assess Mobile Home Park inventory, locations, and their proximity to existing shelters. (Add as a parameter of Mobile Home Survey Existing Study)	General Funds, AARP grant, Duke Foundation Grant, National Realtor's Association grant	1-5 years	Union County Emergency Services / Union County Assessor's Office
Union County	Tornado, High Winds	Low	Promote the construction and use of safe rooms through education to residents, builders, schools, daycares, etc.	General Funds	1-5 years	Union County Emergency Management / Local Fire Department

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	Hazardous Materials	Low	Schedule and attend first responders' tours of nearby manufacturing facilities and their chemical hazards.	First Responder Funds (Fire, EMS & Police)	1-3 years	Union County Emergency Management / Local Fire Department
Union County	Hazardous Materials	High	Secure and review Emergency Plans for RPM Facilities.	Emergency Management	1-3 years	Union County Emergency Management
Union County	Hazardous Materials	High	If necessary, prepare community evacuation plans for manufacturing facilities, truck routes, and railways where hazardous materials accidents are most likely to occur and impact the surrounding community. Union County should target RPM-designated facilities first. (Private facilities should be encouraged to prepare plans, with Union County Emergency Management as backup if the private companies fail to prepare plans.)	Private Companies, Emergency Management	1-3 years	Union County Emergency Management / Local Fire Departments / Union County School District
Union County	Hazardous Materials	Low	Work with SCDOT and Catawba COG to address dangerous intersections identified in this report's Hazardous Materials Truck Routes and Railways Section.	Emergency Management, SCDOT, Catawba COG	1-5 years	Union County Emergency Management / Local Fire Departments / Union County Government Services

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	Nuclear	Low	Coordinate with York County and Catawba Nuclear Power Plant to find an alternate shelter to replace the Baptist Church location, which no longer wishes to serve as a shelter. (in-process)	Emergency Management	1-3 years	Union County Emergency Management / State
Union County	Strong Winds, tornados, hurricanes & Severe Winter Storms	Low	Coordinate with Electric companies to trim and assess the health of trees next to power lines to minimize down-wired hazards and power loss.	General Funds	1-5 years	Union County Emergency Management / Local Fire Department
Union County	Strong Winds, tornados, hurricanes & Severe Winter Storms	Low	Consider requiring or encouraging wind engineering measures and construction techniques that may include structural bracing, straps, and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles.	General Funds	1-5 years	Union County Building Inspection / Union County Government Services
Union County	Strong Winds, tornados, hurricanes & Severe Winter Storms	Low	Consider requiring tie-downs with anchors and ground anchors appropriate for the soil type for manufactured homes.	General Funds	1-5 years	Union County Building Inspection

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	Strong Winds, Tornadoes, Hurricanes & Severe Winter Storms	Low	Consider retrofitting public buildings and critical facilities to reduce future wind damage as noted under recommendation 11 under the Strong Winds Risk Section.	Building Resilient Infrastructure and Communities (BRIC) and Hazard Mitigation Grant Program (HMGP)	1-5 years	Union County Building Inspection / Union County Government Services
Union County	High Hazard Dams, Flooding	Low	Work with SC DHEC on the monitoring of dams located in the county.	General Funds	Continue	Union County Emergency Management / Union County Government Services
Union County	High Hazard Dams, Flooding	Moderate	Acquire Emergency Management Plans for all dams the State identifies as High Hazard Dams.	General Funds	1 year	Union County Emergency Management
Union County	Drought	Low	Union County Emergency Manager should secure copies of each water provider's Drought Management Plans.	General Funds	1 year	Union County Water Companies / Union County Emergency Management
Union County	Drought	Low	Encourage citizens to take water-saving measures during drought events and enforce drought management plans throughout the county.	General Funds	1 year	Union County Emergency Management / Union County Government Services / Union County Water Companies
Union County	High Heat, Extreme Cold	Moderate	Conduct Outreach to vulnerable populations during periods of extreme temperature, including identification of heating and cooling centers.	General Funds	Continue	Union County Emergency Management

