SECTION -1
INTRODUCTION

I. Introduction

Lancaster County, South Carolina and its incorporated communities prepared this Hazard Mitigation Plan to assess the communities' vulnerabilities to both natural and man-made hazards and prepare a long term strategy to address these hazards and prevent future damage and loss of life. This plan was created through participation from county and municipality officials, residents, and business owners and represents the community's consensus.

II. Background

Lancaster County is situated along the northern central border of South Carolina with North Carolina (as shown in Figure 1-1) and has an area of 555 square miles (1,437 km²). It is bound on the west by the Catawba River and Sugar Creek and on the east by the Lynches River. Lancaster County lies in the Piedmont region of the Carolinas and is comprised largely of relatively low, rolling hills with heights above sea level between 200 feet (50 m) and 800 feet to almost 1,000 feet (250 m to 300 m) with numerous rock formations of different materials and ages intermingled with one another. The soils are generally clay-like and moderately fertile, though some southeastern portions of the county are sandy as the Piedmont transitions into the Sand Hills region. The Sand Hills is a region in the interior of the state comprised of a strip of ancient beach dunes which generally divides the Piedmont from the Coastal Plain of South Carolina.

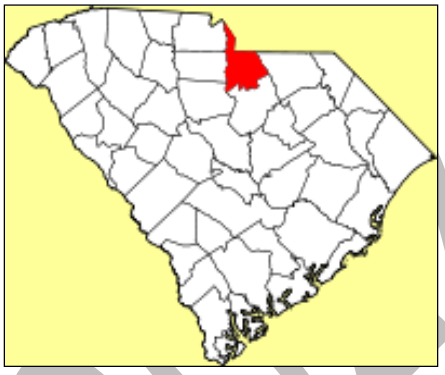


Figure 1-1

Lancaster County has a humid subtropical climate, characterized by hot, humid summers and cool winters. Precipitation does not vary greatly between seasons. July is the hottest month, with an average high temperature of 90 °F (32.2 °C) and an average low temperature of 68 °F (20 °C). The coldest month of the year is January, when the average high temperature is only 53 °F (12 °C) and the average low temperature bottoms out at out at 31 °F (-.6 °C). The record high temperature of 107 °F (42 °C) was recorded in June 1954 and a record low of -4 °F (-20 °C) was recorded January of 1985. The maximum average monthly precipitation occurs in July at 5.05 inches. The average annual rainfall is approximately 45.40 inches with most precipitation occurring from June through October.

Based on U.S. Census data estimates from 2021, Lancaster County is the state's second fastest growing county (by population percentage increase) in 2010 through 2021 with an estimated population increase of 23,684. The 2010 population was 76,652 and the 2021 Census estimates revealed a population of 100,336. This represents an increase of 30.99% from the 2010 population. Where there is population growth, there is usually also significant development; according to Lancaster County Building Department records, there were at least 6,257 building permits issued for houses, group homes, and commercial occupancies between 2014 and 2019.

There are four incorporated communities within the county: The City of Lancaster, the Town of Van Wyck, the Town of Heath Springs and the Town of Kershaw. The City of Lancaster is the County Seat. A map of the county showing the locations of the incorporated communities is provided as Figure 1-2.

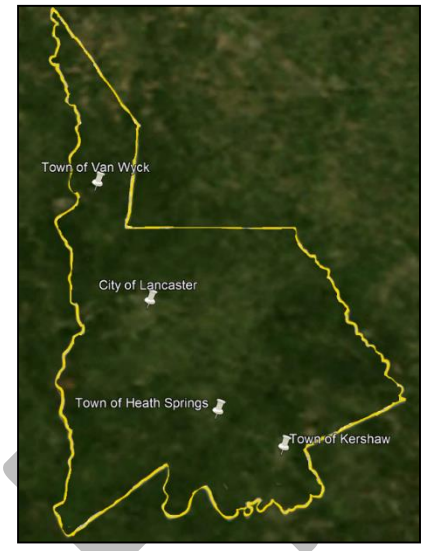


Figure 1-2

Lancaster County is vulnerable to both natural (hurricanes/tropical storm) and technological (hazardous material incidents and cyber-attacks/ viruses) hazards. Hurricane/tropical storms produce the greatest monetary damage; however, the recurrence interval for these storms that directly impact Lancaster County is 14.79 years, making it a relatively rare event. Hail, wind, wildfires, winter storms, tornadoes, and certain man-made or technological incidents are some of the prominent hazards that regularly affect the county, based on past occurrences. Furthermore, its proximity to York County and Charlotte, North Carolina, increases the vulnerability to technological and terrorist hazards. The county's susceptibility to these and several other natural hazards were considered as part of this plan.

III. Planning Process

In order to conduct hazard mitigation planning, a committee was formed consisting of officials from the County, utilities, historical society, school district, higher education, business and economic development, regional government and representatives from each of the participating municipalities. To maximize participation, ensure equal levels of communication, and reduce time lost to travel, all Hazard Mitigation Planning Committee communications, requests for information, sharing of information, and collaboration was completed via electronic means. The most prevalent of these was via e-mail, followed by telephone. Participation in the planning process was defined as reading of e-mails, proof of which is read receipts generated by the opening of emails, and response to information requests contained in said e-mails. Through several mass emails and the return of requested materials and documentation, this Hazard Mitigation Planning Committee developed a countywide Hazard Mitigation Plan.

The committee reviewed the county's vulnerabilities to natural, manmade, and technological hazards and considered a wide variety of ways to reduce and prevent potential damage from these hazards. The committee then worked together to select the most appropriate and feasible mitigation measures.

Because residents are important to the solution, they were involved in the hazard mitigation planning process via a public review process. The plan was made available lobby of the County Administration Building; notifications of this were made on the front page of the County's website and also through the Lancaster County Fire

Rescue/Emergency Management Twitter and Facebook pages. Residents were encouraged to ask any questions and provide any input they wished to bring into the mitigation planning process. Following is a description of the planning process.

IV. Organization

The first step of the hazard mitigation planning process was a comprehensive review of the former hazard mitigation plan. Lists were prepared to verify all represented, discounted, omitted, or otherwise incorrect data. This included a review of the make-up of the existing Hazard Mitigation Planning Committee (HMPC). Members of the Local Emergency Planning Committee (LEPC) were asked to consider serving on the HMPC, since the LEPC is comprised of representatives from utilities, municipality representatives, higher education, and county officials.

The HMPC was convened on March 30th, 2022 to work together to develop the hazard mitigation plan and to conduct a hazard mitigation planning process compliant with Disaster Mitigation Act of 2000 (DMA), Flood Mitigation Assistance (FMA), and Community Rating System (CRS) planning requirements. The HMPC consists of the following representatives from Lancaster County, the City of Lancaster, the Town of Heath Springs, Town of Kershaw and various other public and private entities such as utility companies and historical preservation societies:

Lancaster County Officials
Darren Player – Director, Lancaster County Fire Rescue/Emergency Management
Keith Wilson – Deputy Director, Lancaster County Fire Rescue/Emergency Management
Stuart Barfield – Chief of Operations, Lancaster County Emergency Management
Mike Magette – Fire Marshal, Lancaster County Fire Rescue
Clay Catoe – Director, Lancaster County EMS
Jeff Catoe – Director, Lancaster County Public Works
Shannon Catoe - Director, Lancaster County Zoning
Darin Robinson Certified Building Official, Lancaster County Building Department
Rox Burhans – Director, Lancaster County Planning Department

City of Lancaster Officials
Steven “Flip” Hutfles – Administrator, City of Lancaster
Justin McLellan – Fire Chief, City of Lancaster Fire/Rescue
Rendell Mingo – Director, City of Lancaster Public Works
Lewis Streater – Building Official, City of Lancaster Building and Zoning

Town of Heath Springs
Jason Truesdale – Administrator, Town of Heath Springs
Eddie Moore – Mayor, Town of Heath Springs

Town of Kershaw
Ryan McLemore – Town Administrator, Town of Kershaw
Mark Dorman – Mayor, Town of Kershaw

Town of Van Wyck
Sean Corcoran – Mayor, Town of Van Wyck

School District and Higher Education
David Small – Director of Facilities, Lancaster County School District
Dr. John Rutledge – Director of Law Enforcement and Security and Instructor of Criminal Justice, University of South Carolina – Lancaster

Utility Representatives
Tyson Blanton - District Manager, Duke Energy, Government and Community Relations
Brad Bucy - District Manager, Lancaster County Water and Sewer District
Greg Jordan – Vice President of Engineering and Operations, Lynches River Electric Co-Op
Rocky Hudson – General Manager, Lancaster County Natural Gas Authority
Tim Hallman – Residential Services Manager, Comporium Communications

Business and Economic Development
Jamie Gilbert – Director, Lancaster County Economic Development
John McCain – President, Lancaster County Chamber of Commerce

V. Data Collection

Development of the mitigation plan began with data collection. With the last version of this plan, exhaustive research was conducted by community, county, state, and federal agencies to compile data on previous natural and man-made hazardous events, projected frequencies of future occurrences/the anticipated risk where available, and asset (structure, utility, and transportation systems) inventory information. For this 2022 update, many of the same data sources and some newly discovered ones were used to add in new event occurrences. Historical information and data from the previous plan revision were carried over into this update to maintain sufficient background for the plan.

Policy and regulatory information from each of the communities and the county was collected. This included comprehensive plans, zoning ordinances, development ordinances, and building code requirements as well as the current approved Hazard Mitigation Plan. Information was collected from the Lancaster County Building and Zoning, GIS Department, and Lancaster County and City of Lancaster Public Works. Several state agencies were contacted including the South Carolina Emergency Management Division, the Department of Natural Resources, the Department of Health and Environmental Control, the Forestry Commission, and the Geologic Survey. The University of South Carolina Hazards Research Lab was also determined to be a valuable source of information as well as NASA's Global Warming Sector.

VI. Hazards and Vulnerabilities Assessment

The HMPC worked to complete a hazard identification and vulnerability assessment for the entire county. This process allowed the committee to analyze the county's greatest hazard threats and to determine its most significant vulnerabilities. The Hazard

Identification and Vulnerability Assessment were performed in large part using GIS data as well as federal and state sources.

At the March 30, 2022 HMPC meeting, a discussion was held to determine what parameters should be placed on the planning process for the HMPC. It was determined that the HMPC should focus on natural hazards as well as adding, for the 2022 rewrite, a new section that defines the categories of the following manmade hazards: dam failures, hazardous material releases, train derailments, infrastructure failures, water/sewer system disruption, cyber-attacks, and power system failures. A corresponding disaster threats approach was used in this process (Appendix 5). Increased population and industry growth in Lancaster County necessitated the inclusion of these hazards, as their risks to the population and property in the county are just as tangible and real as risks associated with natural hazards previously mentioned in the plan.

VII. Mitigation Plan Development

A Capability Assessment was performed whereby the existing programs and policies addressing natural, manmade and technological hazards were reviewed. A thorough analysis of the adequacy of existing measures was performed and potential changes and improvements were identified. Lancaster County Emergency Management (LCEM) worked with the response from questionnaires as well as follow-up telephone calls and emails with various committee members to establish an overall Capability Assessment.

During the previous major planning revision, LCEM had worked through the Capability Assessment and Hazard and Vulnerability Assessment to identify goals and objectives for countywide mitigation efforts. LCEM also worked to identify and develop mitigation action plans. For this plan revision period, these goals were presented to the HMPC for review, comment, revision, if necessary, and prioritization. These goals represent the county and communities' vision for disaster resistance.

Everything that could affect hazard event-related damage in the county was considered by the HMPC. Every effort was made to ensure not only that relevant activities were considered, but also that the process was not limited to just a few alternatives. After much discussion, HMPC drafted an "action plan" that specifies recommended projects, who is responsible for implementing them, and when they are to be completed. During this revision period, this action plan was reviewed and updated as necessary to reflect progress made on projects, as well as relevancy of projects.

This plan recommends mitigation measures that should be pursued. Implementation of these recommendations depends on adoption of this plan by the County Council and each of the municipalities and the cooperation and support of the offices and contacts designated as being responsible for each action item.

VIII. Plan Review and Maintenance

Lancaster County Emergency Management serves as the lead agency for the HMPC and will work with the HMPC to monitor the implementation the plan and as part of the HMPC, will perform annual reviews of this plan. As representatives of the various jurisdictions covered in this plan, it is the responsibility of members of the HMPC to report the implementation of projects or activities related to Hazard Mitigation to the committee.

The annual evaluation will assess current hazards and vulnerabilities, goals and objectives of the current plan, implementation problems with the current plan, progress and outcomes of projects, and participation of the members of the HMPC. The results of these annual evaluations will serve as the basis for a complete update of this plan every five years. The HMPC will hold annual public meetings to review the plan and solicit citizen comments.

IX. Funding Sources for Mitigation

The committee had to become familiar with potential funding sources for each project identified during the planning process. Several federal and state funding sources were identified by the committee. The previous plan identified the Severe Repetitive Loss (SRL) and the Repetitive Flood Claims (RFC) programs; these programs have since been retired by FEMA. The following is a summary of the potential funding sources identified.

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance (FMA)
- Building Resilient Infrastructure and Communities (BRIC) Program

Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, United States Code (U.S.C.) 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. The amount of HMGP funding available to the Applicant is based upon the estimated total Federal assistance to be provided by FEMA for disaster recovery under the Presidential major disaster declaration.

The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). The National Flood Insurance Fund provides funding for FMA. Both PDM and FMA programs are subject to the availability of appropriation funding, as well as any program specific directive or restriction made with respect to such funds.

The Hazard Mitigation Grant Program (HMGP) may provide funds to States, Territories, Indian Tribal governments, local governments, and eligible private non-profits following a Presidential major disaster declaration. The Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) programs may provide funds annually to States, Territories, Indian Tribal governments, and local governments. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to natural hazards.

The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Authorized under Section 404 of the Stafford Act and administered by FEMA, HMGP was created to reduce the loss of life and property due to natural disasters. The program enables mitigation measures to be implemented during the immediate recovery from a disaster.

Hazard Mitigation Grant Program funding is only available to applicants that reside within a presidentially declared disaster area. Eligible applicants are

- State and local governments
- Indian tribes or other tribal organizations
- Certain non-profit organizations

Individual homeowners and businesses may not apply directly to the program; however a community may apply on their behalf.

HMGP funds may be used to fund projects that will reduce or eliminate the losses from future disasters. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. Examples of projects include, but are not limited to:

- Acquisition of real property from willing sellers and demolition or relocation of buildings to convert the property to open space use
- Retrofitting structures and facilities to minimize damages from high winds, earthquake, flood, wildfire, or other natural hazards
- Elevation of flood prone structures
- Development and initial implementation of vegetative management programs
- Minor flood control projects that do not duplicate the flood prevention activities of other Federal agencies
- Localized flood control projects, such as certain ring levees and floodwall systems, that are designed specifically to protect critical facilities
- Post-disaster building code related activities that support building code officials during the reconstruction process

The amount of funding available for the HMGP under a particular disaster declaration is limited. The program may provide a State with up to 15 percent of the first $2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between $2 billion and $10 billion, and up to 7.5 percent for amounts between $10 billion and $35.333 billion of funds released to states by FEMA. States that meet higher mitigation planning criteria may qualify for a higher percentage under the Disaster Mitigation Act of 2000.

FEMA can fund up to 75% of the eligible costs of each project. The State or grantee must provide a 25% match, which can be fashioned from a combination of cash and in-kind sources. Funding from other Federal sources cannot be used for the 25% share with one exception. Funding provided to States under the Community Development Block Grant program from the Department of Housing and Urban Development can be used to meet the non-federal share requirement.

According to the FEMA website, there are five issues you must consider when determining the eligibility of a proposed project.

- Does your project conform to your State's Hazard Mitigation Plan?
- Does your project provide a beneficial impact on the disaster area, i.e. the State?
- Does your application meet the environmental requirements?
- Does your project solve a problem independently?
- Is your project cost-effective?

HMGP funding is allocated using a “sliding scale” formula based on a percentage of the estimated total Federal assistance under the Stafford Act, excluding administrative costs for each Presidential major disaster declaration. Applicants with a FEMA-approved State or Tribal Standard Hazard Mitigation Plan may receive:

- Up to 15 percent of the first $2 Billion of the estimated aggregate amount of disaster assistance;
- Up to 10 percent for the next portion of the estimated aggregate amount more than $2 Billion and up to $10 Billion; and
- 7.5 percent for the next portion of the estimated aggregate amount more than $10 Billion and up to $35.333 Billion

Applicants with a FEMA-approved State or Tribal Enhanced Hazard Mitigation Plan are eligible for HMGP funding not to exceed 20 percent of the estimated total Federal assistance under the Stafford Act, up to $35.333 Billion of such assistance, excluding administrative costs authorized for the disaster.

Under the HMA programs, the total cost to implement approved mitigation activities is generally funded by a combination of Federal and non-Federal sources. The non-Federal share must be an eligible cost used in direct support of the approved activities under the grant award. Contributions of cash, in-kind services or materials, or any

combination thereof, may be accepted as part of the non-Federal cost share. For FMA, not more than one half of the non-Federal contribution may be provided from in-kind contributions.

Eligible applicants must apply for the HMGP and PDM through the South Carolina Emergency Management Division – Recovery and Mitigation Group.

FEMA's Flood Mitigation Assistance Program (FMA) provides grants to states and communities for planning assistance and mitigation projects that reduce the risk of flood damage to structures covered by flood insurance. The types of grants available include planning and project assistance. FMA monies are available to eligible applicants when a Flood Mitigation Plan has been developed and FEMA has approved it.

FEMA may contribute up to 75 percent of the total eligible costs. At least 25 percent of the total eligible costs must be provided by a nonfederal source. Of this 25 percent, no more than half can be provided as in-kind contributions from third parties. There are limits on the frequency of grants and the amount of funding that can be allocated to a State or community in any 5-year period. The South Carolina Department of Natural Resources (SCDNR) serves as the administrator of the planning and projects portions of the grant. The State's FMA Coordinator is within the Land, Water and Conservation Division of SCDNR. The agency's web page is www.dnr.sc.gov.

Building Resilient Infrastructure and Communities (BRIC) Program

The Federal Emergency Management Agency's (FEMA's) Bric program is designed to support states, local communities, tribes and territories in hazard mitigation projects. The overall goal of this program is to reduce the risks that states, local communities, tribes and territories can be exposed to from natural disasters and hazards.

The guiding principles for the BRIC program reflect FEMA's guiding principles. "The principles are to support communities through capability-and-capacity building. This type of building enables innovation, supports larger projects, promotes partnerships, maintains flexibility, and provides consistency." The BRIC program also supports FEMA's priorities because it builds a culture of preparedness, prepares that nation for catastrophic disasters, and reduces complexities associated with emergency planning. Some examples of mitigation projects that would be supported by BRIC include, but are not limited to, housing acquisitions or demolitions, flood mitigation measures, structural flood control, and mitigation planning. Examples of capability-and-capacity-building include adopting building codes, project scoping, mitigation planning, and other activities that improve the administration of mitigation assistance. Examples of ineligible projects are communications systems, emergency support equipment, vehicles, and projects that are already in progress or already receiving other federal money.

The BRIC program grants have a 75-percent/ 25-percent federal/ non-federal cost share. FEMA encourages the use of public-private-sector partnerships to meet the non-federal cost share. The program also provides management cost coverage up to 5%. This portion of the program can be requested for eligible grant administration expenses and if approved, the costs are reimbursed at a 100% federal share.

In total, there is $1 billion available in BRIC funding for the 2021 fiscal year. The application for the 2021 fiscal year opens on September 30, 2021 and closes January 28, 2022 at 3 p.m. ET. This fiscal year's application process utilizes FEMA Go and requires sub applications to be submitted with the original application. After application, submissions undergo a rigorous selection process. There were only 22 projects selected nationwide to receive a portion of the BRIC grant for the 2020 fiscal year. These projects were based on a composite scoring system. The selected projects fell into seven categories of project type: elevation, flood control, flood proofing, relocation, safe room/shelter, utility and infrastructure protection, and wildfire management. Project selections for the 2021 fiscal year should be available by the Summer of 2022. Information pertaining to FEMA's BRIC program can be found at https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities and locally at https://www.scemd.org/recover/mitigation/bric-frequently-asked-questions/ .