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	High Winds	Low	Coordinate with electric companies to trim and assess the health of trees next to power lines to minimize down-wired hazards and power loss.	General Funds	1-5 years	Union County Emergency Management/ Local Fire Departments / Union County Government Services
Union County	High Winds & Tornados	Low	Prepare code requirements for constructing Safe Rooms for Mobile Home Parks and other high-risk areas.	General Funds	1-5 years, contingent on receiving grant funding	Union County Building Inspector
Union County	Hurricanes	Low	Warn the public through media and other channels about securing fuel for travel, heating, and other needs before a hurricane/tropical storm makes landfall in Louisiana, which could shut down the Kinder Morgan fuel lines. Encourage businesses to implement work-from-home policies during such events to preserve fuel for emergency personnel and companies that require in-person operations.	General Funds	Ongoing	Union County Emergency Management / Union County Government Services
Union County	Hail	Low	Develop a program to educate the public about how to retrofit buildings that can prevent hail damage. Program that covers measures identified in recommendation 2 of this report's Thunderstorms, hail, and Lightning section.	General Funds, AARP grant, Duke Foundation Grant, National Realtor's Association grant	Ongoing	Union County Building Inspector / Union County Assessor's Office

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	Severe Winter Weather	Low	Educate the public about how to prevent water pipe breaks and how to secure utility assistance if needed.	General Funds, AARP grant, Duke Foundation Grant, National Realtor's Association grant	Ongoing	Union County Emergency Management / Union County Water Companies / Union County Government Services
Union County	Wildfires	Moderate	Prepare an evacuation plan for wildfires that includes translators, transportation (including ADA-accessible buses/shuttles), and volunteers/staff to help with wildfire evacuations physically.	General Funds	1-5 years	Union County Emergency Management / Local Fire Departments / State
Union County	Earthquakes	Low	Develop an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and homes with cripple wall foundations.	General Funds	1-5 years	Union County Emergency Management / Union County Building Inspector / Union County Assessor's Office
Union County	Local Economies, all Hazards	Low	Encourage the Union County Chamber of Commerce and Union County Development Board to educate local businesses about actions to mitigate loss from natural and manmade hazards, as noted in this report's Local Economic Hazards section.	General Funds	1-5 years	Union County Government Services / Union County Emergency Management

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
Union County	Infectious Diseases	Low	Maintain Communicable Disease Plans & lessons learned from COVID-19.	General Funds	Ongoing	State / Union County Emergency Management
Union County	Aviation Emergency	Low	Continue to enforce the Union County Aviation Ordinance for Troy Sheldon Airport.	General Funds	Ongoing	Union County Government Services
Union County	Aviation Emergency	Moderate	Locate a Fire Station at Troy Sheldon Airport with onsite Fire Trucks that have foam systems.	General Funds, First Responder Funds, FEMA Firefighters Grant Fund	Ongoing	Union County Government Services
Union County	Aviation Emergency	Moderate	Union County first responders to communicate with Troy Shelton Field staff.	General Funds	Ongoing	Union County Government Services / Union County Emergency Management
Union County	Aviation Emergency	Low	Prepare or revise a response plan for a large-scale commercial passenger aviation accident.	General Funds	1-5 years	Troy Sheldon Airport Director / Union County Emergency Management / Local Fire Departments
Union County	Terrorism (School Emergencies)	High	Review existing Emergency Action Plans for each school and keep a copy in the Union County Emergency Management office.	General Funds	1-2 years, ongoing	Union County School System, Union County School District, Union County Emergency Management

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Terrorism (cyber security)	Moderate	County, City, and Towns and Emergency response services providers should prepare, update, or review a Cyber Security Plan annually or more frequently. The Cyber Security Plan should include recommendations in the Cyber Security subsection of the Terrorism Hazard section.	General Funds	1-5 years, ongoing	Union County Government Services, Town of Lockhart, Town of Jonesville, Town of Carlisle, and City of Union
All	Terrorism (cyber security)	Moderate	Prepare a Continuity of Operations Plan that includes non-technology procedures for the operation of government facilities and Emergency Response Services to cover a period when technology may be down for an extended time.	General Funds	1-5 years, ongoing	Union County Government Services / Union County Emergency Management / State
All	Wildfires	Moderate	Educate the public about the Home Ignition Zone Program, which includes simple steps from roof to foundation to make a home safer from embers and radiant heat. (provide handouts to the public).	General funds	Ongoing	Local Fire Departments / Union County Building Inspector / Emergency Management
All	Earthquakes	Low	Educate the public about earthquake insurance and that homeowner's insurance does not cover earthquake damage.	General Funds, Insurance Companies	1- 5 years	Union County Assessor's Office / Union County Government Services

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	All Hazards	Low	Replace or purchase new fire, police, EMS, or other emergency equipment to adequately address all hazards.	General Funds, First Responder Funds, Assistance to Fire Fighter's grants, Staffing for Adequate Fire and Emergency Response (SAFER) grant, and Fire Prevention and Safety grant	as needed	Union County Government Services
All	All Hazards	Moderate	Provide a voluntary Emergency Management Registration form for older adults, individuals with special medical needs, homeless, and other vulnerable populations (partner with County).	General Funds and First Responder Funds	1 year, Ongoing	Union County Emergency Management / Local Fire Department / Union County Government Services
All	All Hazards	High	Schedule and participate in Hazard Mitigation Task Force - review actions identified in the Hazard Mitigation Plan annually. Identify mitigation activities that have been completed and items to pursue in the new year.	General Funds	1 year, Ongoing	Union County Emergency Management
All	All Hazards	Moderate	Prepare a plan for a two-week or more extended power outage event. The plan should address items identified under recommendation three (3) noted in this report's Hurricanes/Tropical Storms section.	General Funds and First Responder Funds	1 year, ongoing	Union County Emergency Management / Union County Government Services

Jurisdiction	Hazard	Priority	Recommendation	Funding Source	Implementation Timeline	Responsible Agent
All	Wildfires	Low	Adopt or continue to enforce the International Fire Code (International Code Council 2021) or the NFPA 1 Fire Code (National Fire Protection Association 2021).	General Funds and First Responder Funds	1 year, Ongoing	Union County Building
All	Earthquakes and all hazards	High	Seek funding to demolish vacant, dilapidated buildings to protect the health and safety of residents.	CDBG funds	as needed	Union County Government Services

CHANGES TO THIS SECTION

- ✓ This section has been modified to include recommendations for all participating municipalities.
- ✓ This section has been modified to include mitigation actions found through the Hazard Mitigation Planning process completed in 2023.

Potential Funding Sources

FEMA GRANTS

BUILDING RESILIENT INFRASTRUCTURE AND COMMUNITIES (BRIC) GRANT

The BRIC program is a federal pre-disaster mitigation grant program administered by the Federal Emergency Management Agency (FEMA). It replaced the Pre-disaster Mitigation (PDM) program in 2020.

How it works:

BRIC funding is on a reimbursement basis. An eligible public agency applies for grant funding through the South Carolina Emergency Management Department (SCEMD) by proposing the project or mitigation measure and providing supporting documentation. FEMA reviews, and if the project aligns with funding policy and priorities, FEMA awards the grant. The process for approval or award of the project takes a year or more. Once FEMA awards the project, the applicant implements the project scope of work, spending money on eligible project expenses. The applicant then submits requests for reimbursement to SCEMD and receives 75% of federal funds.

FEMA funds BRIC Projects on a cost-share basis – generally 75% federal and 25% non-federal/local.