X. Changes from the Last Plan

Due to the last update of this plan being in 2017, Census data was updated to reflect the data presented in the 2021 Census estimates. Some of the population values were estimated by the US Census Bureau due to COVID-19 interruptions. The weather related averages included in the introduction section were updated to reflect current values found on the NOAA database. All contact information was updated in relation to employment changes The Town of Van Wyck was incorporated in the Summer of 2018, so the Town of Van Wyck was added to incorporated areas. In addition to these changes, the HUD CDBG section was replaced with the BRIC program.

SECTION - 2
HAZARD IDENTIFICATION

I. Hazard Identification - Introduction

Lancaster County performed a Hazard Identification Analysis to determine the hazards the County faces. To perform this process, existing sources of hazard frequency data were researched including South Carolina Emergency Management Division's State of South Carolina Hazards Assessment, University of South Carolina's 2013 Hazard Assessment Profile, South Carolina Department of Natural Resources - South Carolina State Climatology Office, State Climate Office of North Carolina, Flood Insurance Rate Maps (FIRMs), FEMA publications, FEMA's National Risk Index, Department of Agriculture Forest Service wildfire risk maps, USGS earthquake and landslide risk maps, State of South Carolina erosion information, data from the South Carolina Forestry Commission (SCFC), the National Oceanographic and Atmospheric Administration (NOAA),and wind and climatic data. Additionally, historical hazard events were researched through news publications as well as state and federal agency information provided on the internet to determine their effects on the County and their probability of recurrence. Finally, flood insurance policy information was obtained from the state. The Hazard Identification process was used to identify those hazards that pose the greatest risk to the County and warrant further analysis through the vulnerability assessment.

In addition to natural hazards, this Hazard Identification also includes an overview of the man-made hazards that Lancaster County faces from day to day. Technological hazards, such as dam failures, water/sewer system disruption, hazardous material releases, power system failures, train derailments, electromagnetic pulses (EMP), or infrastructure failures are not always weather-related, but they can all pose similar and significant risks to the population of the county. It is also not uncommon for natural weather-related events to interfere with the operation of man-made equipment or facilities and cause a hazardous incident to occur. When combined in this manner, these two categories of hazardous events can place great stress on the agencies and individuals involved in their mitigation.

II. Climate Change

Despite debate about the cause, evidence shows that Earth is undergoing a climate change. While climate change is not considered in this plan to be an independent hazard to Lancaster County, evidence shows that there is a correlation between rising global temperatures and the occurrence of severe weather events. For millions of years, the planet has been subject to regular naturally occurring cycles of temperature fluctuation, but in the past 250 years, a great deal of consensus exists that humans may have exacerbated the effects of these cycles.

Since the mid-eighteenth century, industrial and societal expansion has been artificially increasing naturally occurring greenhouse gases such as methane, carbon dioxide, and nitrous oxide. If the rising global temperatures were brought about because of increased solar radiation alone, the upper levels of the atmosphere would be warmed before the lower levels, unlike the case today. According to NASA, since

1980, temperatures in the upper atmosphere have actually decreased in response to a decreased number of sunspots. In the lower atmosphere however, temperatures are rising in relation to increased greenhouse gases.

In Lancaster County, severe weather events have been increasing since 1950. Using records from 1854 onward, including NOAA data, to group weather events by decade, it was found that the frequency of flooding, hail storm, ice storm, thunderstorm, and winter storm events has increased, coinciding with increasing average temperatures across the country. Interestingly, in the decade of 2000-2009, there were 95 total severe weather events. From 2010-2020, there have been 201 severe weather events. In one decade, the amount of severe weather events has increased by 111%. This is a tremendous increase considering the amount of damage that can occur with this number of additional storms.

According to NASA's Global Climate Change website in 2021, a portion of the carbon dioxide, one of the greenhouse gases that raises temperatures, is beneficial as a fertilizer. However, this increase in carbon dioxide is only beneficial in moderation. Each year the amount of CO_2 is increasing in response to the amount of fossil fuels that are being burned. According to NASA, this increase is allowing crops to grow faster and bigger, but the amount of protein and micronutrient content in the crops are proportionally lower. In addition to this, the heat associated with climate change is affecting the growth patterns and life cycles of certain crops like grains, causing the plants to mature more rapidly than normal. This maturation speed increase can lead to fewer grains and smaller crop yields because the plant will not have spent as much time building up leaves and collecting the sunlight needed for proper growth

Increasing temperatures, the driving force behind changing weather patterns, have coincided with increased reported severe weather events. If this trend continues, the county will face more severe weather in the future. These conclusions have been made with the understanding that unreported severe weather events in the past could artificially intensify the positive correlation between temperature and severe weather. Still, industry, population, and thru-county traffic continue to grow and the effects of more severe weather bring greater risk to life, property, and economy in Lancaster County.

III. High Wind

High Winds are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. A high wind watch is issued when high wind conditions are expected to develop in the next 12 to 36 hours. Sometimes it will be issued late in the first forecast period - 6 to 12 hours - if the potential for high wind exists but there is some uncertainty. High wind advisories in South Carolina are normally included as part of some other watch or warning such as severe thunderstorm, nor'easters, tropical storm, or tropical depressions. According to FEMA's Risk Index, Lancaster County is at a relatively moderate risk for strong winds at a score of 20.09 out of 100. Note that this score is calculated using

FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience. This score is an estimate of the effect that a certain type of disaster will have on Lancaster County.

A microburst is a localized column of sinking air, producing damaging divergent and straight-line winds at the surface that are similar to, but distinguishable from, tornadoes, which generally have convergent damage. A microburst will typically have an affected outflow area of less than 2½ miles wide and peak winds lasting less than 5 minutes. A microburst may induce dangerous horizontal/vertical wind shears, which can adversely affect aircraft performance and cause property damage.

A distinction can be made between a wet microburst which consists of precipitation and a dry microburst which consists of virga, or wisps of precipitation falling from a cloud but evaporating before reaching the ground. They generally are formed by precipitation-cooled air rushing to the surface, but could also be powered from the high speed winds of the jet stream deflected to the surface in a thunderstorm. Microbursts are recognized as capable of generating wind speeds higher than 168 mph.

Macrobursts are also possible in certain storm systems. A macroburst is a convective downdraft with an affected outflow area of at least 2½ miles wide and peak winds lasting between 5 and 20 minutes. Intense macrobursts may cause tornado-force damage of up to F3 intensity.

Hurricanes, tropical storms, tropical depressions, and nor'easters by definition bring high winds which can cause significant damage. These systems, with winds from 39 miles per hour and exceeding 155 miles per hour, should all include the hazard of high winds when considering their potential destructive power.

The strongest winds that Lancaster County has experienced were results of tropical storm systems. Hurricane Hugo hit Lancaster County in September of 1989 as a category two hurricane. Its winds reached speeds of up to 97.8 miles per hour. During Hurricane Michael in October of 2018 wind speeds reached 51.7 miles per hour. During Hurricane Hugo, South Carolina lost 5,000 homes and another 8,000 were damaged. Some residents faced power outages that spanned weeks and debris blocked roads long after the storm had cleared. During Michael of 2018, Lancaster experienced over 11 roads blocked by downed trees and power outages. A vast majority of damaging wind events in Lancaster County were the result of either thunderstorms or tropical cyclones and damage details are covered in the following sections. It is assumed that as the occurrence of these storms will increase over time, the damaging winds they cause will increase in frequency as well.

IV. Tropical Cyclones

Hurricanes, tropical storms and tropical depressions are all tropical cyclones which are defined by the National Weather Service's National Hurricane Center (NHC) as

warm-core non-frontal synoptic-scale cyclones, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center. According to the NHC, once they have formed, tropical cyclones maintain themselves by extracting heat energy from the ocean at high temperatures and releasing heat at the low temperatures of the upper troposphere. Hurricanes and tropical storms bring heavy rainfalls, storm surge, and high winds, all of which can cause significant damage. These storms can last for several days, and therefore have the potential to cause sustained flooding, high wind, and erosion conditions. These types of storms are classified by the National Weather Service using the Saffir-Simpson Hurricane Scale, which uses wind speed and barometric pressure data to predict potential property damage and flood levels. Table 2-1 illustrates the Saffir-Simpson scale.

CATEGORY	SUSTAINED WIND SPEED (MPH)	SURGE (FT)	PRESSURE (Mb)	TYPICAL DAMAGE
Tropical Depression	<39	-	-	
Tropical Storm	39-73	-	-	
Hurricane 1	74-95	4-5	> 980	Minimal
Hurricane 2	96-110	6-8	965-980	Moderate
Hurricane 3	111-129	9-12	945-965	Extensive Damage
Hurricane 4	130-156	13-18	920-945	Devastating Damage
Hurricane 5	> 157	> 18	< 920	Catastrophic Damage

Minimal	Moderate	Extensive Damage	Extreme Damage	Catastrophic Damage
Damage is done primarily to shrubbery and trees, unanchored manufactured homes are damaged, some signs are damaged, no real damage is done to structures on permanent foundations.	Some trees are toppled, some roof coverings are damaged, and major damage is done to manufactured homes.	Large trees are toppled, some structural damage is done to roofs, manufactured homes are destroyed, and structural damage is done to small homes and utility buildings.	Extensive damage is done to roofs, windows, and doors; roof systems on small buildings completely fail some curtain walls fail.	Roof damage is considerable and widespread, window and door damage is severe, there are extensive glass failures, some buildings fail completely. Many mobile homes will be completely destroyed in addition to a high percentage of frame homes and apartment buildings.

Table 2-1. Saffir-Simpson Scale and Typical Damages Due to Hurricane Winds

Nor'easters are extratropical storms occurring during the period from late fall to early spring that affect the east coast of the U.S. Low pressure systems develop off the east coast that lead to storms that bring strong northeast winds and heavy

rains/precipitation. Although nor'easters' winds might be less intense than that of hurricanes, nor'easters can hover for several days over a given area. This kind of long duration storm allows larger accumulations of precipitation as well as more damage to structures as they are exposed to wind and flooding for long periods of time. These types of storms are so massive they affect all jurisdictions within the entire county equally.

A. Past Occurrences of Tropical Cyclones

A search of historical records shows that sixty-seven tropical cyclones have passed either directly over or within fifty miles of Lancaster County since 1851. Table 2-2 shows the number and types of storms that passed directly over Lancaster County from 1850 through 2021. Local newspapers archives, Monthly Weather Review archives, Stormpulse.com, National Hurricane Center, and other sources were used to compile this record.

Hurricanes that pass in relatively close proximity to Lancaster County can also have an impact upon Lancaster County. Therefore, an analysis of storms passing through or within 50 miles of the County was also performed. These storms are listed in Table 2-3.

Tropical Cyclones Passing Directly over Lancaster County Since 1851	
10	Hurricanes
5	Tropical Storms
1	Tropical Depressions

Table 2-2

Tropical Cyclones within 50 Miles of Lancaster County	
41	Hurricanes
24	Tropical Storms
2	Tropical Depressions

Table 2-3

The following storm events are those that affected Lancaster County and could be verified by at least two sources.

Storm Name	Date	Classification	Max Category	Category at Lancaster Impact
Number 2	9/9/1854	Hurricane/T.S.	Category 3	Tropical Storm
Number 5	9/16/1859	Hurricane/T.S.	Category 1	Tropical Storm
	10/4/1877	Tropical Storm	Category 3	Tropical Storm
	9/12/1878	Tropical Storm	Category 2	Tropical Storm
	9/10/1882	Hurricane/T.S.		
Number 2	9/11/1882	Hurricane/T.S.	Category 3	Tropical Storm
	10/12/1885	Tropical Storm	Tropical Storm	Tropical Storm
	6/22/1886	Tropical Storm	Category 2	Tropical Storm
	7/1/1886	Tropical Storm		
	10/20/1887	Tropical Storm	Category 1	Tropical Depression
	9/10/1888	Tropical Storm	Tropical Storm	Tropical Storm
Number 6	9/24/1889	Hurricane/T.S.	Cateogry 2	Tropical Storm
Number 6	8/28/1893	Hurricane	Category 3	Category 2
	10/4/1893	Tropical Storm	Category 4	Tropical Storm
	9/29/1896	Hurricane	Category 3	Category 2
Number 1	6/15/1902 - 6/16/1902	Tropical Storm	Tropical Storm	Tropical Storm
	9/14/1904	Tropical Storm		
	10/23/1908	Tropical Storm		
	8/30/1911	Tropical Storm		
	6/14/1912	Tropical Storm		
Number 1	8/3/1915	Tropical Storm		
	10/3/1927	Tropical Storm		
	8/11/1928	Tropical Storm		
	10/22/1929	Tropical Storm		
	9/5/1935	Tropical Storm		
Number 5	10/8/1946 - 10/9/1946	Tropical Storm	Category 2	Tropical Storm
Able	8/31/1952	Hurricane	Category 2	Category 1
Cindy	7/4/1959-7/12/1959	Tropical Depression	Category 1	Tropical Storm
Gracie	9/30/1959	Hurricane	Category 4	Category 1
Cleo	8/30/1964	Hurricane/T.S.	Category 4	Tropical Depression
Alma	5/26/1970	Hurricane/T.D.	Category 1	Tropical Storm
Babe	9/8/1977	Hurricane/T.D.	Category 1	Tropical Depression
David	9/5/1979	Hurricane	Category 5	Tropical Storm
Bob	7/25/1985	Hurricane	Category 1	Tropical Storm
Chris	8/28/1988	Tropical Storm	Tropical Storm	Tropical Storm
Hugo	9/22/1989	Hurricane	Category 5	Category 2
Marco	10/12/1990	Tropical Storm		
Danny	7/19/1997 - 7/20/1997	Hurricane	Category 1	Tropical Depression
Jeanne	9/13/2004-9/29/2004	Tropical Depression	Category 3	Tropical Depression
Alberto	6/14/2006	Tropical Storm	Tropical Storm	Tropical Depression
Fay	8/21/2008 - 8/26/2008	Tropical Storm		
Michael	10/6/2018-10/15/2018	Tropical Storm	Category 5	Tropical Storm
Bertha	5/27/2020-5/28/2020	Tropical Depression	Tropical Storm	Tropical Depression

Table 2-4

Hurricane Hugo – September 22, 1989

Hugo had a lasting and devastating effect on Lancaster County. Thousands of citizens were without power, many for weeks after the storm. Schools and businesses were shut down and commodities such as canned foods, gasoline, batteries, and ice were in short supply. Damage to tree crops, electrical utilities, and structures was extensive as this was the most intense storm of recent memory.

Hurricane Hugo formed over the eastern Atlantic near the Cape Verde Islands on September 9, 1989. Hugo moved thousands of miles across the Atlantic, rapidly strengthening to briefly attain category 5 hurricane strength. It later crossed over Guadeloupe and St. Croix on September 17 as a category 4 hurricane. Weakening slightly more, Hurricane Hugo passed over Puerto Rico as a strong category 3 hurricane. Further weakening occurred several hours after re-emerging into the Atlantic, becoming downgraded to a category 2 hurricane. Hurricane Hugo re-strengthened into a category 4 hurricane before making landfall in South Carolina on September 22.

In Lancaster County, Hugo wreaked havoc on both the manmade and natural environments. Data from the National Hurricane Center and the National Weather Service indicates that winds in Lancaster County reached an estimated speed of over 80 miles per hour. According to a New York Times article from November 12, 1989, over 8,000 homes were damaged in the county. USDA Forest Service data shows that Lancaster County lost 35% of its softwood timber inventory, over double that of the 14% loss over the entire state of South Carolina. Crop and property losses in Lancaster County exceeded $100 million.

B. Future Probabilities of Hurricanes, Tropical Storms, and Tropical Depressions

In order to estimate the frequency of occurrence, the number of hurricanes is compared to the length of the period of record which is 1850-2021. The recurrence interval is defined from this information and is a rough estimate of the amount of time, on average, during which one occurrence of a given storm will take place. It is important to note that in reality, a storm can occur multiple times during one recurrence interval, and that the recurrence interval is only an estimated average time period. According to FEMA's Risk Index, Lancaster County is at a relatively moderate risk for hurricanes at a score of 12.86 out of 100. Note that this score is calculated using FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience. This score is an estimate of the effect that a certain type of disaster will have on Lancaster County. Recurrence intervals for hurricanes and tropical storms within and in the vicinity of Lancaster County are presented in Table 2-5.

STORM TYPE	NUMBER OF OCCURRENCES WITH CENTER OF STORM TRACK WITHIN 50 MILES OF LANCASTER COUNTY	RECURRENCE INTERVAL (years)	Chance per Year of Recurrence	NUMBER OF OCCURRENCES WITH CENTER OF STORM TRACK IN LANCASTER COUNTY	RECURRENCE INTERVAL (years)	Chance per Year of Recurrence
HURRICANE	3	57	1.75 %	1	171	.5%
TROPICAL STORM	23	7.4	13.45 %	7	4.43	4.09 %
TROPICAL DEPRESSION	17	10.06	9.9%	4	42.75	2.3 %

Table 2-5

The average number of tropical cyclones, including hurricanes, that directly affect Lancaster County has been following a slight decreasing trend since the beginning of the records used for this document. While the decade between 1880 and 1889 saw a large number of tropical events, the trend is still decreasing if data from this decade is excluded. Figure 2-1 shows this trend with data from all years included.

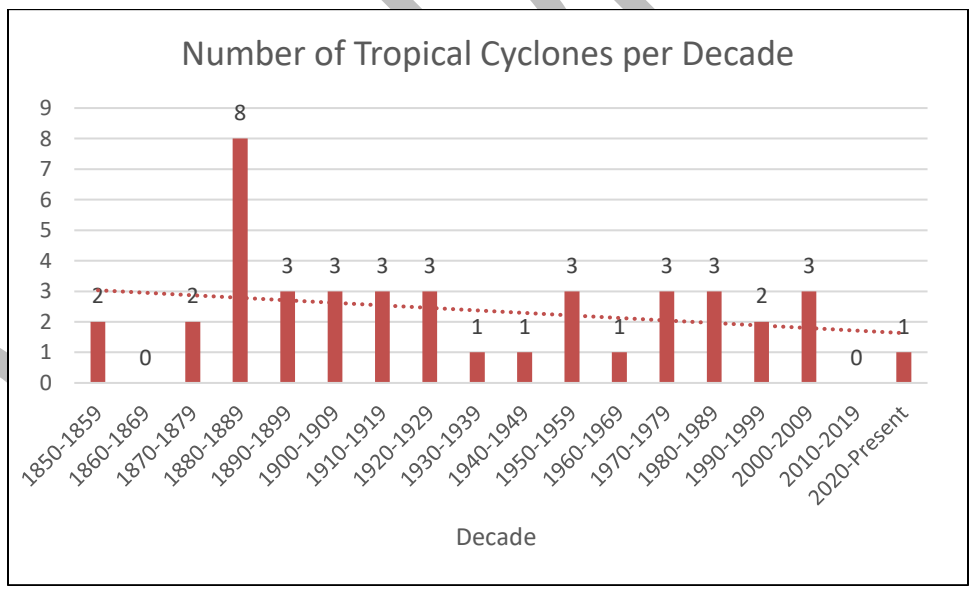


Figure 2-1

V. Severe Thunderstorms

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 one inch in diameter, or produce tornadoes. In order to form, thunderstorms simply require moisture to form clouds and rain, coupled with an unstable mass of warm air that can rise rapidly. Thunderstorms affect relatively small areas when compared with 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 year in the United States only about 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 capable of threatening 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 and causes an average of 39 deaths per year in the United States.