- Small, impoverished communities can be eligible for a reduced local cost share (up to 90% federal/10% non-federal).
- FEMA encourages public-private sector partnerships to meet the non-federal cost share.

Applicants can request management costs (up to 5% of total costs) for eligible grant administration expenses; if approved, FEMA reimburses management costs at 100% federal share.

FEMA awards for the following types of projects:

- ✓ Mitigation projects that increase resilience and public safety reduce injuries, loss of life, and damage and destruction to property, critical services, facilities, and infrastructure.
- ✓ Examples include housing acquisitions or demolition, flood mitigation measures, structural flood control, and mitigation planning.
- ✓ Priorities include mitigating risks to public infrastructure or community lifelines or using nature-based solutions.
- ✓ Capability and capacity-building (C&CB), such as adopting building codes, project scoping, mitigation planning, planning-related activities, and other activities that improve the administration of mitigation assistance.
- ✓ Non-financial direct technical assistance.

Ineligible projects include:

- ◇ Response communications systems.
- ◇ Emergency support equipment.
- ◇ Vehicles.
- ◇ Projects already in progress.
- ◇ Projects receiving other federal money.

HAZARD MITIGATION GRANT PROGRAM (HMGP)

FEMA's Hazard Mitigation Grant Program provides funding to state, local, tribal, and territorial governments to develop hazard mitigation plans and rebuild in a way that reduces or mitigates future disaster losses in their communities. This grant funding is available after a presidentially declared disaster.

In this program, homeowners and businesses cannot apply for a grant. However, a local community may apply for funding on their behalf.

All state, local, tribal, and territorial governments must develop and adopt hazard mitigation plans to receive funding for hazard mitigation project applications.

The Hazard Mitigation Grant Program (HMGP) may fund projects for:

- ✓ Developing or updating a FEMA-approved mitigation plan to help state, local, tribal, and territorial governments identify risks and plan for ways to reduce vulnerabilities from current and future hazards.
- ✓ Planning-related activities related to updating FEMA-approved Hazard Mitigation Plans, integrating risk assessment or mitigation strategy information from mitigation plans, building capacity through technical assistance, and evaluating the adoption of risk reduction ordinances.
- ✓ Retrofitting existing buildings to make them less susceptible to damage from various natural hazards.
- ✓ Purchasing hazard-prone property to remove people and structures from harm's way.
- ✓ Utility and infrastructure retrofit to reduce the risk of failure caused by natural hazards.
- ✓ Drainage improvement projects to reduce the potential for flood damage.
- ✓ Slope stabilization projects to reduce risk to people and structures.
- ✓ Developing and adopting hazard mitigation plans, which are required for state, local, tribal, and territorial governments to receive funding for their hazard mitigation projects.
- ✓ Using aquifer storage and recovery, floodplain and stream restoration, flood diversion and storage, or green infrastructure methods to reduce the impacts of flood and drought.

Projects must:

- ✓ Be cost-effective.
- ✓ Be a designed project that is both feasible and effective at mitigating the risks of the hazard(s) for which the project.
- ✓ Must comply with all applicable Environmental Planning and Historic Preservation laws and regulations.

FEMA FIREFIGHTERS GRANTS

1. Assistance to Firefighters Grants

The primary goal of the Assistance to Firefighters Grant (AFG) is to meet the firefighting and emergency response needs of fire departments and non-affiliated emergency medical service organizations. Grant helps firefighters and other first responders obtain critically needed equipment, protective gear, emergency vehicles, training, and other resources to protect the public and emergency personnel from fire and related hazards. The AFG Program provides financial assistance directly to eligible fire departments, non-affiliated emergency medical service (EMS) organizations, and State Fire Training Academies (SFTAs) for critical training and equipment. In 2023, FEMA awarded 631 projects totaling \$119.8 million.

FEMA requires a cost share of 5% for the municipalities in Union County and 10% if Union County is the applicant (communities of 20,000 residents and less than 1 million require a 10% match).