A. Past Occurrences of Severe Thunderstorms

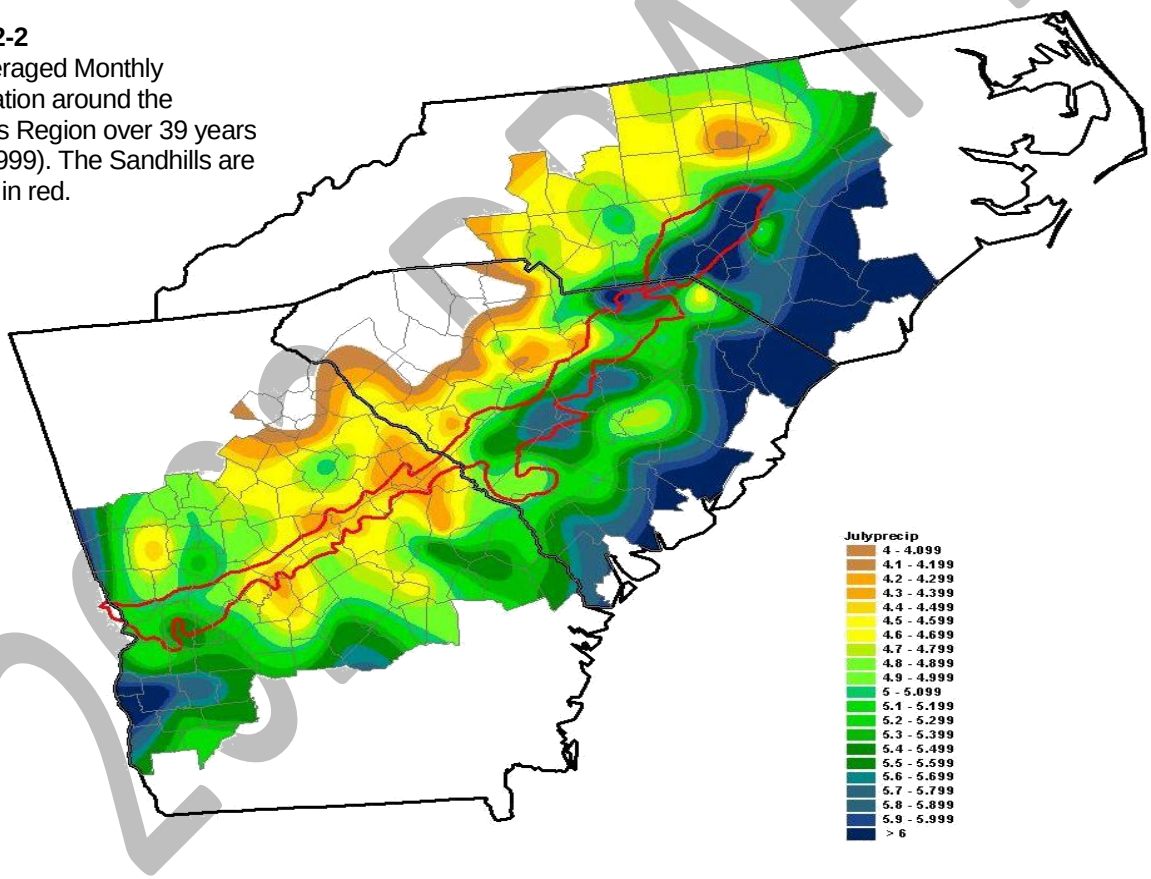
Thunderstorms are fairly common in South Carolina, and severe storms bring increased risk to property and life. According to National Oceanic and Atmospheric Administration's (NOAA) National Environmental Satellite Data and Information Service's (NESDIS) National Climatic Data Center (NCDC), there have been 345 severe thunderstorm events reported in Lancaster County between January 1, 1950 and December 31, 2021. These severe thunderstorm events include high winds and hail. These storms resulted in $2,086,900 in property damages, $150,400 of crop damages, 12 injuries, and one death. The average hail size for these events was 1.1" and the maximum hail size was 2.75" in May 2014. This average hail size is a decrease from 1.17'' in 2016. The average wind speed for these storms was 54.83 mph with a maximum of 104.7 mph on May 5, 2020. We have seen a significant increase in wind speed since 2016.

While this is the most comprehensive list of storm events used for this plan, there may be some inaccuracy based on a lack of adequate reporting in earlier years. For example, from 1950 to 1990, there were only 22 severe thunderstorms reported. There were no severe thunderstorms reported from 1950 to 1960. Despite a general increase in the number of severe weather events the past few decades, these low numbers in earlier years can most likely be attributed to poor reporting techniques at the time or a lack of historic record from which to draw data. Over the past five years, however, there have been an average of over sixteen severe thunderstorms per year, nearly all of which caused thousands of dollars in damage.

B. Future Probabilities of Severe Thunderstorms

According to the State Climate Office of North Carolina thunderstorms occur more frequently in the Sandhills Region of North and South Carolina. The Carolina and Georgia Sandhills region of the Southeast is an elongated area of sandy soil that is located adjacent to regions of varying soil type. (See Figure 2-2) The Piedmont area to the northeast has soils that are mainly loam and clay-loam, while a variety of soil types exists in the Coastal Plain to the southeast. It is the differences in these soil types that create differential heating of the ground surface. The sandy soil regions allow an easier release of moisture into the air and, since the sandy soil absorbs less heat than the loamy or clay soils, solar heat energy heats the ground itself more than it evaporates the moisture from the ground. In short, given the same amount of energy, sandy soil would increase in temperature more than the loam or clay soils.

Figure 2-2
July Averaged Monthly Precipitation around the Sandhills Region over 39 years (1960-1999). The Sandhills are outlined in red.



These differential surface heating patterns create mesoscale circulations, causing clouds to form. Eventually, if conditions are right, thunderstorms will also form along the boundaries of these areas. By examining climatological precipitation in this and surrounding areas, the effects of the Sandhills region topography can be investigated. A period of 40 years was used to average the precipitation for 120 stations located within 50 miles of the Sandhills. Because surface heating is greatest during the summer months, these months are of most interest. Rainfall during the summer in the

Carolinas and Georgia is mainly the result of thunderstorm activity, so any increase in activity would be more clearly seen during this season. Lancaster County's southern and eastern borders are along the area defined as the Sandhills. According to FEMA's Risk Index, Lancaster County is at a relatively moderate risk for lightning at a score of 17.28 out of 100. Lancaster County is at a relatively low risk for hail events at 10.87. Note that this score is calculated using FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience.

Climate change is also affecting surface heating in that, due to a generally warmer atmosphere, there is less heating required at the ground level to reach temperatures required for thunderstorm formation. As global temperatures continue to rise, it can be expected that the number of thunderstorms each year will rise in correlation.

Based on the frequency of past events, the occurrence of future events can be predicted. In order to estimate the frequency of occurrence, the number of severe thunderstorms is compared to the length of record which is from 1950-2021. The recurrence interval is derived from this information and is a rough estimate of the amount of time, on average, during which one occurrence of a given storm will take place. It is important to note that in reality, a storm can occur multiple times during one recurrence interval, and that the recurrence interval is only an estimated average time period. Recurrence intervals for severe thunderstorms within and in the vicinity of Lancaster County are presented in Table 2-6.

THUNDERSTORMS			
NUMBER OF EVENTS	**YEARS IN HISTORY**	**Recurrence Interval (Years)**	**Hazard Frequency (Percent Chance per Year)**
345	**71**	**.21**	**486%**
Percentages greater than 100% indicate hazard can be expected to occur more than once per year. Data collected from January 1950-September 1, 2021.			

Table 2-6

Since the last update of this plan in 2016, there have been an additional 74 severe thunderstorms reported, bringing the total number of storms up to 345 from January 1950 to September 1, 2021. Since 1960, there have also been 74 hail-producing events that include some of these thunderstorms. These storms resulted in 12 injuries and one death, $2,086,900 in property damage and $150,400 in crop damage, a total of $2,217,300 of economic loss in Lancaster County over the course of 71 years due to severe thunderstorms.

Figures 2-3 and 2-4 show the distribution of when in the year and during the day past severe thunderstorms have occurred. Severe thunderstorms can and do occur throughout all of Lancaster County including all jurisdictions and municipalities and therefore should be expected to continue occurring in all areas of the county in the future.

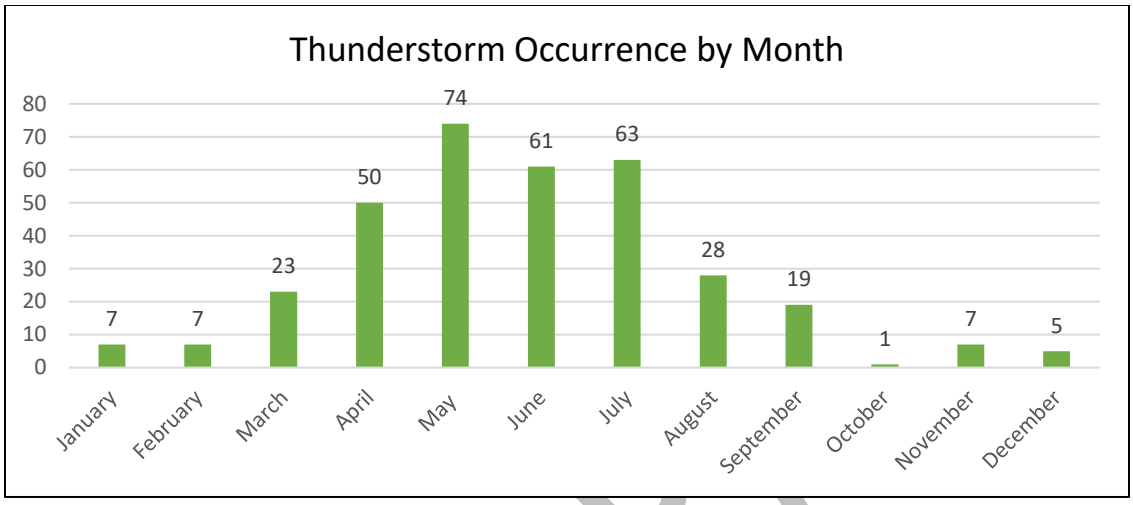


Figure 2-3

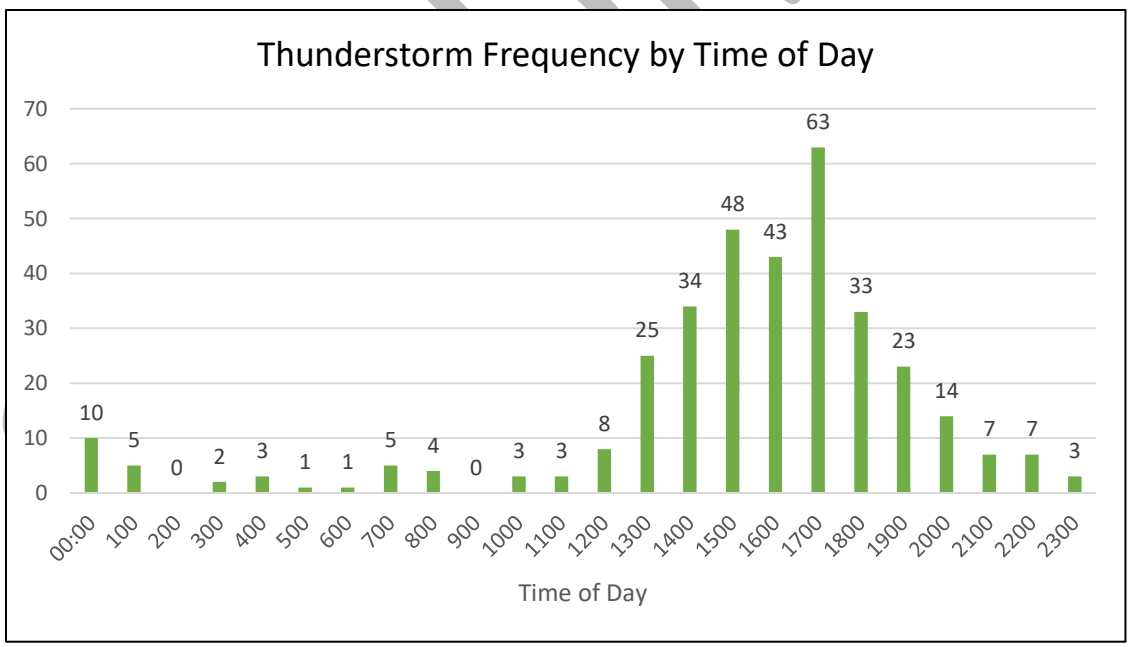


Figure 2-4

VI. Tornadoes

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 damage from a tornado is a result of the high wind velocity and wind-blown debris, although they are commonly accompanied by large hail as well. 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 intensity, size and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, such as residential homes, and are quite localized in impact.

Tornadoes have touched down in South Carolina during every month of the year; however, the most likely months are in the spring, March through May, and later in the fall during September. During spring, tornadoes result from active cold fronts and pre-frontal squall lines. During November and December, it is not uncommon to have active cold fronts and tornadic activity. Tornado frequency reaches a minimum in October and January; only 3% of the totals are experienced during these two months. South Carolina Department of Natural Resources keeps track of tornado statistics for the state the following graphs are from the DNR website using this data. For monthly tornado distribution see figure 2-5.

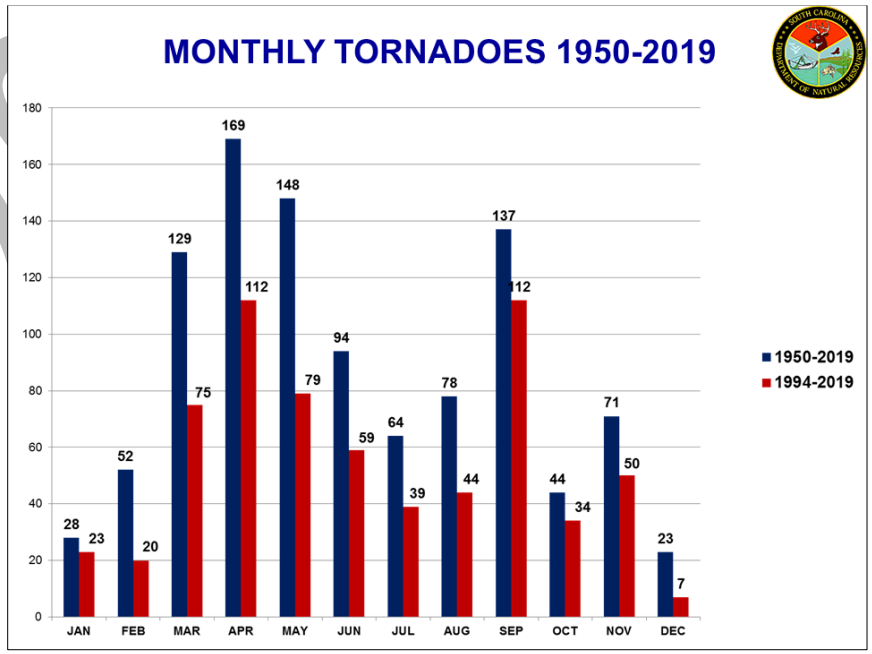


Figure 2-5

Tornadoes in South Carolina can also touch down at any time during the day or night. Figure 2-6 shows tornadoes are more likely to touchdown during the afternoon and early evening; but, tornadoes can also touch down late at night and during the early morning hours. These tornadoes in particular are more dangerous because most people are likely asleep and not able to hear television or radio warnings; and, even if awake, would not be able to see the tornadoes in the darkness.

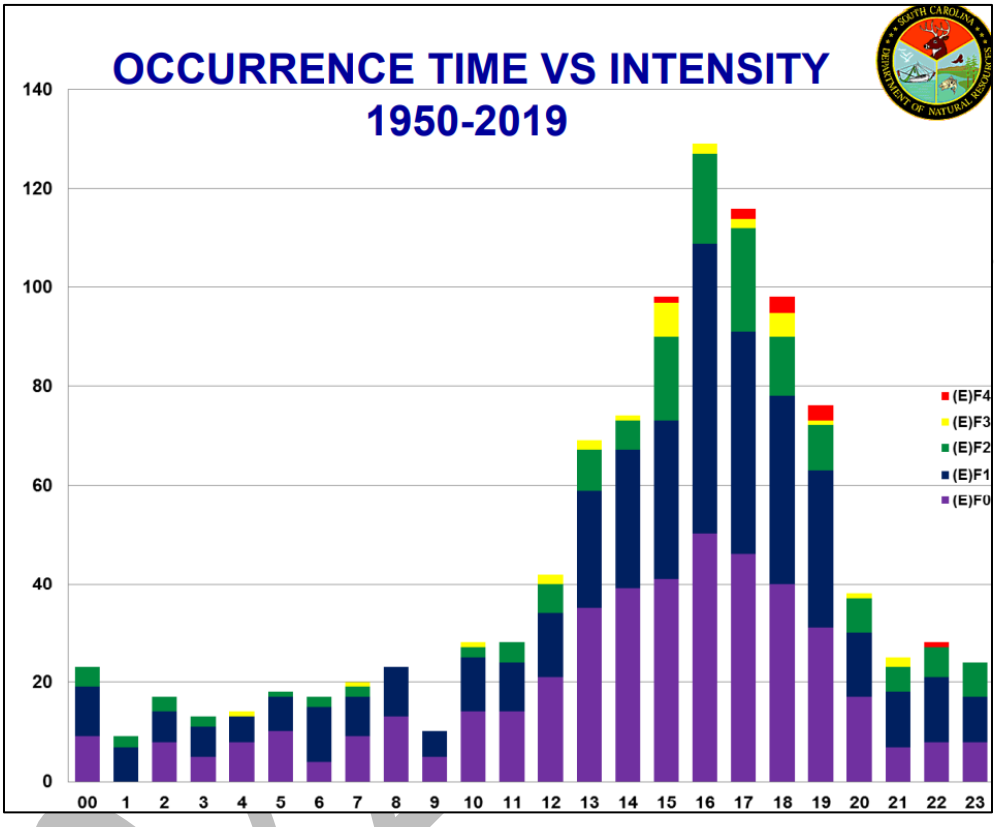


Figure 2-6

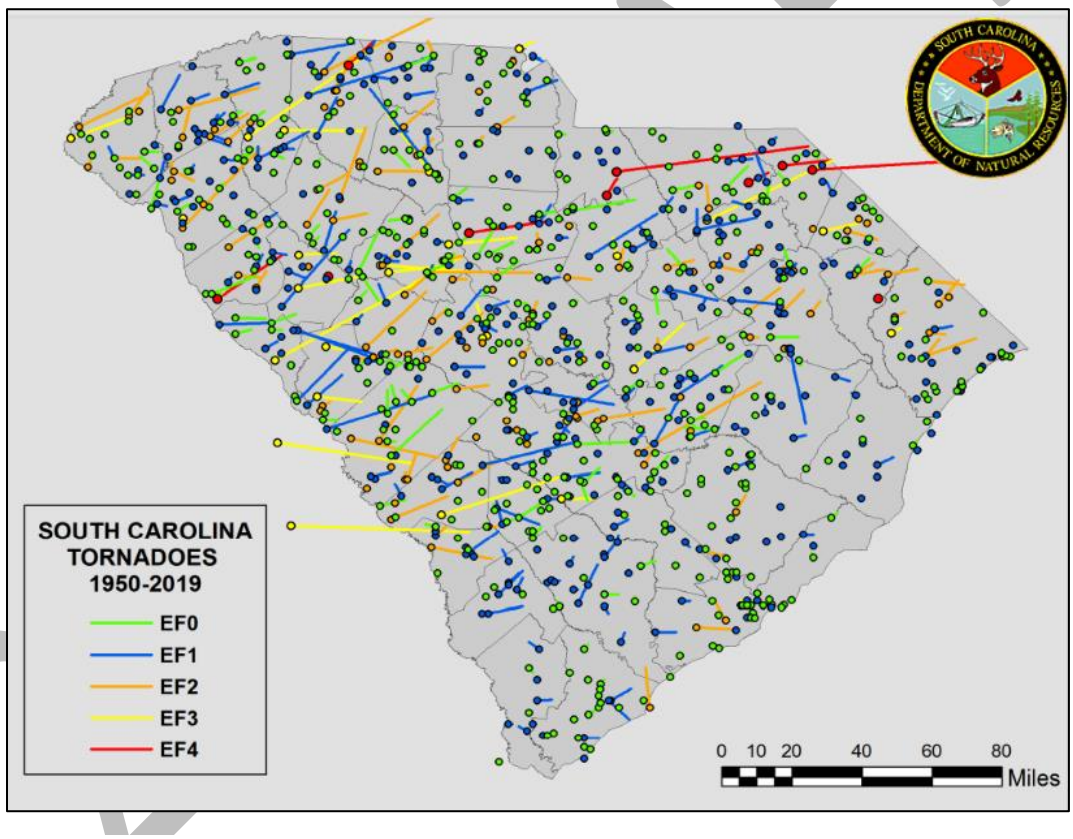
Tornado spotting and reporting methods have changed a lot over the last several decades. Plus, official tornado records only date back to 1950, therefore we do not know the actual average number of tornadoes that occur each year. It is estimated about 1,000 tornadoes hit the U.S. annually.

The largest and most devastating tornado outbreak to affect South Carolina during the last century occurred on March 28, 1984. The outbreak produced 22 tornadoes that killed 57 people, 42 in North Carolina and 15 in South Carolina, and injured another 1,248. The first tornado to strike produced F4 damage as it moved northeast into Scotland County, NC from Marlboro County, SC. around 6:15 p.m. Seven people were killed in Marlboro County, SC. Roughly a third of the victims were in mobile homes. The damage reached $200 million. (Data from www.weather.com)

A. Historical Occurrences

There were 670 confirmed tornado touchdown events in South Carolina between 1950 and 2001 according to the USC Hazards Lab that resulted in 72 deaths and 1,842 injuries. Typically, South Carolina tornadoes are less severe than in other parts of the country.

According to information gathered from the National Climatic Data Center and other sources, Lancaster County has been subject to 14 tornadoes between January 1, 1950 and September 1,2021. These events have caused 7 injuries and over $28,101,000 in property damage. The following map indicates the location of touchdowns. The red arrows indicate the direction of travel if known and the red dots indicate the end of travel if known. The accompanying chart shows 12 historic Lancaster County tornado incidents ranging from EF0 to F4 in intensity.



South Carolina distribution of tornado touchdowns across the State and the tracks of longer-lived tornadoes 1950 through 2019. (SCDNR Map)

Figure 2-7

The following map shows that tornadoes can and do occur in all areas of Lancaster County. No municipality or jurisdiction is immune to the potential destruction of a tornado. The map shows tornados listed under both the Fujita and the Enhanced Fujita scales. The magnitude of all tornado occurrences prior to 2007 is recorded using the original Fujita Tornado Damage Scale. Table 2-8 describes the Enhanced Fujita (EF) Scale used today.

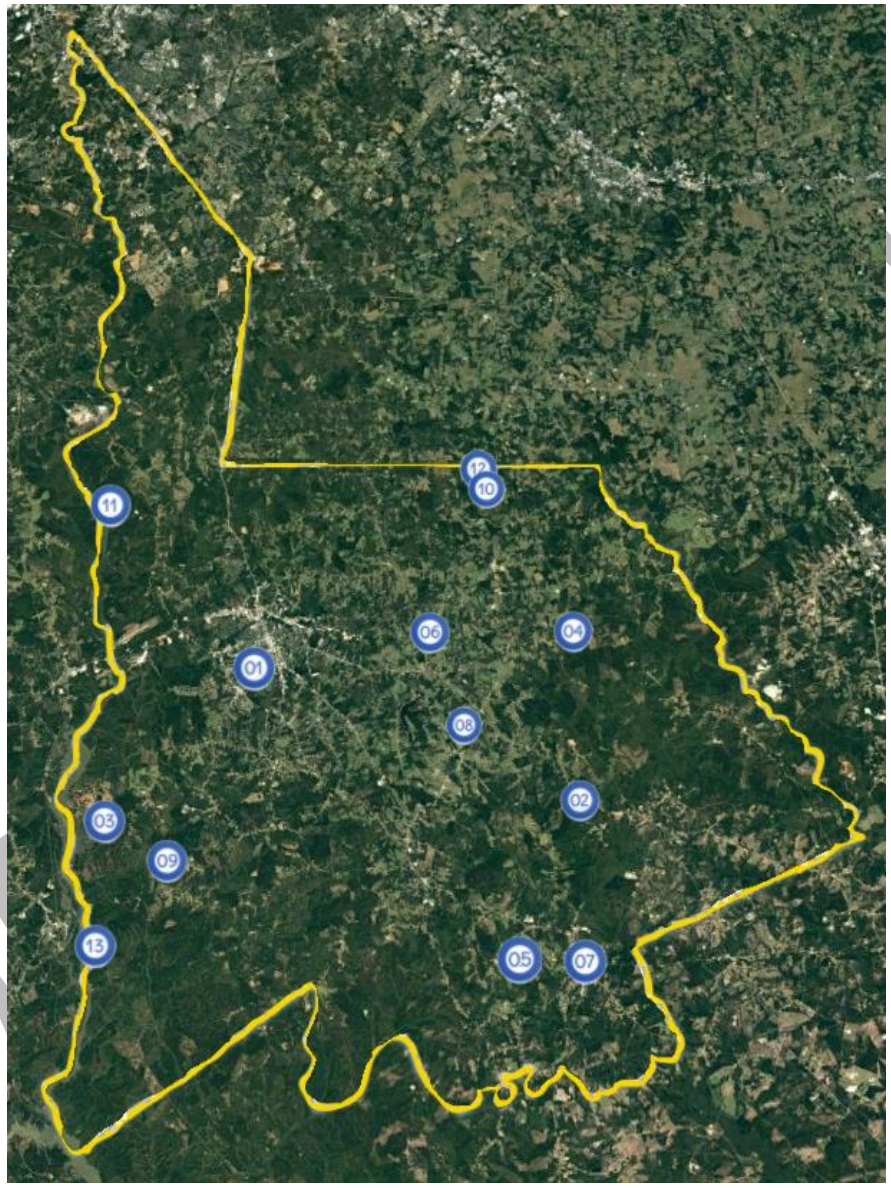


Figure 2-8

Tornado #	Date	Time	Magnitude	Injuries	Damage
1	4/5/1957	7:30 PM EST	F1	0	$250K
2	4/8/1957	4:00 PM EST	F4	0	$250K
3	10/1/1969	11:45 PM EST	F0	0	$250
4	3/4/1977	12:20 PM EST	F1	0	$25K
5	3/28/1984	5:25 PM EST	F4	5	$25.0M
6	6/16/1989	5:15 PM EST	F1	1	$2.5M
7	9/22/1989	12:45 AM EST	F1	0	$3K
8	9/7/2004	9:40 AM EST	F1	0	0
9	3/4/2008	4:42 PM EST	EF0	0	0
10	7/12/2010	1:57 PM EST	EF0	0	$65K
11	7/12/2010	3:12 PM EST	EF0	0	$8K
12	5/24/2017	3:19 PM EST	EF 0	0	0
13	5/5/2020	5:58 PM EST	EF 2	0	0

Table 2-7

Dr. T. Theodore Fujita developed a damage scale (Fujita 1971, Fujita and Pearson 1973) for winds, including tornadoes, which was supposed to relate the degree of damage to the intensity of the wind. As of 2007 the original F-scale was abandoned and was replaced by an enhanced version. The Enhanced F-scale is a much more precise and robust way to assess tornado damage than the original F-scale.

ENHANCED FUJITA SCALE			
DERIVED EF SCALE		**OPERATIONAL EF SCALE**	
EF Number	**3 Second Gust (mph)**	**EF Number**	**3 Second Gust (mph)**
0	65-85	**0**	**65-85**
1	86-109	1	86-110
2	110-137	2	111-135
3	138-167	3	136-165
4	168-199	4	166-200
5	200-234	5	Over 200
***** IMPORTANT NOTE ABOUT ENHANCED F-SCALE WINDS:** *The Enhanced F-scale still is a set of wind estimates (not measurements) based on damage.* These estimates vary with height and exposure. **Important**: The 3 second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured, "one minute mile" speed.			

Table 2-8

B. Future Probabilities of Tornadoes

Based on the frequency of past events, the occurrence of future events can be predicted. In order to estimate the frequency of occurrence, the number of tornadoes is compared to the length of the period of record which is from 1950-December 31, 2021. The recurrence interval is defined from this information and is a rough estimate of the amount of time, on average, during which one occurrence of a given storm will take place. It is important to note that in reality, a storm can occur multiple times during

one recurrence interval, and that the recurrence interval is only an estimated average time period. Recurrence intervals for tornadoes within and in the vicinity of Lancaster County are presented in Table 2-9. There have been no tornadoes in the county since 2010. No tornadoes have occurred in Lancaster County over the last 5 years. According to FEMA's Risk Index, Lancaster County is at a relatively high risk for tornadoes at a score of 26.99 out of 100. Note that this score is calculated using FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience. This score is an estimate of the effect that a certain type of disaster will have on Lancaster County.

TORNADOES			
NUMBER OF EVENTS	YEARS IN HISTORY	Recurrence Interval (Years)	Hazard Frequency (Percent Chance per Year)
13	71	5.46	18.31%
Percentages greater than 100% indicate hazard can be expected to occur more than once per year.			

Table 2-9

VII. Flooding and Flash Floods

Lancaster County is susceptible to both riverine and flash floods. According to information gathered from the National Climate Data Center (NCDC) there is a 75% chance of a flood occurring annually. The NCDC only records 14 flood events for Lancaster County beginning in 2003 through present day. However, Lancaster County has a long history of dealing with flooding. Proof of this can be found in historical data. The newspaper Lancaster Ledger reported "*a great freshet"* or sudden flood and described creeks too high to cross and flooded crops in the September 28, 1859 edition. Also, in 2012, WSOC News reported that over a foot of water flooded SC Highway 522 in Lancaster County.

As with the dangers of rising floodwaters in the event of a dam failure, flash flooding due to heavy precipitation can prove fatal to those caught unprepared or simply in the wrong place in the event of a flood. One of the biggest causes of injury and death during flooding is the actions of pedestrians, motorists, or others when they ignore early warnings, barricading efforts, and evacuation mandates. Even though evacuation and total avoidance of flood waters are the safest course of action, some people do not take heed to these measures and place themselves in great danger, in turn placing emergency responders at great risk when rescues and recoveries have to be performed.

In the interest of alleviating the flooding problems, the U.S. Department of Agriculture's Soil Conservation Service suggested the construction of five reservoir lakes throughout the county to control excess rain runoff. Lancaster County heeded this advice and the flooding became less severe after the lakes were constructed. As the population of the county grew, however, flooding again became a growing issue due to increasing litter and manmade debris entering the system of creeks and streams in the county. This new waste

mixed with already present natural debris and clogged waterways caused inundation of floodplains during heavy precipitation once again. Despite numerous cleanup efforts over the years, the litter and debris problem returns and remains a countywide problem. The need for an extensive cleanout effort becomes ever more apparent with each passing heavy precipitation event. The following are examples of heavy precipitation events that cause flooding problems.

A. Past Occurrences

In October of 2015, South Carolina experienced a “thousand-year flood” as a result of a unique weather pattern that devastated South Carolina. Over a year later, recovery efforts are still under way. This weather event was preceded by almost five inches of rainfall in the North Carolina Mountains in weeks prior. While much of the mountains were experiencing severe drought, the rainfall filled rivers and basins to capacity. The power companies released water from upstream impoundments to balance the water levels in their locality. This compounded the South Carolina flooding problem.

At least sixteen dams breached or failed in the Columbia area, leading to major flooding in a very short amount of time in one of the most heavily populated areas of the state. As a result, many people in the area did not recognize the depth, speed and force of the water. There were 19 deaths as a result of flooding in Columbia, two of which happened when motorists drove around a barricade and the roadway gave way washing the vehicle away. Locally, there have been witnessed instances of people moving barricades, going around barricades and crossing roadways covered with water. These heighten the relevance of failure to heed the warnings in place to deter traffic. There are documented cases of death due to vehicles attempting to cross washed out roadways prior to barricade placement at both the local and state levels.

Infrastructure failure as a result of flooding presents economic impact and threatens public safety. During the October 2015 flooding, approximately 70 miles of Interstate 95 closed due to flooding according to the SCDOT. The total monetary impact is complex and difficult to compute. Another aspect of economic impact caused by infrastructure failure are those impacts to the adjoining businesses along the routes, which depress local economy. Locally, the greatest hazard caused by infrastructure failure is the impact to public safety response. Roadway closure increases emergency response times and in some cases isolates whole communities.

In conjunction with the significant flooding events in central South Carolina in October 2015, Lancaster County experienced an anomalous increase in rainfall in the fall of 2015. Sustained rainfall events have been occurring in greater frequency and in shorter intervals. This increases the risk for flooding that can damage roads and other infrastructure. Also, when water is added to already full reservoirs, the risk for dam failure increases. During a flood event on September 13, 2014, 1-2 feet of water was reported on several roads in the northern portion of the county.

From January 1, 1950 through December 31, 2021 there have been 58 flooding and flash flooding event reported by NOAA in Lancaster County. There are no events reported before 2003. In Lancaster County there has been one reported death and zero injuries The total amount of damage due to flooding is $672,400. Of the damage reported, there has been $649,400 in property damage and $23,000 in damaged crops. These damage totals were obtained from NOAA's database.

Historical loss data is indicated in the following table that plots the losses countywide due to rainfall.

Location	Date	Event Type	Deaths	Injuries	Prop. Damage	Ag. Damage	Incident ID	Notable Impacts
COUNTYWIDE	2/27/2003	Flash Flood	0	0	$40,000	$0	1146574	Multiple Flooded Mobile Homes
LANCASTER	6/17/2003	Flash Flood	0	0	$0	$0	1153489	Multiple Flooded Apartments
HEATH SPGS	7/13/2003	Flash Flood	0	0	$0	$0	1153491	Flooded Roadways
HEATH SPGS	8/26/2008	Flash Flood	0	0	$26,000	$0	20207	Multiple Flooded Roads
LANCASTER	12/25/2009	Flash Flood	0	0	$14,000	$8,000	34727	Multiple Flooded & Damaged Roads
LANCASTER	1/25/2010	Flash Flood	0	0	$60,000	$0	35124	Washed out Roads
Central Lancaster Co.	9/17/2012	Flash Flood	0	0	$169,000	$0	66898	Water Rescue & Multiple Flooded Roads
JONES XRDS	7/11/2013	Flash Flood	0	0	$84,000	$0	74793	Multiple Flooded Houses
VAN WYCK	9/13/2014	Flash Flood	0	0	$6,000	$0	88645	Flooded Roadways
Eastern Lancaster Co.	9/19/2014	Flash Flood	0	0	$195,000		88771	Numerous Road Washouts
LANCASTER	1/12/2015	Flood	1	0	$0	$8,000	91482	Fatality from Vehicle Washed Off of Road
Lancaster	12/30/2015	Flash Flood	0	0	$28,000	$5,000	101969	Water Rescue & Multiple Flooded Roads
Northern Lancaster Co.	4/30/2016	Flash Flood	0	0	$600	$0	104036	Multiple Flooded Roads
CAMP CREEK	5/2/2016	Flood	0	0	$0	$0	105363	Flooded Roadways
Countywide	9/16/2018	Flash Flood	0	0	$1,200	$1,200	129284	Numerous Roads Washed Out
LANCASTER	5/11/2019	Flash Flood	0	0	$10,000	$100	136082	Flooded Apartment Complex
Central Lancaster Co.	5/27/2020	Flood	0	0	$500	$500	147777	Multiple Flooded Roads
FOSTERS XRDS	5/29/2020	Flood	0	0	$100	$100	147780	Flooded Roadways
LANCASTER	6/24/2020	Flash Flood	0	0	$10,000	$100	147798	Water Rescue, Flooded Apartment Complex

Figure 2-9

B. Repetitive Losses

Currently, the County of Lancaster, the Town of Kershaw, and the City of Lancaster are all participating jurisdictions in the National Flood Insurance Program (NFIP) and within compliance of the requirements of the program. The Towns of Heath Springs and Van Wyck do not participate in NFIP because they have no Special Flood Hazard Areas. According to information gathered from South Carolina Department of Natural Resources Flood Mitigation Program, Lancaster County has had two (2) NFIP Repetitive Loss claims since 1978. These current claims total $170,849.76. This structure was in Zone B, C, or X which are areas either outside of the 100-year flood plain, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. According to our County Flood Manager the flooding was due to a culvert pipe being blocked by storm debris. Currently, there are no repetitive loss structures insured in Lancaster County. Currently, there are 83 flood insurance policies in effect in Lancaster County. The insurance in force in Lancaster County exceeds $16,000,000.00.

According to information gathered from South Carolina Department of Natural Resources Flood Mitigation Program, the City of Lancaster has had no repetitive loss claims but 4 flood damage claims since 1978. These claims totaled $21,663.68. These structures are in Zones B, C, or X. Currently there are 25 flood insurance policies in effect in the City of Lancaster. Of these,14 are in A01-30 and AE Zones which have a 1% chance of experiencing a 100-year flood. The remaining 11 are in B, C, or X Zone which are areas either outside of the 100-year flood plain, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. Twelve of these structures are single family homes, five are 2-4 family homes, three are other residential structures and five are non-residential. The total insurance in force is $6,338,400.

C. Future Probabilities

When taking into consideration the possibility of flooding with any heavy precipitation event, it is possible that flooding may occur with any severe thunderstorm or tropical storm. Since the official record for flooding only encompasses 16 years, it may presumably be inconsistent and therefore may not be reliable. With all aspects considered, a safe assumption would seem to be the possibility of a flood event occurring annually would be at least 75%.

The Base Flood is the standard used by most Federal and state agencies, and is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. The Base Flood Elevation is the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum. The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. To access flood insurance rate maps (FIRM) please visit either the arcgis link or the FEMA NFIP map link provided in the section 2 bibliography. The annual chance of any 100-year flood is 1% while the chance for a 500-year flood is 0.2% for any given year.

According to FEMA's Risk Index, Lancaster County is at a relatively low risk for riverine flooding at a score of 7.72 out of 100. Note that this score is calculated using FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience. The Risk Index did not include data for flash flooding. This score is an estimate of the effect that a certain type of disaster will have on Lancaster County.

VIII. Earthquakes

An earthquake is the result of a sudden movement or slip along fault lines within the earth/ This movement releases built-up energy in the form of seismic waves which can cause the ground to shake. Many are unware of the prevalence of earthquakes

within the state. According to the South Carolina Emergency Management Division, 10 to 15 earthquakes are recorded annually within the state. Many believe that they are uncommon because several earthquakes are not felt. Of the 10 to 15 annually recorded earthquakes, only 3 to 5 are noticed by people. In the past several years there have been no catastrophic earthquakes recorded within Lancaster County. However, a quick-look at the fault line map for the county will reveal that the county is vulnerable to earthquakes. The Richter Scale is used to measure the intensity of earthquakes and is calculated using seismographic readings. A whole-number jump on the Richter scale represents an energy increase of about 32 times. It is also logarithmic so each increase of one point also represents a 10-fold increase in the magnitude of the quake.

A. Past Occurrences

From January 1, 1950 to September 30, 2021 there have been 42 reported earthquakes (with a Richter Scale value of 1 or higher) within a 50-mile radius of Lancaster County. The average strength for the 42 earthquakes within the circle between January 1, 1950 and September 1, 2021 was 2.15 on the Richter Scale. According to USDS, “an earthquake with magnitude of about 2.0 or less are usually called micro earthquakes; they are not commonly felt by people.” However, if an earthquake is relatively close to the surface, it is possible that one of a small magnitude can be felt and depending on the quality of the soil on the surface can cause minor damage. There is not any easily accessible data reporting damages from an earthquake in Lancaster County.