2. Staffing For Adequate Fire and Emergency Response (SAFER)

FEMA created The Staffing for Adequate Fire and Emergency Response (SAFER) Grant to provide funding directly to fire departments and volunteer firefighter interest organizations to help them increase or maintain the number of trained, “front line” firefighters available in their communities. SAFER grants aim to enhance the local fire department’s abilities to comply with staffing, response, and operational standards established by the National Fire Protection Association (NFPA) NFPA 1710 or NFPA 1720.

The maximum grant amount is unknown. In 2022, FEMA awarded \$360,000,000 worth of grants to 364 jurisdictions. In 2022, there was no match required.

3. Fire Prevention and Safety

The purpose of the Fire Prevention and Safety (FP&S) Grant Program is to provide critically needed resources to fire departments and non-profit organizations to carry out fire prevention education and training, fire code enforcement, fire/arson investigation, firefighter safety and

health programming, strategic national projects, prevention efforts, and research and development. FEMA used information provided by fire service subject-matter experts to prepare a competitive process. FEMA awards Grants to applicants whose requests best address the priorities of the FP&S Grant Program. The maximum award in 2022 was \$1.5 million, with a 5% match required (cash or in-kind).

SOUTH CAROLINA STATE LAW ENFORCEMENT DIVISION

State Homeland Security Program (SHSP)

The State Homeland Security Program (SHSP) is a core assistance program that provides funds to build capabilities at the State, local, tribal, and territorial levels to enhance national resilience to absorb disruptions and rapidly recover from incidents, both natural and manmade as well as to implement the goals and objectives included in State homeland security strategies and initiatives in their State Preparedness Report (SPR).

FEMA provides funding to the state administrative agency for this program. The South Carolina State Law Enforcement Division is the state administrative agency for the SHSP. The State Law Enforcement Division has included the SHSP funding in the State Homeland Grant Program (SHGP). The County and municipalities can submit applications for this funding to the South Carolina SHGP in February/March each year.

The HSGP supports investments that improve the ability of jurisdictions nationwide to:

- ✓ Prevent a threatened or an actual act of terrorism;
- ✓ Protect citizens, residents, visitors, and assets against the threats that pose the greatest risk to the security of the United States;
- ✓ Mitigate the loss of life and property by lessening the impact of future catastrophic events;
- ✓ Respond quickly to save lives, protect property and the environment, and meet basic human needs in the aftermath of a catastrophic incident or
- ✓ Recover through a focus on the timely restoration, strengthening, accessibility, and revitalization of infrastructure, housing, and a sustainable economy, as well as the health, social, cultural, HSGP historical, and environmental fabric of communities affected by a catastrophic incident, and do so in a manner that engages the whole community while ensuring the protection of civil rights.

FEMA funding guidelines support the five mission areas—Prevention, Protection, Mitigation, Response, and Recovery—and associated core capabilities within the Goal. Allowable investments made in support of the national priorities, as well as other capability-enhancing projects, must have a nexus to terrorism preparedness and fall into the categories of planning, organization, exercises, training, or equipment, aligned to closing capability gaps or sustaining capabilities identified in the THIRA/SPR.

Applicants may use SHSP funds for a range of emergency preparedness and management planning activities, such as those associated with the development, review, and revision of the THIRA, SPR, continuity plans, and other planning activities that support the Goal and placing an emphasis on updating and maintaining a current Emergency Operations Plan (EOP) that conforms to the guidelines outlined in Comprehensive Preparedness Guide (CPG) 101 v2. Planning efforts can also include conducting risk and resilience assessments on increasingly connected cyber and physical systems, on which security depends, using the Infrastructure Resilience Planning Framework and related Cybersecurity and Infrastructure Security Agency (CISA) resources.