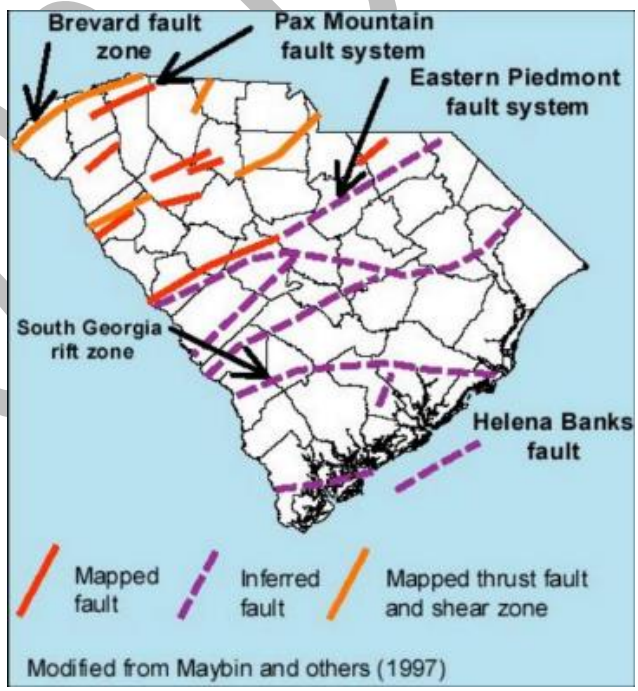


Figure 2-10

Date of Occurence	Magnitude	Location	Coordinates	Time	Time	EST Dat
10/27/1959	3.9	6 km NE of McBee, South Carolina	34.500 N, 80.200 W	02:07:25 (UTC)	21:07:25 (EST)	10/26/1959
1/25/1978	2.6	5 km ENE of Jenkinsville, South Carolina	34.295 N, 81.238 W	08:29:39 (UTC)	03:29:39 (EST)	1/25/1978
4/22/1978	2.6	14 km N of Jenkinsville, South Carolina	34.393 N, 81.316 W	06:36:22 (UTC)	01:36:22 (EST)	4/22/1978
10/8/1979	2.9	7 km NE of Pomaria, South Carolina	34.314 N, 81.362 W	23:20:10 (UTC)	19:20:10 (EST)	10/18/1979
3/2/1982	2.5	6 km NE of Pomaria, South Carolina	34.318 N, 81.376 W	16:48:07 (UTC)	11:48:07 (EST)	3/2/2021
4/13/1982	2.7	4 km NE of Pomaria, South Carolina	34.291 N, 81.381 W	09:25:19 (UTC)	04:25:19 (EST)	4/13/1982
4/13/1998	3.5	8 km WSW of Jefferson, South Carolina	34.610 N, 80.466 W	09:56:11 (UTC)	04:56:11 (EST)	4/13/1998
4/14/2002	2.3	8 km NNW of Jenkinsville, South Carolina	34.338 N, 81.321 W	16:49:34 (UTC)	12:49:34 (EST)	4/14/2002
1/12/2004	1.4	South Carolina	34.452 N, 81.164 W	01:55:16 (UTC)	20:55:16 (EST)	1/11/2004
3/29/2004	1.6	10 km NW of Winnsboro, South Carolina	34.451 N, 81.164 W	23:15:40 (UTC)	18:15:40 (EST)	3/29/2004
2/18/2005	2.9	7 km ENE of Irmo, South Carolina	34.118 N, 81.112 W	14:21:55 (UTC)	09:21:55 (EST)	2/18/2005
3/18/2009	2.3	5 km NNE of Jenkinsville, South Carolina	34.312 N, 81.276 W	22:00:48 (UTC)	18:00:48 (EDT)	3/18/2009
3/20/2009	2.1	5 km NE of Jenkinsville, South Carolina	34.305 N, 81.250 W	01:03:43 (UTC)	21:03:43 (EDT)	3/19/2009
4/2/2009	1.6	16 km NNW of Jenkinsvile, South Carolina	34.411 N, 81.333 W	17:08:53 (UTC)	13:08:53 (EDT)	4/2/2009
5/7/2009	1.8	18 km NNW of Pomaria, South Carolina	34.430 N, 81.354 W	16:23:33 (UTC)	12:23:33 (EDT)	5/7/2009
9/13/2009	1.5	8 km EE of Jenkinsville, South Carolina	34.243 N, 81.198 W	06:01:56 (UTC)	02:01:56 (EDT)	9/13/2009
9/14/2009	1.9	10 km W of Blythewood, South Carolina	34.228 N, 81.084 W	16:48:34 (UTC)	12:48:34 (EDT)	9/14/2009
6/24/2011	2.3	10 km N of Camden, South Carolina	34.345 N, 80.605 W	17:15:38 (UTC)	13:15:38 (EDT)	6/24/2011
12/13/2011	1.8	17 km N of Pomaria, South Carolina	34.429 N, 81.390 W	17:36:55 (UTC)	12:36:55 (EST)	12/13/2011
1/26/2012	2	5 km ENE of Irmo, South Carolina	34.103 N, 81.123 W	17:28:34 (UTC)	12:28:34 (EST)	1/26/2012
3/31/2012	2.2	9 km WSW of Burnsville, North Carolina	35.083 N, 80.342 W	16:49:30 (UTC)	12:49:30 (EDT)	3/31/2012
2/5/2013	2	8 km NNE of Richburg, South Carolina	34.788 N, 80.980 W	11:47:12 (UTC)	06:47:12 (EST)	2/5/2013
2/16/2017	1.1	13 km S of Great Falls, South Carolina	34.456 N, 80.883 W	02:00:21 (UTC)	21:00:21 (EST)	2/15/2017
2/16/2017	1.7	13km SSE of Great Falls, South Carolina	34.459 N, 80.870 W	02:02:23 (UTC)	21:02:23 (EST)	2/15/2017
5/3/2017	1.6	5 km NNW of Jenkinsville, South Carolina	34.315 N, 81.314 W	02:06:19 (UTC)	22:06:19 (EDT)	5/2/2017
5/18/2017	2.2	5 km ESE of Pageland, South Carolina	34.759 N, 80.336 W	06:08:37 (UTC)	02:08:37 (EDT)	5/18/2017
8/20/2017	1.7	6 km NNE of Mount Holly, North Carolina	35.354 N, 80.990 W	04:34:25 (UTC)	00:34:25 (EDT)	8/20/2017
11/24/2017	2.4	6 km NW of Jefferson, South Carolina	34.688 N, 80.448 W	05:57:17 (UTC)	00:57:17 (EST)	11/24/2017
12/2/2017	2.4	9 km ENE of Jenkinsville, South Carolina	34.304 N, 81.195 W	06:15:07 (UTC)	01:15:07 (EST)	12/2/2017
12/20/2017	2.2	10 km WNW of Pageland, South Carolina	34.794 N, 80.499 W	13:47:26 (UTC)	08:47:26 (EST)	12/20/2017
2/17/2018	2.3	3 km ENE of Monarch Mill, South Carolina	34.726 N, 81.550 W	12:11:23 (UTC)	07:11:23 (EST)	2/7/2018
4/6/2018	2	South Carolina	34.710 N, 80.268 W	02:52:30 (UTC)	22:52:30 (EDT)	4/5/2018
1/24/2019	2.5	6 km NNW of Jenkinsville, South Carolina	34.321 N, 81.313 W	09:03:29 (UTC)	04:03:29 (EST)	4/6/2019
7/10/2019	1.4	9 km SW of Winnsboro Mills, South Caroli	34.315 N, 81.170 W	08:06:13 (UTC)	04:06:13 (EDT)	7/10/2019
7/17/2019	2.2	6 km NE of Irmo, South Carolina	34.129 N, 81.135 W	08:07:36 (UTC)	04:07:36 (EDT)	7/17/2019
10/6/2019	1.8	4 km ESE of Hemby Bridge, North Carolina	35.089 N, 80.586 W	08:30:10 (UTC)	04:30:10 (EDT)	10/6/2019
1/15/2020	2.3	8 km ESE of Kershaw, South Carolina	34.522 N, 80.499 W	09:52:30 (UTC)	04:52:30 (EST)	1/5/2020
4/6/2020	2.3	8 km N of Richburg, South Carolina	34.796 N, 81.014 W	19:02:16 (UTC)	15:02:16 (EDT)	4/6/2020
5/2/2020	2	5 km NNW of Jenkinsville, South Carolina	34.312 N, 81.311 W	02:43:14 (UTC)	22:43:14 (EDT)	5/1/2020
7/25/2020	2.2	12 km W of Bethune, South Carolina	34.426 N, 80.484 W	09:55:12 (UTC)	05:55:12 (EDT)	7/25/2020
8/21/2020	2	5 km NNE of Lesslie, South Carolina	34.936 N, 80.938 W	11:57:31 (UTC)	07:57:31 (EDT)	8/21/2020
5/12/2021	1.8	13 km SSW of Heath Springs, South Caroli	34.474 N, 80.722 W	08:00:48 (UTC)	04:00:48 (EDT)	5/12/2021
10/25/2021	2.2	8 km N of Jenkinsville, South Carolina	34.347 N, 81.298 W	16:41:41 (UTC)	12:41:41 (EDT)	10/25/2021
10/26/2021	1.8	7 km NE of Jenkinsville, South Carolina	34.319 N, 81.236 W	09:50:41 (UTC)	05:50:41 (EDT)	10/26/2021
10/28/2021	1.8	9 km N of Jenkinsville, South Carolina	34.356 N, 81.288 W	10:28:31 (UTC)	06:28:31 (EDT)	10/28/2021
10/28/2021	1.7	9 km N of Jenkinsville, South Carolina	34.356 N, 81.279 W	10:30:48 (UTC)	06:30:48 (EDT)	10/28/2021
10/28/2021	2.1	7 km NNE of Jenkinsville, South Carolina	34.332 N, 81.256 W	22:21:42 (UTC)	18:21:42 (EDT)	10/28/2021
10/31/2021	2.3	8 km N of Jenkinsville, South Carolina	34.340 N, 81.299 W	08:23:19 (UTC)	04:23:19 (EDT)	10/31/2021
11/1/2021	2	6 km NE of Jenkinsville, South Carolina	34.314 N, 81.247 W	14:59:09 (UTC)	10:59:09 (EDT)	11/1/2021
12/27/2021	3.3	5 km SSW of Lugoff, South Carolina	34.183 N, 80.720 W	19:18:54 (UTC)	14:18:54 (EST)	12/27/2021
12/27/2021	2.5	6 km SSW of Lugoff, South Carolina	34.176 N, 80.717 W	22:38:21 (UTC)	17:38:21 (EST)	12/27/2021
12/27/2021	2.1	6 km ESE of Elgin, South Carolina	34.155 N, 80.729 W	23:22:50 (UTC)	18:22:50 (EST)	12/27/2021
12/28/2021	1.7	7 km SE of Elgin, South Carolina	34.122 N, 80.736 W	03:03:16 (UTC)	22:03:16 (EST)	12/27/2021
12/29/2021	2.3	6 km E of Elgin, South Carolina	34.170 N, 80.724 W	09:12:05 (UTC)	04:12:05 (EST)	12/29/2021
12/30/2021	2.5	6 km E of Elgin, South Carolina	34.169 N, 80.723 W	12:11:31 (UTC)	07:11:31 (EST)	12/30/2021
12/30/2021	2.4	6 km ESE of Elgin, South Carolina	34.148 N, 80.732 W	19:11:56 (UTC)	14:11:31 (EST)	12/30/2021

Table 2-11

B. Future Probabilities

Earthquakes			
NUMBER OF EVENTS	**YEARS IN HISTORY**	**Recurrence Interval (Years)**	**Hazard Frequency (Percent Chance per Year)**
56	**71**	**1.27**	**78.87%**
Percentages greater than 100% indicate hazard can be expected to occur more than once per year.			

Table 2-12

An earthquake of high intensity could cause disaster to buildings and homes within the area, as well as damage to dams, bridges, and roads. Falling debris could pose a danger to life or property. All of the data used for the above charts was obtained from the United States Geological Survey earthquake frequency chart. The map limitations were drawn using the coordinates for Lancaster County (34.7204, -80.7709). Then a circle with the radius of 50 miles was drawn around those coordinates.

IX. Dam Failure

Dam means any artificial barrier, together with appurtenant works, including but not limited to dams, levees, dikes or floodwalls for the impoundment or diversion of water or other fluids where failure may cause danger to life or property.

Dam failure, in Lancaster County as in other places with dam and reservoir systems, could mean potential disaster for homeowners, land owners, and motorists in close proximity to and downstream of the ruptured dam. Major flooding could wreak havoc on infrastructure in the county and hamper emergency response efforts.

The height of a dam is established with respect to maximum water storage elevation measured from the natural bed of the stream or water course at the downstream toe of the barrier, or if it is not across a stream or water course, the height from the lowest elevation of the outside limit of the barrier, to the maximum water storage elevation.

South Carolina Code of Laws Title 49 Chapter 11 details laws regarding dams and includes the Dams and Reservoirs Safety Act. Dams within the state of South Carolina are regulated by South Carolina Department of Health and Environmental Control (DHEC). The law specifically gives DHEC the power to review plans to construct, repair, alter or remove any dam under its jurisdiction. Additionally, DHEC has the authority to make inspections, call for remedial work, issue permits, cite non-compliance and invoke judicial action. DHEC may take over a dam in the event of an emergency and may make rules and regulations for proper administration of the law.

State law specifically exempts dams that are:

- Less than twenty-five feet in height from the natural bed of the stream or watercourse measured at the downstream toe of the dam, or less than twenty-five feet from the lowest elevation of the outside limit of the dam, if it is not across a stream channel or watercourse, to the maximum water storage elevation and has an impounding capacity at maximum water storage elevation of less than fifty-acre feet unless a situation exists where the hazard potential as determined by DHEC is such that dam failure or improper reservoir operation may cause loss of human life;

- Owned or operated by a department or an agency of the federal government;

- Owned or licensed by the Federal Energy Regulatory Commission, the South Carolina Public Service Authority, the Nuclear Regulatory Commission, the United

States Corps of Engineers, or other responsible federal licensing agencies considered appropriate by the department;

- Upon which the Department of Transportation or county or municipal governments have accepted maintenance responsibility for a road or highway where that road or highway is the only danger to life or property with respect to failure of the dam.

The purpose of this law is to provide for the certification and inspection of certain dams in South Carolina in the interest of public health, safety, and welfare in order to reduce the risk of failure of the dams, prevent injuries to persons and damage to property, and confer upon South Carolina Department of Health and Environmental Control the regulatory authority to accomplish the purposes.

In Lancaster County, a vast majority of all the dams are privately owned, including those used to produce hydroelectric power. Easements are in place along downstream waters to allow access for maintenance and inspection duties. All of the dams in the county fall under the jurisdiction of two public watershed boards. Under the guidance of these boards, the Natural Resources Conservation Service, a branch of the U.S. Department of Agriculture, inspects and assesses these dams and makes recommendations for maintenance or repair activities. Specific maintenance and repair activities are the responsibility of the two watershed boards through the property owners.

Dams are classified by size and hazard potential. (Appendix 6) See Table 2-13 Hazard Classification and Table 2-14 Size Classification.

Hazard Classification	
Class	**Hazard Potential**
I – High Hazard	Dams located where failure will likely cause loss of life or serious damage.
II – Significant Hazard	Dams located where failure will not likely cause loss of life but may damage property.
III – Low Hazard	Dams located where failure may cause minimal property damage.

Table 2-13

Size Classification		
Category	**Storage (ac-ft.)**	**Height (ft.)**
Very Small	< 50	< 25
Small	≥ 50 And < 1,000	≥ 25 And < 40
Intermediate	≥ 1,000 And < 50,000	≥ 40 And < 100
Large	≥ 50,000	≥ 100

Table 2-14

A. High Hazard Dams in Lancaster County

In the mid-20th century, Lancaster County built five reservoir lakes under the guidance of the U.S. Department of Agriculture's Soil Conservation Service in response to a growing problem with flooding in the Lancaster City and Kershaw areas. The county then formed the Cane Creek Watershed Board and the Little Lynches Watershed Board to keep the dams of these lakes properly maintained and the public informed about the lakes. In partnership with the Natural Resources Conservation Service and SCDHEC, the two Boards evaluate and maintain the privately owned dams in the systems of the five reservoirs.

	Built	Latitude	Longitude	Elevation
Ghent Dam	1971-1972	34.7717	-80.6692	591 ft.
Parker Reservoir	1972-1973	34.6935	-80.7031	584 ft.
Gill's Creek	1977-1978	34.7359	-80.7126	541 ft.
Little Lynches	1978-1979	34.5523	-80.6079	486 ft.
Bear Creek	1980-1984	34.6827	-80.6881	552 ft.

Table 2-15

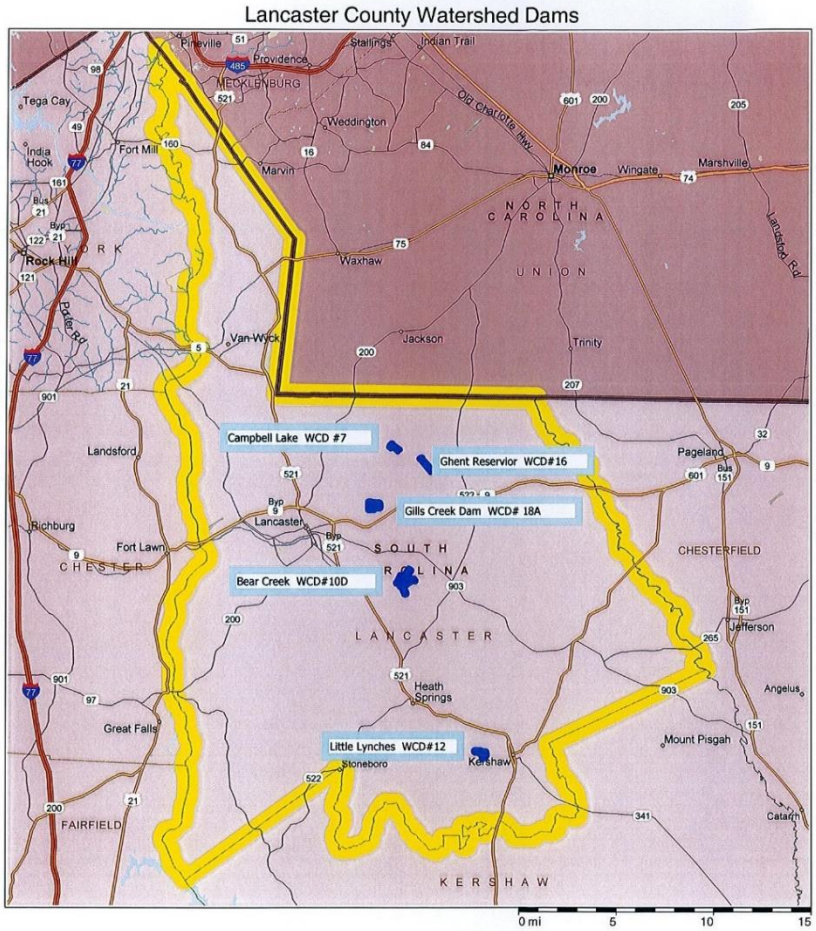


Figure 2-11

B. Cane Creek Watershed

Cane Creek Watershed is located in Lancaster County and consists primarily of Cane Creek and its tributaries. The watershed occupies 90,086 acres of the Piedmont region of South Carolina. Land use/land cover in the watershed includes: 69.6% forested land, 16.9% agricultural land, 9.3% urban land, 3.1% scrub/shrub land, 0.6% water, and 0.5 barren land.

Cane Creek originates in North Carolina and accepts drainage from Simpson Branch, Unity Branch, Flag Pond Branch, McAteer Branch, Sandy Branch, Cedar Pines Lake, and Camp Creek (North Prong, South Prong). Further downstream, the Bear Creek drainage enters Cane Creek.

Bear Creek accepts drainage from Caney Branch and Dry Branch before flowing through the Lancaster Reservoir. Lancaster Reservoir (75 acres) is used for municipal and recreational purposes for the Town of Lancaster. Turkey Quarter Creek (Little Turkey Creek) flows into Bear Creek at the reservoir and further downstream Gills Creek (Hannah's Creek) enters near the Town of Lancaster. Rum Creek drains into Cane Creek near the Town of Fort Lawn. There are a total of 236.4 stream miles and 371.5 acres of lake waters in this watershed.

Lakes & Reservoirs Within the Cane Creek Watershed			
Lake/Reservoir	**Normal Pool Acres**	**Flood Pool Acres**	**Drainage Area Acres**
Campbell Lake / Parker Reservoir	31	181	5,210
Gills Creek	74	327	8,185
Bear Creek	548.5	558	7,807
Joe Ghent	29	82.9	1,883

Table 2-16 a

C. Little Lynches Watershed

The Little Lynches Watershed is located in Lancaster and Kershaw Counties and consists primarily of the Little Lynches River and its tributaries from its origin to Mill Creek. Baskins Creek (Lyles Branch, Falls Branch, and Bend Creek) is joined by Blackmon Branch to form the headwaters of the Little Lynches River. The Little Lynches River accepts drainage from Horton Creek (Little Lynches Creek, Sunrise Lake, Beckham Branch, and Mobley Branch), Mill Creek, Camp Branch, Todd's Branch, Haile Gold Mine Creek (Ledbetter Reservoir), and Ned's Creek. Hanging Rock Creek (Lick Creek) flows past the Town of Kershaw to join the Little Lynches River downstream of Ned's Creek, followed by Gates Ford Branch and Shirley Creek. The watershed occupies 86,935 acres of the Piedmont and Sandhills regions of South

Carolina. Little Lynches Watershed is located in south-central Lancaster County and northeastern Kershaw County.

The estimated population of the watershed is 9,600. The towns of Kershaw and Heath Springs are located in this watershed. Land use/land cover in the watershed includes: 58% forested land, 14% cultivated land, 23% pasture and idle land, 5% miscellaneous use land. This watershed is served by U.S. Highway 521, and U.S. Highway 601 as well as South Carolina Highways 903,157, and 341. The L&C railroad also serves this watershed as it connects the towns of Kershaw, Heath Springs and the City of Lancaster.

Lakes & Reservoirs Within the Little Lynches Watershed			
Lake/Reservoir	**Normal Pool Acres**	**Flood Pool Acres**	**Drainage Area Acres**
Little Lynches	40.5	78.3	2,016
Table 2-16 b			

D. Hydro-Electric Dams

There are five hydro-electric dams operated by Duke Energy that would have a direct negative impact on Lancaster County should a failure occur.

1. Mountain Island Hydro-Station is located on the Catawba River approximately three miles north of Mt. Holly, North Carolina. Located 28 miles downstream of Mountain Island is the Wylie Hydro Station which forms Lake Wylie.

2. Wylie Hydro Station is located on the Catawba River approximately six miles north of Rock Hill, South Carolina. Located 39 miles downstream of Wylie is Fishing Creek Hydro Station which forms the Fishing Creek Reservoir.

3. Fishing Creek Hydro Station is located on the Catawba River approximately two miles north of Great Falls, South Carolina. Located two miles downstream of Fishing Creek is the Great Falls/Dearborn Hydro Station which forms the Great Falls Reservoir.

4. Great Falls/Dearborn Hydro Station is located on the Catawba River in Great Falls, South Carolina. Located one mile downstream of the Great Falls/Dearborn Hydro Station is the Rocky Creek/Cedar Creek Hydro Station which forms the Cedar Creek Reservoir. The tailrace of Great Falls/Dearborn Hydro Station is actually part of the Rocky Creek/Cedar Creek Hydro Station headwaters.

5. Rocky Creek/Cedar Creek Hydro Station is located on the Catawba River approximately one-mile south of Great Falls, South Carolina. Located twenty-two miles downstream of Rocky Creek/Cedar Creek Hydro Station is Wateree

Hydro Station which forms Lake Wateree. The tailrace of Rocky Creek/Cedar Creek Hydro Station is actually part of Lake Wateree's headwaters.

Inundation maps and profiles for each listed hydro-electric dam as well as additional information about hydro-electric dams that may affect Lancaster County can be found in the Duke Energy Emergency Action Plan Hydro-Electric Plants. A copy of this plan is on file with the Emergency Management Planner at Lancaster County Emergency Operations Center.

E. Inundation Profiles and Maps

Inundation maps and profiles for the five hydro-electric dams that would affect Lancaster County are located in the 2014 version of this plan and to date have not been updated. Duke Energy, owner of the five dams performed an analysis of each potential dam failure to produce these maps and profiles. These were conducted using a computer-simulated dam failure that may or may not describe conditions during an actual dam failure. These simulations used both a summer Probable Maximum Flood (PMF) event and a fire weather of sunny day event.

Inundation maps for the Cane Creek Watershed are on file with Lancaster County Emergency Management. Dam assessments are being done by the Natural Resources Conservation Service through the United States Department of Agriculture and information from these assessments is also being made available to Emergency Management. Inundation maps for the Little Lynches River Watershed will be made available when that assessment is complete in the spring of 2017.

F. Past and Future Occurrences of Dam Failures in Lancaster County

There are no known documented failures of any High Hazard or Significant Hazard dams in Lancaster County. However, dams in Lancaster County, in addition to roads, have historically been prone to damage due to rising waters from heavy rains. If dams are not well maintained, heavy rains could cause breaches or failures that could lead to significant property damage and/or injuries and death.

X. Temperature Extremes

While there are no historical records of major impact to life or economy caused by them in Lancaster County, temperature extremes can adversely affect people, crops, animals, utilities, historical items, and even structures. Coupled with varying humidity levels, temperature extremes can have a plethora of effects on living beings as well as inanimate objects. No municipality or jurisdiction is immune to temperature extremes.

A. Extreme Heat

Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. Droughts occur when a long period passes without substantial rainfall. A heat wave combined with a drought is a very dangerous situation.

In addition to heat-related dangers to the human body such as heat stress and hyperthermia, extreme heat can bring problems to critical infrastructure and processes essential to the normal function of society. Extreme heat can adversely affect the transmission of electricity, the growth of crops, the structural integrity of paved surfaces, the operation of machinery, and the health of livestock.

No area in Lancaster County is immune to the possibility of extreme heat. According to globalchange.gov's National Climate Assessment, Lancaster County lies in the southeastern region of the US that has been nicknamed the "warming hole" because of its incongruity with the warming average temperatures of the rest of the country. Despite this, the topography and environmental features of the county are conducive to high temperatures in the summer months. The mix of sandy soils in the south of the county that reflect solar heat back into the ground-level atmosphere and the clay soils in the north that can soak in rainwater and release heated water vapor under summer sun contribute to both air temperature and heat index values.

B. Extreme Cold

What constitutes extreme cold and its effect varies across different areas of the United States. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in buildings that are poorly insulated or without heat.

Like extreme heat, there are distinct dangers associated with extreme cold that put both individuals and communities as a whole at risk. Extended periods of extremely low temperatures pose the greatest threats when compared to more temporary "cold snaps" because the longer the human body is exposed to these conditions, the more susceptible one becomes to the symptoms of hypothermia and frostbite. Especially at risk are the very young and the elderly, whose bodies have a harder time compensating for the lack of heat. Also at risk are those without access to heated shelter and as such, cannot readily maintain a suitable body temperature.

There are a variety of transportation impacts due to cold weather. Diesel engines are stressed and, often fuel gels in extreme cold weather impacting trucking and rail traffic.

Cold temperatures take their toll on vehicle batteries. Sheer cold temperatures stress metal bridge structures.

Cold temperature impacts on agriculture are frequently discussed in terms of frost and freeze impacts early or late in growing seasons. Absolute temperature and duration of extreme cold can have devastating effects on trees and winter crops as well. Prolonged cold snaps can impact livestock not protected from the frigid temperatures.

Energy consumption rises significantly during extreme cold weather. With the increased cost of energy, the cost of staying warm has also increased. Some lower income families cannot afford the increased cost of utilities and may be subject to having their power or gas shut off. There have been instances of elderly persons freezing to death after having their utilities shut off after not being able to afford to pay their bill. This has led some communities and states to enact laws to prevent the disconnection of utility services when winter weather is expected to be dangerously cold.

Expansion and contraction of the ground due to freezing, thawing, and re-freezing can cause buried water pipes to burst leading to massive ice problems and loss of water pressure in metropolitan areas. This poses a variety of public health and public safety problems.

With the onset of cold weather and extreme cold temperatures comes an increased risk of fire due to individuals using unsafe heating equipment and practices. The use of space heaters increases as does the use of fireplaces. Improper maintenance and, in the case of space heaters, improper placement can lead to devastating fires.

A past example of extreme cold grouped with the winter storms that Lancaster County experienced occurred in the beginning of 2022. The storm took place January 16th and 17th of 2022 and was given the name Winter Storm Izzy. The storm took out trees and power lines, made multiple roads impassable and left some residents without power for days. Low temperatures ranged from 21-28 degrees over the 16th – 17th. Response to this storm cost an estimated $13,000.

C. Average and Extreme Temperatures

Lancaster County's climate is warm during summer when temperatures average between the 70's and 80's across day and night and cool in the winters when temperatures average between the 40's and 50's across day and night. (See Table 2-17)

The warmest month of the year is July, with an average maximum temperature of 90.14 degrees Fahrenheit, while the coldest month of the year is January with an average minimum temperature of 30.72 degrees Fahrenheit. Temperature variations between night and day tend to be moderate during summer with a difference

that can reach 23 degrees Fahrenheit, and also moderate during winter with an average difference of 25 degrees Fahrenheit.

During the summer months of May through September the average high temperature is 86.29º F. Any temperature exceeding 96.29º F is considered extreme heat. The average low temperature during the winter months of November through February is 33.43º F. Any temperature below 23.43ºF is considered extreme cold. (See Table 2-17)

The highest temperature on record is 107 degrees Fahrenheit as measured on July 28, 1954. The lowest temperature on record is -4 degrees Fahrenheit as measured on January 21, 1985.

Average High & Low temperatures By Month												
Average Daily	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Low	30.72	32.34	39.31	47.16	56.03	64	67.64	66.63	60.82	48.58	38.58	31.60
High	52.98	55.96	63.85	73.23	81.47	87.73	90.14	88.48	83.65	73.97	63.53	54.63

Table 2-17

D. Future Probabilities of Temperature Extremes

According to the U.S. Environmental Protection Agency's (EPA) summarization of the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC, 2007) since 1950, the number of heat waves has increased and widespread increases have occurred in the numbers of warm nights. The extent of regions affected by droughts has also increased as precipitation over land has marginally decreased while evaporation has increased due to warmer conditions. Generally, numbers of heavy daily precipitation events that lead to flooding have increased, but not everywhere. Tropical storm and hurricane frequencies vary considerably from year to year, but evidence suggests substantial increases in intensity and duration since the 1970s. In the extra-tropics, variations in tracks and intensity of storms reflect variations in major features of the atmospheric circulation, such as the North Atlantic Oscillation. Assuming the position of the IPCC, 2007 is correct; the citizens of Lancaster County should expect future high temperature extremes and fewer chances of lower temperature extremes.

XI. Winter Storms (Snow, Sleet, Freezing Rain, and Ice)

Widespread accumulating snow or freezing rain across central South Carolina is an unusual event. This region is generally unaccustomed to snow, ice, and freezing temperatures. These occurrences cause substantial disruption by impacting transportation systems and commerce. Once in a while, cold air penetrates south and mixes with moist air from the Gulf of Mexico. Temperatures fall below freezing killing tender vegetation, such as flowering plants and fruit crops. Wet snow and ice rapidly accumulate on trees with leaves, causing the branches to snap under the load. Some trees fall on

power lines causing power outages, likewise ice accumulation of over a quarter inch on power lines can cause them to snap under the weight. Local motorists are generally unaccustomed to driving on slick roads and traffic accidents increase. Some buildings are poorly insulated or lack heat altogether. Heavy snow can 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 the elderly.
Due to the relatively 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, many communities are not prepared for such events. Local municipalities may not have adequate snow removal equipment or treatments available, such as sand or salt, for icy roads. Accurate and timely precipitation type forecasts for these events are essential to minimize the impact on local communities not accustomed to winter storms. Everyone is potentially at risk during winter storms. The actual threat to individuals depends on their specific situation.

A. Past Occurrences of Winter Storms

Records from the National Climactic Data Center, the South Carolina State Climatology Office, the National Weather Service, the American Meteorological Society and various newspapers were used to compile a list of past winter storms. Because the older events had inconsistencies across records, this report only includes events that happened from 1958 onward. Table 2-18 below lists these past events.

December 22 - 24, 1989

A winter storm event began on Friday, December 22, 1989 and continued through Sunday, December 24. This storm has been used for a study of the impact of significant east coast winter storms and upper and lower level wind anomalies resulting in slow moving storm with extended periods of enhanced precipitation by NOAA and NWS. This storm left 12”-18” of snow in many places across the Carolinas that normally receive less than 6” per year. (See figures 2-12 and 2-13)

Lancaster County experienced 2” to 4” of snow. Since it was Christmas holiday, schools were already closed. However, due to the holiday travel season, 60 automobile collisions were reported in the Lancaster News. There was no record of deaths, injuries, or other property damage found related to this event. *(Source: Lancaster News December 27, 1989 edition, National Oceanic and Atmospheric Administration (NOAA) study by Neil A. Stuart NOAA/NWS Albany, NY located at: http://cstar.cestm.albany.edu/nrow/nrow8/stuartanomalies.ppt#256,1,Evaluating Potential Impact of Significant East Coast Winter Storms by Analysis of Upper and Low-Level Wind Anomalies, and South Carolina Department of Natural Resources – South Carolina State Climatology Office http://www.dnr.sc.gov/climate/sco/ClimateData/cli_sc_climate.php)*

There have been at least 121 injuries and one death attributed to winter weather in Lancaster County from December 1958 to September 2021, according to the records used for this plan.

Date	Precipitation Type	Accumulation
12/11/1958-12/12/1958	Snow	12"
1/26/1961	Sleet	
1/25/1966-1/26/1966	Snow	3"
1/29/1966	Snow	3"
1/10/1968	Ice	
1/12/1968	Ice	
2/15/1969-2/16/1969	Snow, Ice	6"
1/8/1971-1/9/1971	Freezing Rain, Ice	
3/25/1971	Snow	4-6"
12/3/1971	Snow, Sleet	8"
1/7/1973	Snow, Ice	2.6"
2/10/1973-2/11/1973	Snow	7"
1/3/1977	Snow	2"
1/3/1988	Ice	
1/7/1988	Snow	10-12"
12/22/1989-12/24/1989	Snow	2-4"
2/10/1994-2/11/1994	Ice	
1/7/1996-1/8/1996	Snow, Ice	2"
1/11/1996-1/12/1996	Sleet, Freezing Rain, Snow	2"
3/9/1999-3/10/1999	Freezing Rain	2-3"
1/24/2000-1/25/2000	Snow	11"
1/2/2002-1/3/2002	Snow	8"
12/4/2002-12/5/2002	Ice	1"
1/23/2003	Snow	4-7"
2/16/2003-2/17/2003	Ice	3/4"
1/25/2004-1/27/2004	Ice/Sleet	2 3/4"
2/26/2004-2/27/2004	Snow	3-12"
1/29/2005-1/30/2005	Ice	1/4-1/2"
1/18/2007	Ice	1/4"
2/1/2007	Snow	2-5"
1/16/2008	Snow, Sleet	2"
1/20/2009	Snow, Ice	
3/1/2009	Snow, Ice	2-3"
1/30/2010	Snow, Ice	3-4"
2/12/2010-2/13/2010	Snow	3-5"
3/2/2010	Snow	1-2 1/2"
12/26/2010	Snow	2-5"
1/10/2011	Snow, Ice	5-8" Snow, 1/4" Ice
2/16/2013	Snow	1-3"
1/28/2014-1/29/2014	Snow, Sleet	1-3"
2/12/2014-2/13/2014	Snow, Ice	4-8" Snow, 1/4-1/2" Ice
2/17/2015	Ice	1/2-3/4"
2/25/2015	Snow	2"
1/22/2016	Sleet, Freezing Rain	1/4"
1/7/2017	Snow	.1" Snow
1/17/2018	Heavy Snow	3" Snow

Table 2-18

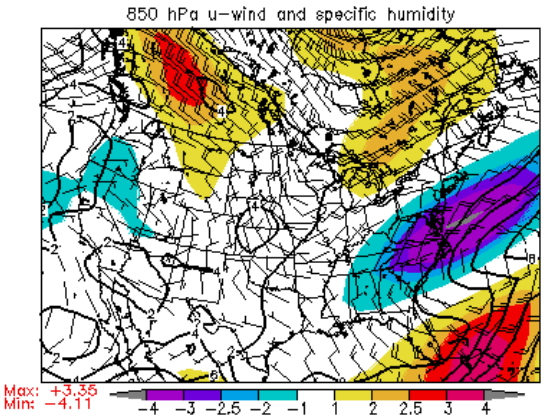


Figure 2-12

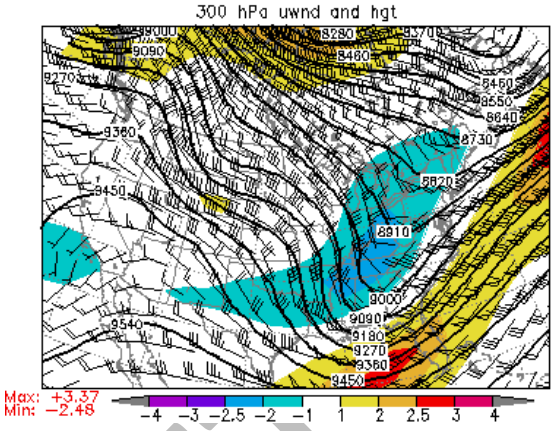


Figure 2-13

B. Future Probabilities of Winter Storms

Since 1958 we have documented 46 winter storm events. According to FEMA's Risk Index, Lancaster County is at a very low risk for winter weather at a score of 7.01 out of 100. Note that this score is calculated using FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience. This score is an estimate of the effect that a certain type of disaster will have on Lancaster County. Based on the frequency of past events, the occurrence of future events can be predicted. In order to estimate the frequency of occurrence, the number of winter storms is compared to the length of the 63- year period of record from 1958-2021. The recurrence interval is defined from this information and is a rough estimate of the amount of time, on average, during which one occurrence of a given storm will take place. It is important to note that in reality, a storm can occur multiple times during one recurrence interval, and that the recurrence interval is only an estimated average time period. See Table 2-19.

HAZARD	Number of Events	Years In Record	Recurrence Interval (Years)	% Chance Per Year	Average Accumulation (Inches)
Any Winter Storm	46	63	1.37	73.01%	2.02"
Snow Only Event	18	63	3.15	31.75%	4.74"
Ice Only Event	12	63	5.25	19.05%	.88"
Wintry Mix	14	63	4.5	22.22%	2.66"

Table 2-19

Due to the complex nature of winter weather and the components that must be in place to produce precipitation, winter storms can be difficult to predict with pinpoint accuracy. Meteorologists face the challenge of determining an exact time that the proper mix of moisture, temperature, and wind speed and direction will cause precipitation to fall on a given area- a nearly impossible feat. Unlike tornadoes and thunderstorms, which generally tend to occur during the mid to late afternoon hours, winter storms in Lancaster County historically have no discernible tendency when it comes to time of occurrence during the day.

From a mitigation standpoint, this complicates efforts made to minimize the impact of winter storms on the population. In the past, winter storms have been forecast to begin at a certain time, only for conditions to change and cause the storm to either dissipate or begin at a different time. This situation can cause schools to cancel class for storms that never arrive or not cancel in time before students arrive because a storm forms sooner than expected. The same goes for businesses and the population in general; it is not uncommon to get caught in a winter storm that develops differently than earlier forecasts predicted or to prepare for a storm that ends up posing little to no threat. Often, it is not certain until the first precipitation begins as to when exactly the storm will arrive and how severe or mild it will be. Figure 2-14 shows the times that past winter storms have occurred during the day.

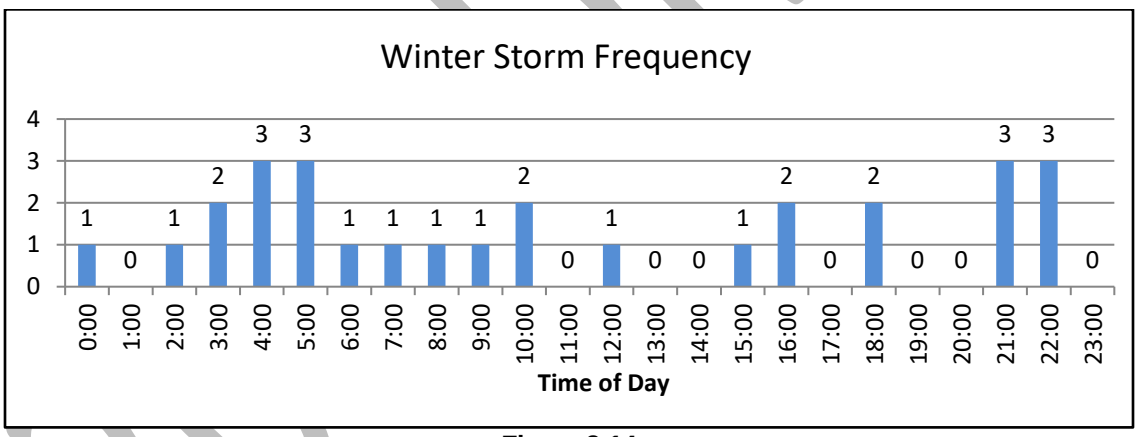


Figure 2-14

Despite the rising average temperatures due to climate change, the number of severe winter weather events is increasing. Winter storms and ice storms put great stress on Lancaster County and are more complicated for emergency agencies to respond to than other weather events. As more of these events happen in the future, the effects will be felt by a greater number of people due to projected population growth and county development. Figure 2-15a and 2-15b show the rising trend of winter storm and ice storm occurrences.