Project construction using SHSP funds may not exceed \$1 million or 15% of the grant award. For the limitations on funding levels, Communications towers are not considered construction. All construction of communication towers requires EHP review. When applying for funds to construct communication towers, recipients and subrecipients must submit evidence that the Federal Communication Commission’s Section 106 of the National Historic Preservation Act, Pub. L. No. 89- 665, as amended, the review process has been completed, and submit all documentation resulting from that review to FEMA with a GPD EHP Screening Form and supporting materials for EHP review.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Rehabilitation of High Hazard Potential Dams Grant (HHPD)

The Rehabilitation of High Hazard Potential Dams Grant (HHPD) awards provide technical, planning, design, and construction assistance through grants for rehabilitating eligible high-hazard potential dams. The funding originates from FEMA. FEMA provides the HHPD grant funds to a state or territory with an enacted dam safety program. The State Administrative Agency, or an equivalent state agency, is eligible for the grant. In South Carolina, the state receives the HHPD grant funding from the federal government and distributes it to qualified applicants throughout the state. The South Carolina Department of Health and Environmental Control manages the program for South Carolina.

A High Hazard Potential Dam is a classification standard for any dam whose failure or misoperation will cause loss of human life and significant property destruction.

The following dams are eligible for funding:

- ✓ Located in a state or territory with a dam safety program.
- ✓ Classified as “high hazard potential” by the state/territory dam safety agency in the state or territory where the dam is located.
- ✓ Has an Emergency Action Plan (EAP)-approved state or territory dam safety program or is in conformance with state or territory law and pending approval by the relevant state or territory dam safety agency.
- ✓ Located in a jurisdiction with a FEMA-approved hazard mitigation plan that includes dam risk.

- ✓ Fails to meet minimum state/territory dam safety standards and poses an unacceptable risk to the public.

The following dams are not eligible:

- A Federal Energy Regulatory Commission-licensed hydroelectric dam under a hydropower project with an authorized installed capacity greater than 1.5 megawatts.
- For FY2021 awards and subsequent fiscal years, the licensed hydroelectric dam under a hydropower project with an authorized installed capacity of greater than 1.5 megawatts.
- Federally owned dams.
- Dams built under the authority of the Secretary of Agriculture.

DUKE ENERGY FOUNDATION

Climate Resiliency

The Duke Energy Foundation funds projects under the Climate Resiliency initiative for up to \$20,000 annually. The Foundation accepts applications on a rolling basis. The Duke Energy Foundation webpage provides examples of projects identified under Environmental Resiliency and Natural Disasters.

Examples of environmental resiliency projects that prepare communities for and mitigate against the effects of climate change are:

- ✓ Flood mitigation planning and execution for low-lying communities
- ✓ Piloting new methods for mitigating climate change to scale
- ✓ Education about renewable technologies

Natural disaster preparedness and response Examples:

- ✓ Educating communities, training volunteers, and providing supplies ahead of disasters
- ✓ Providing shelter and basic needs for disaster evacuees
- ✓ Materials and equipment for disaster response for underserved communities

NATIONAL ASSOCIATION OF REALTORS

Rural Outreach Grant

Rural Outreach Grants support state and local REALTOR® association initiatives, including training, forums, events, studies, and ordinance drafting on a wide range of rural issues such as broadband, well and septic, open space preservation, environmental standards, and planning and zoning issues.

The grant also funds natural disaster recovery and prevention through the following activities:

- ✓ Develop disaster prevention (i.e., wildfire safety/prevention) educational materials for Realtors® to distribute to residents and homebuyers.
- ✓ Conduct a public forum/town hall to discuss disaster prevention information.
- ✓ Organize a forum to discuss natural disaster recovery, what's next, and whether or not to rebuild.

Communities can request a Level 2 grant for up to \$7,500. Communities in Union County must contact the local Association of Realtors at the Spartanburg National Realtors Association Office.

CHANGES TO THIS SECTION

- ✓ This section is new.