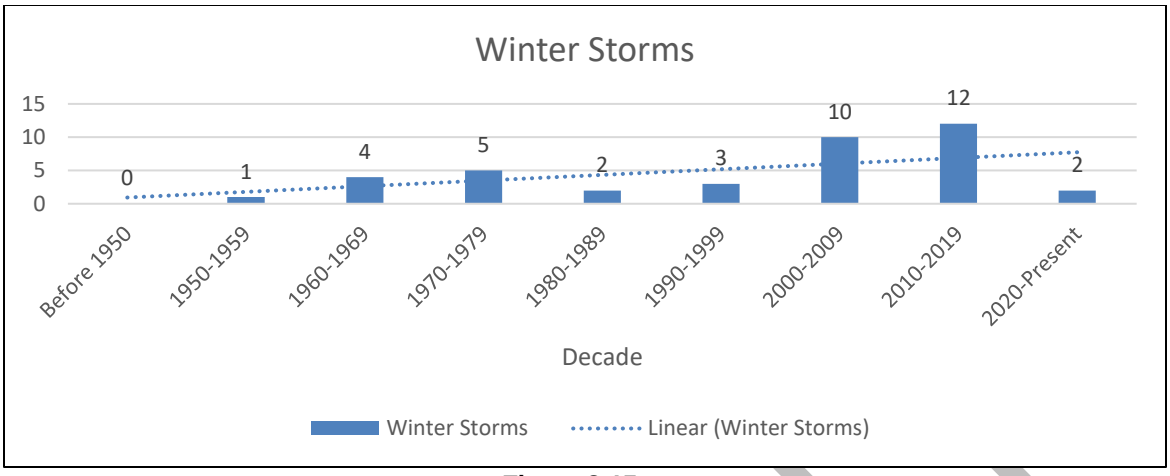


Figure 2-15 a

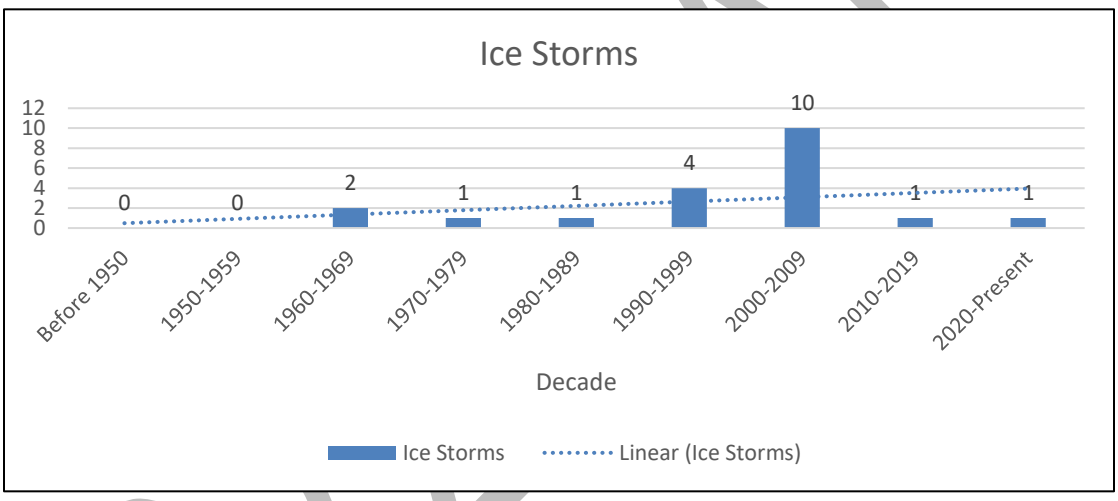


Figure 2-15b

C. Severity of Winter Storms

Winter storms affect all jurisdictions and municipalities within Lancaster County equally. (See Table 2-20)

Winter Events Affecting All Jurisdictions Within Lancaster County					
Type of Winter Event	**Schools & Local Government Offices**	**Roads**	**Bridges & Overpasses**	**Electrical Utilities**	**Severity**
< 2" of Snow < ¼" of Ice Above 32° F	Possible Delay or Early Dismissal	Generally Passable with Caution	Generally Passable with Caution	Outages Typically < 500	MILD
< 2" of Snow < ¼" of Ice Below 32° F	Likely Delay or Early Dismissal	Generally Passable with Few Minor Incidents. Caution Urged When Driving.	If Treated: Generally Passable with Few Minor Incidents	Outages Typically < 500	
2" – 4" of Snow or ¼" – ½" of Ice Below 32° F	Likely Closed	Passable with Some Minor Incidents. Necessary Travel Only.	If Treated: Passable with Caution. Minor Incidents Likely.	Outages 500 to 2,000 Likely	MODERATE
Over 4" of Snow or Over ½" of Ice Below 32° F	**Closed**	**Most Secondary Roads Not Passable. Travel Not Advised.**	**Dangerous. Travel Not Advised**	**Outages Over 2,000 Likely**	**SEVERE**

Table 2-20

XII. Drought

Drought is a normal, recurrent feature of climate, although many mistakenly consider it a rare and random event. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another. Drought is a temporary deviation from normal levels of rainfall over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector.

Drought should not be viewed as only a physical or natural event. Its impacts on society result from the relationship between a natural event and the demand people place on water supply. Human beings often exacerbate the impact of drought. Recent droughts have resulted in negative economic and environmental impacts and personal hardships have underscored the vulnerability of societies to this "natural" hazard. Adverse impacts to people and economy were made especially clear during the droughts of 1998-2002 and 2007-2008. These droughts affected agriculture, forestry, tourism, power generation, public water supply, and fisheries.

No single operational definition of drought works in all circumstances, and this is a big part of why policy makers, resource planners, and others have more trouble recognizing and planning for drought than they do for other natural disasters. In fact, most drought planners now rely on mathematic indices to decide when to start implementing water conservation or drought response measures.

South Carolina began to examine the impacts and occurrences of drought in 1978 while most of the United States was experiencing severe drought conditions. South Carolina recognized the need to formalize a drought plan by passing the South Carolina Drought Response Act in 1985. This act was amended in 2000 to implement guidelines set forth in the 1998 State Water Plan. Several plans and laws have been established to monitor, manage, and conserve the state's water resources during drought periods in the best interest of all South Carolinians.

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

- Agricultural Drought: defined by soil moisture deficiencies that affect crop performance
- Hydrological Drought: defined by declining surface and groundwater supplies due to a lack of precipitation
- Meteorological Drought: defined by a lack of precipitation relative to average precipitation for a given region
- Hydrological Drought & Land Use: defined by a meteorological drought in one area that has hydrological drought impact in another area due to manmade alterations to natural geography
- Socioeconomic Drought: defined as drought that impacts supply and demand of some economic activity

The Palmer Drought Severity Index is used to measure long-term drought impacts and uses rainfall and temperature data to rate the severity of drought conditions from 0 (no drought) to -4 (extreme drought). In the case of excess rain, a region can be placed under positive ratings such as +2 (moderate rainfall) or +4 (heavy rainfall). The Palmer Index is used to retroactively measure drought conditions over an extended time period such as months in the past as opposed to weeks or days in the past. Using the Palmer Index, the South Carolina Emergency Management Division has put Lancaster County at a medium-high risk for drought occurrence and in the medium category for social and place vulnerability for drought events.

A. Past and Future Occurrences of Drought

The earliest records of drought indicate that some streams in South Carolina went dry in 1818, and fish in smaller streams died from lack of water in 1848. Other droughts were recorded in the years of 1890, 1925, and 1933 while the most damaging droughts in recent history occurred in 1954, 1986, 1998-2002, and 2007-2008. Droughts have occurred at roughly 30 year intervals with some exceptions, since the early 1800's. Using NOAA's Storm Events Database with a record from 1950-2016, there have been 9 years in which Lancaster County was listed in drought status. The most recent drought, which occurred in 2008, was considered a severe drought, with a Palmer Severity Index of -3. The State Climatology Office put Lancaster County into 'Severe Drought' status during this drought.

According to FEMA's Risk Index, Lancaster County is at a relatively low risk for drought at a score of 5.10 out of 100. Note that this score is calculated using FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience. This score is an estimate of the effect that a certain type of disaster will have on Lancaster County. There is no record of deaths or economic loss due to drought in Lancaster County.

XIII. Wildland Fire

Lancaster County Fire Rescue averages response to more than 244 wildland fires each year since 2005. This equates to an 66.8% chance of a wildland fire occurring each day. Therefore, these types of fires, also known as brushfires, woods fires, or forest fires, are considered common occurrences in Lancaster County. As common occurrences, Lancaster County Fire Rescue and the volunteer stations that make up our firefighting forces are adept at handling most of these of fires without assistance. If Lancaster County firefighting resources cannot make access to the fire area or if the fire exceeds the capabilities of county resources, the South Carolina Forestry Commission (SCFC) must be called in to assist. While Lancaster County and the municipalities within Lancaster County have ordinances in place with regards to outdoor burning, it is generally left to South Carolina Forestry Commission to enforce their laws. Through the fire incident reports kept by the county, the following chart depicts the amount of wildland fires that stations respond to annually. In addition to the information provided in the first chart below, the second chart depicts the types of wildland fires from 2005-2020. A type 140 wildland fire is a natural vegetation fire, or has another listed cause. A type 141 is defined as a forest, woods, or wildland fire. Type 142 wildfires are brush or brush-and-grass mixture fires and a type 143 is a grass fire. For the purposes of this plan, the term "wildfire" is referring to any outside fire that was responded to within Lancaster County's jurisdiction. Within Lancaster County there have not been any wildland fires that have burned large acreage. Therefore, there are no such occurrences on record. So, this plan focuses on the outside fires that affect Lancaster County by destroying wooded areas and other property.

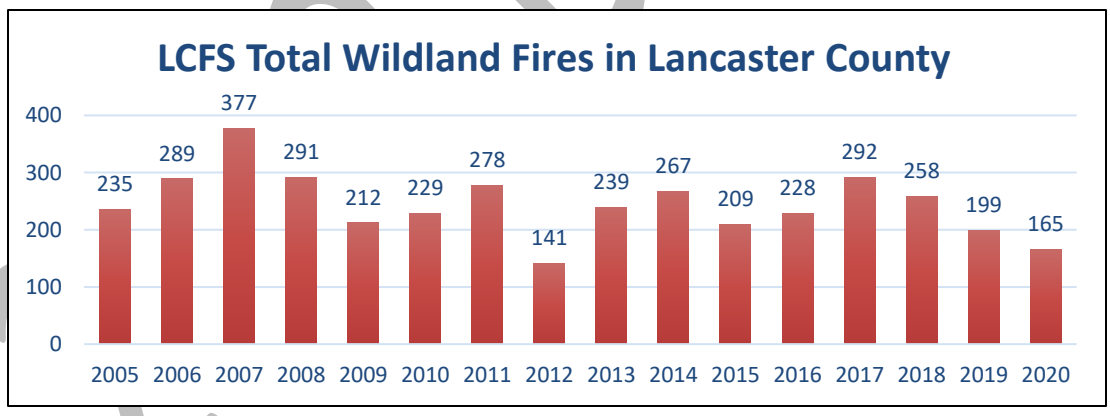


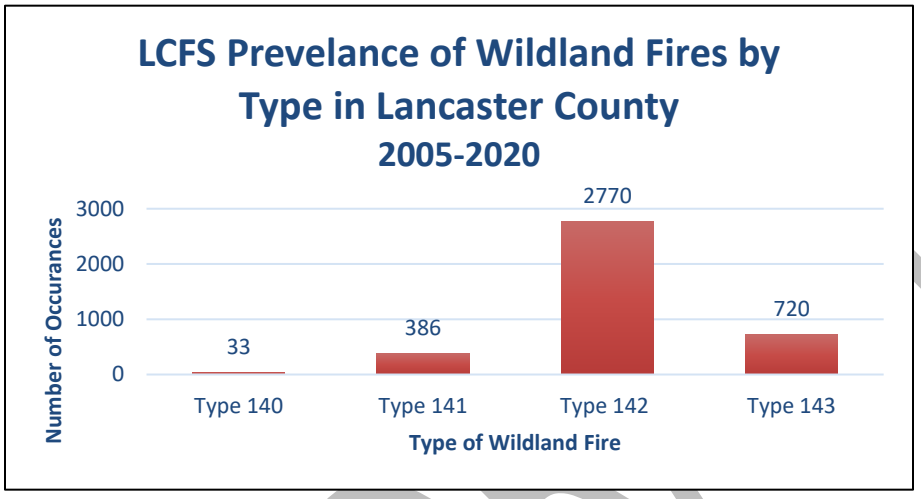
Figure 2-16a

A. Causes of Wildland Fire

Debris burning causes over 50% of the total wildfires and represents the most common cause in Lancaster County. By S.C. State Law and Lancaster County Ordinance # 921, anyone burning a yard debris fire is required to make notification by calling (800) 705-8610 prior to starting the fire. Lancaster County averages over 4,500 of these debris fire notifications annually.

Figure 2-16b

Table 2-21 lists wildland fires by cause, in Lancaster County, in which SCFC responded for the fiscal years of 2011 through 2015. The major causes of fire are listed as Lightning, Campfire, Debris Burning, Incendiary, Railroad, Children and Miscellaneous. Debris fires are any planned fire that escapes or leaves its desired area. Incendiary fires set to burn someone else's property without the owner's consent account for 6% of all wildland fires.



S.C. Forestry Commission Response to Lancaster County 2011 - 2015										
CAUSE	2011		2012		2013		2014		2015	
	Number of Responses	Acres	Number of Responses	Acres	Number of Responses	Acres	Number of Responses	Acres	Number of Responses	Acres
Debris Fire	5	11.3	7	4.2	12	24.1	15	58.6	11	15.9
Miscellaneous	3	40.4	3	1.0	2	1.4	6	14.9	4	5.7
Lightning	0	0	2	24	0	0	0	0	1	4
Incendiary	2	1.2	4	7.5	2	8	8	22.1	3	0.9
Equipment	2	1.1	2	2.5	3	16.1	6	11.2	0	0
Children	1	0.2	0	0	2	1.4	0	0	0	0
Smoking	0	0	2	3	0	0	0	0	0	0
Railroad	1	0.2	0	0	0	0	0	0	1	1.0
Campfire	1	3.0	0	0	2	1.1	0	0	1	2.5
Totals	15	57.4	20	42.2	23	52.1	35	106.8	21	30

Table 2-21

B. Wildland-Urban Interface

The number of homes lost nationally due to wildland fires has been increasing at an alarming number. These losses are found primarily in the wildland-urban interface area, or the immediate boundary between undeveloped natural land and developed residential or commercial property. In recent years, an influx of new residents has moved into Lancaster County and residential building has expanded drastically into previously untouched woodlands. As development increases, lives and property will be threatened as never before and a greater demand will be placed on services such as fire protection, law enforcement, and emergency medical services.

C. Future Probabilities of Wildland Fires

Some of the information contained in this document relating to wildland fire in Lancaster County was derived from the South Carolina Forestry Commission's Annual Reports from 1996 through 2015. These can be found at http://www.state.sc.us/forest/ar.htm. Additional information came from Lancaster County Fire Rescue Fire Incident Reports. Based on the frequency of past events, the occurrence of future events can be predicted. According to records obtained from SCFC (Table 2-23), there were greater than 3,300 responses to wildland fires in Lancaster County in the past739 years. If trends continue, it is predicted that the 10-year average number of responses to Lancaster County by SCFC will be 46 per year with 239.05 acres involved annually.

According to FEMA's National Risk Index, a wildfire poses a very low risk to Lancaster County at the score of 3.00 out of 100. Note that this score is calculated using FEMA's formula of multiplying expected annual loss by social vulnerability then dividing by the community's resilience. This score is an estimate of the effect that a certain type of disaster will have on Lancaster County.

South Carolina Forestry Commission Wildland Fire Response to Lancaster County

Years In Record	Total Responses	Total Acres Involved	Average Calls Per Year	Average Acres Involved Per Call	10 Year Average Number of Responses	10 Year Average Acres Involved	Chance of Occurrence (Daily)
73	3,365	17,450.9	46.09	5.19	24	54.92	6.68%

Table 2-22

Lancaster County Fire Rescue Wildland Fire Response

Years In Record	Total Responses	Average Calls Per Year	Chance of Occurrence (Daily)
16	3,909	244.3	66.8%

Table 2-23

Lancaster County Fire Rescue responds to an average of 244 calls per year for wildland fires. (See Table 2-24). Accurate records are only available for the past sixteen years. A review of the sixteen years of data from Lancaster County Fire Rescue indicates that wildfires have decreased steadily since 2017. (Figure 2.13a and 2.13b) Earlier notification due to communication improvements as well as public education campaigns contributed to the decrease we have seen. Urban Interface remains an area of concern for Lancaster County Fire Rescue as new developments are constructed and sprawl reaches into areas that were previously open land. This change from rural to suburban has driven the cost of fire upward. Our losses grew from the thousand-dollar range to tens of thousands over a ten-year period. This variance may also be attributed to enhanced reporting methods. Our trend data shows incremental increases over the last three reporting years. The Fire Commission enacted a burn ordinance that will continue to address this, however, an increase in population equates to an increase in response.

In Lancaster County there are an average of about 13 wildfires per month. However, not all of those wildfires are created equal, some may burn acres of woodland or farmland while others are just trash debris that have been lit ablaze.

Through dissection and assessment some interesting facts were found through Lancaster County's wildfire statistics. For the 2017 plan update wildfire data was pulled from January 1, 2014 through December 31, 2015. These years totaled 312 outside fires across all types in two full years. For the 2022 plan update wildfire data was pulled from January 1, 2020 through December 31, 2020. This year totaled 153 outside fires across all types in one full year. If this data is taken and compared, it provides insight to the frequency of outside fires within the County as the years progress. If the number of outside fires from 2014 and 2015 are divided in half, the total is 156. The total for 2020 was 153, only 3 less fires than its previous successor. This shows that the total of outside fires is not fluctuating a significant amount between these years.

Using The Seasonal Nature of Fires released by the United States Fire Administration in coordination with FEMA, Lancaster County's outside fire data can be compared to national statistics. The month that proved to be an outlier was April. However, if the national statistics are observed this actually lines up pretty well. According to this print, Spring is the season with the highest number of daily fires. This increase can be contributed to an increase in outside fires including tree, brush, and grass fires. The national data reflected the highest number of outside fires around July 4th, which was contributed to fireworks for Fourth of July celebrations. Although this does not directly line up with Lancaster County's numbers, it is similar. The month with the second highest number of outside fires was July, while the highest was April. April being among the highest aligns with national data as it is within the three spring months.

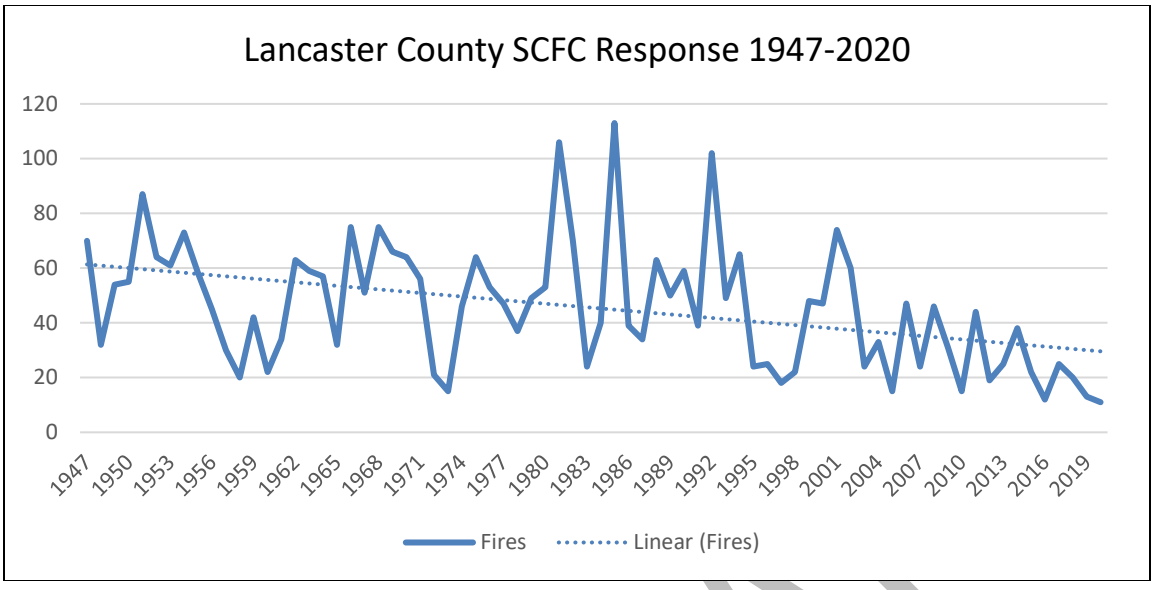


Figure 2-17a

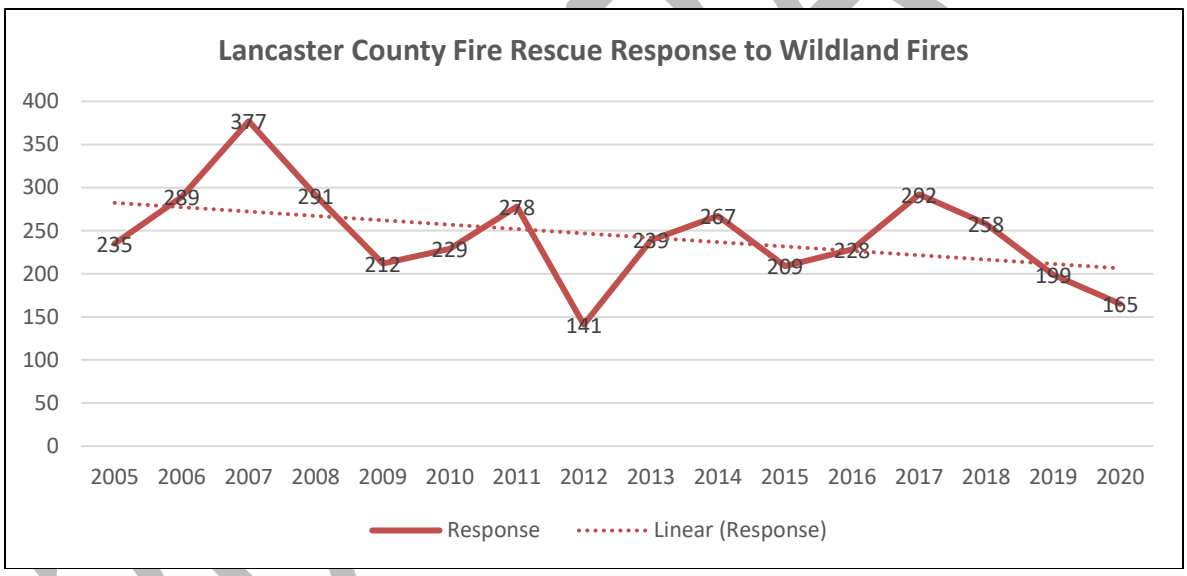


Figure 2-17b

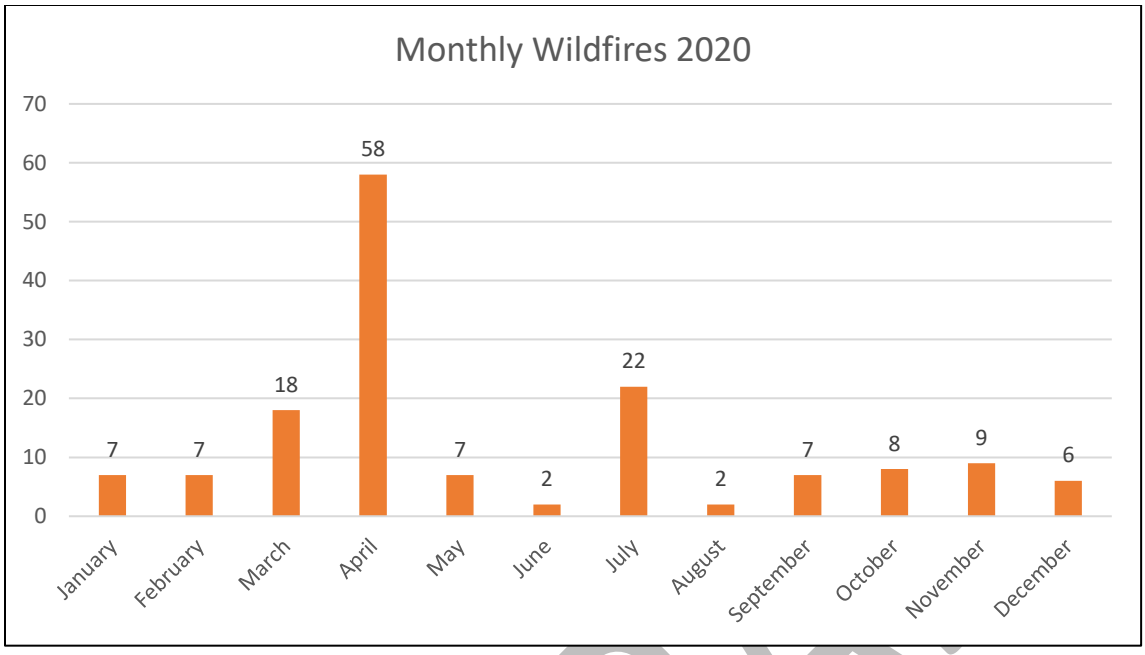


Figure 2-17c

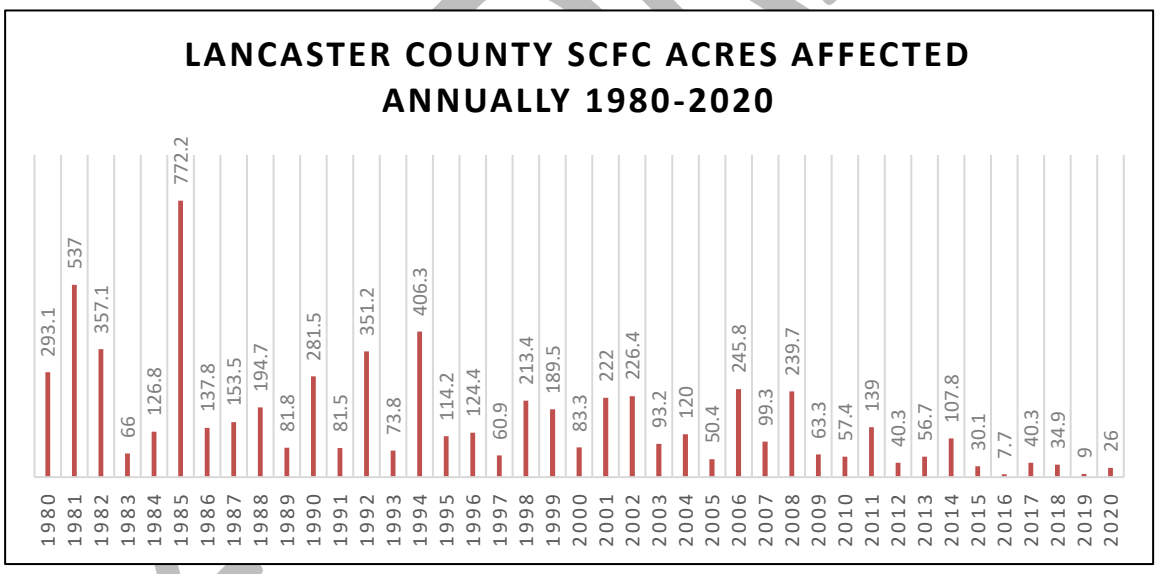


Figure 2-17d

D. Jurisdictions Affected by Wildland Fire

Wildland fires typically occur outside of heavily developed areas and not in municipal localities. Lancaster, Kershaw and Heath Springs have railroads that cross through them. The associated 60' railroad right-of-ways through the municipalities are often accompanied by tracts of undeveloped land subject to wildland type fires, however as referenced previously in Table 2-5 Lancaster County doesn't see this trend. (Appendix 7)

SCFC provided map data in Figure 2-18 which shows fire by size, class and location. The map below indicates that SCFC responds to more rural areas and less to the more populous regions. (Appendix 8) In contrast, Lancaster County Fire Rescue has seen an influx in population and now deals with more of an urban interface style fire situation to which our fire departments are equipped to mitigate. Our fire problem changed and our staff met those challenges with diversified equipment.

There are two diseases that affect Lancaster County's trees, in turn affecting the number of wildfires in the County. The first of the two diseases is Oak Wilt. This disease is caused by the fungus Ceratocystis fagacearum. This fungus causes vascular issues within the county's trees. It is transmittable from Oak trees to other trees through root grafting or insects feasting on an infected tree and spreading infected spores to other trees. This disease causes vascular disease in the roots, thus drying out the infected tree making it more susceptible to fires. The second disease affecting Lancaster's trees is Dutch Elm disease. This is caused by fungi as well. It can be spread through beetles. This disease also causes wilting and drying, making the infected trees more susceptible to fires.

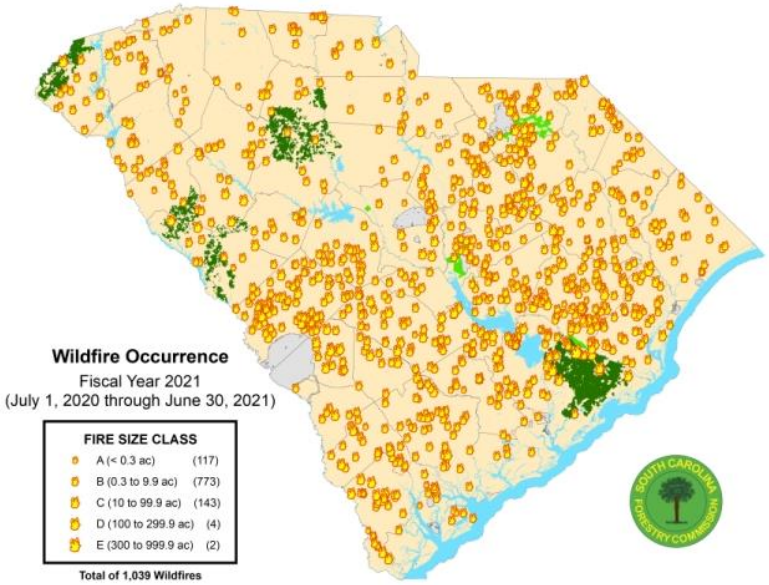
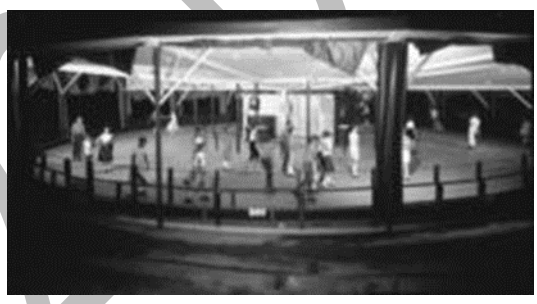


Figure 2-18

Figure 2-19 shows wildland fires that occurred from January 1, 2020 through December 31, 2020 in Lancaster County. (Appendix 10) These results were obtained from Lancaster County Fire Rescue and include all outside fires not involving structures, vehicles, or other equipment. This illustrates a correlation between population density and the occurrence of wildfires. The three fire districts with the greatest population density in the county, Gooches, Indian Land and Pleasant Valley, have the highest incidence rates of wildfires, while the less dense districts of the county have fewer wildfires.

An example of a wildfire that Lancaster County has responded to can be seen at the Springs Park Fire in March of 2021. This incident would likely be classified as a structure fire, however it led to a brush fire. On March 17 of 2021, firefighters responded to the old Springs Park at 21:00. When units arrived it was confirmed that the structure ablaze was the old skating rink that used to be a staple at the successful 1980's family amusement park. The structure was burnt to the ground, but spread to surrounding brush on its way down. The fire was raging so large that South Carolina forestry was called by command at 21:13. Forestry was desperately needed as the County's fire trucks were too large to reach the fire and brush truck hoses were insufficient for a fire of the size. An image of this fire can be seen below as well as a photo of the structure and surrounding areas before and after the fire.



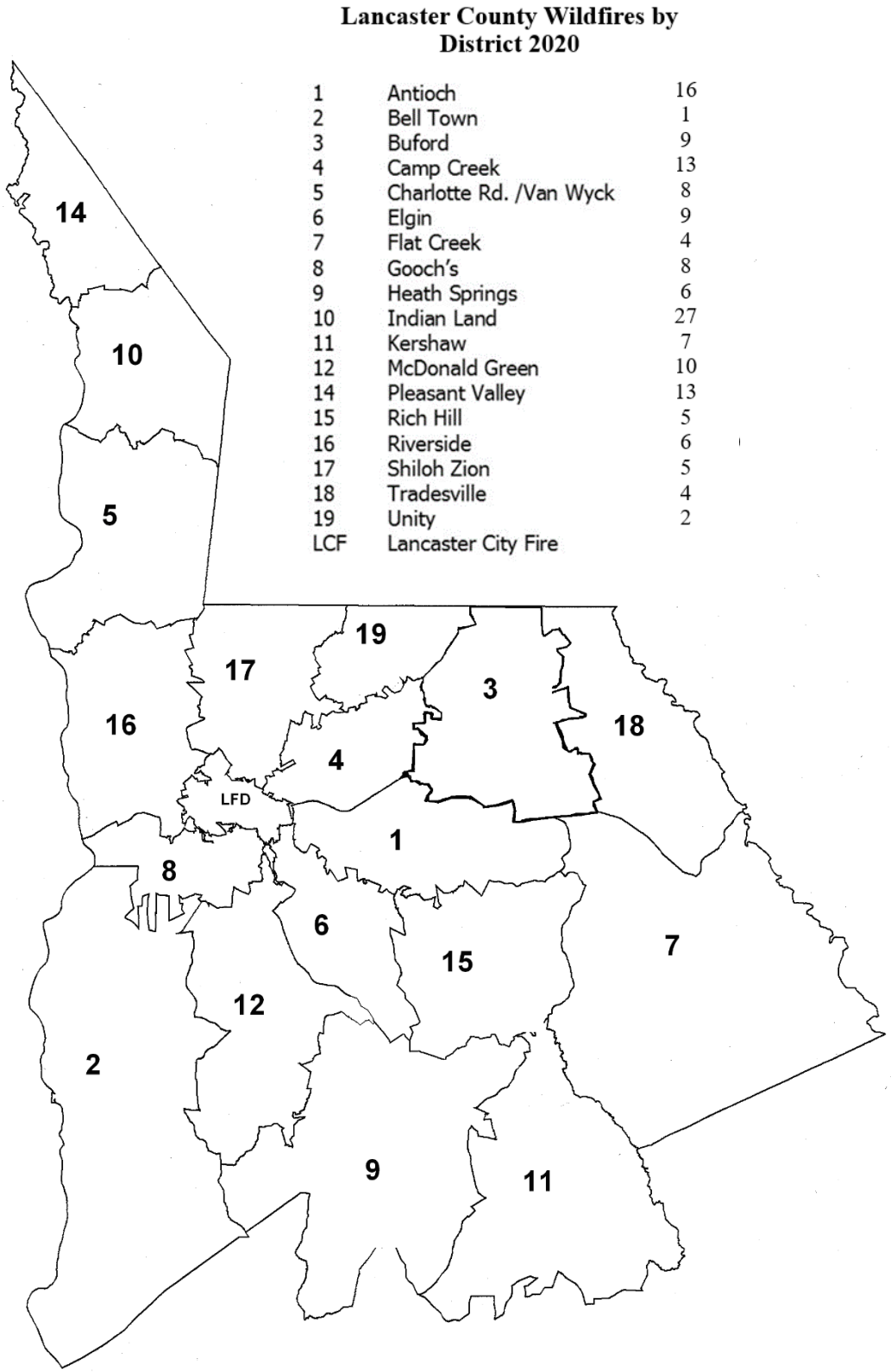

Lancaster County Wildfires by District 2020
1 Antioch 16
2 Bell Town 1
3 Buford 9
4 Camp Creek 13
5 Charlotte Rd. /Van Wyck 8
6 Elgin 9
7 Flat Creek 4
8 Gooch's 8
9 Heath Springs 6
10 Indian Land 27
11 Kershaw 7
12 McDonald Green 10
14 Pleasant Valley 13
15 Rich Hill 5
16 Riverside 6
17 Shiloh Zion 5
18 Tradesville 4
19 Unity 2
LCF Lancaster City Fire
14
10
5
19
17
3
16
18
4
LFD
1
8
6
7
15
12
2
9
11

Figure 2-19

XIV. Technological and Man-Made Hazards

Lancaster County is undergoing constant residential, commercial, and industrial expansion due to its proximity to the Charlotte metropolitan area, the presence of the L&C Railroad, and the major state and U.S. highways that traverse the county. Because of the growth in residential population, daily thru-county traffic, and increases in transport and on-site storage of hazardous materials, there is also a constant growth of the risks associated with incidents involving hazardous materials or critical infrastructure. While there are concerns and problems specific to each individual man-made and natural hazard, there are unique complications that can arise when these two hazard classes are combined in single incidents. The major classes of man-made or technological hazards that are present in Lancaster County are dam failures, hazardous material releases, train derailments, infrastructure failures, water/sewer system disruption and power system failures.

A. Hazardous Materials

Lancaster County has multiple facilities that use hazardous materials in daily processes. There are others that create, store and ship hazardous materials. Through hazard planning, Emergency Management identified six high risk, four moderate risk and nineteen low risk facilities in the county. The risk is identified by analysis of material on site and its potential to impact the public or environment. This data is compiled under the cover of the Lancaster County Hazardous Materials Response Plan. (Appendix 9)

Identification and classification for these facilities is developed using E-Plan which is a Hazard and Emergency Management tool that utilizes federal Tier II reporting regulations. On a normal day when all process and containment works as it is designed, there are no risks. When things go wrong and a failure occurs, whether it be technological or anthropogenic, there becomes a hazard to humans, the environment, infrastructure, and property.

The hazards identified by Lancaster County Emergency Management related to hazardous materials are:

- Accidental Release
- Fire
- Severe Weather
- Equipment Failure
- Transportation
- Infrastructure Compromise

Some of these hazards may be interrelated (such as equipment failure causing a fire or severe weather causing infrastructure compromise). Also, some hazards consist of hazardous elements which relate to one of the six above.

1. Accidental Release

An accidental release can happen as a result of multiple interrelated hazards. These accidental releases require some intervention either by facility staff or response agencies to mitigate the incident. Lancaster County Emergency Management, Fire Rescue and the Hazardous Materials Response Team have responded before to incidents of accidental release of hazardous materials into the environment. It is recognized that industry mitigates many small-scale non-reportable incidents without activating the 911 system. Facility location in the community plays a major role in consideration of what chemicals may be released and the measures necessary to control the leak and numbers of people that may need to be evacuated.

2. Fire

Nearly all of the hazardous materials present in Lancaster County are adversely affected when exposed to extreme heat or open flame. As such, fires in or around facilities handling these materials can prove to be dangerous to any surrounding people or property. Lancaster County and City Fire Services are equipped to mitigate fire incidents involving hazardous materials, but, depending on the properties and amount of chemical involved, the duration and severity of such an event can vary greatly.

3. Severe Weather

As with Lancaster County in general, facilities that handle hazardous materials are subject to distinct risks from severe weather events such as those addressed in this plan. Hurricanes and Tornadoes in particular can bring damaging lightning, rain, flooding, hail, and heavy winds. Risk to the population from a hazardous material release caused by these conditions would only be compounded by resulting damage to critical facilities and infrastructure. Response times for repair and containment personnel could be lengthened, increasing the duration of an environment hazardous to both on-site workers and the general public. In the event that neither the facility itself nor containment structures are compromised, most of these facilities still rely on regular delivery of supplies necessary to daily operations. Any interruption of normal function for these facilities caused by severe weather could be disastrous under the right circumstances.

4. Equipment Failure

Unforeseen failure of any aspect of operations at a facility handling hazardous materials could easily result in a release of product. Unlike an accidental release, the ability to contain the released material may be compromised by the failure of equipment crucial to normal operation. Like damage caused by

severe weather, time will need to be taken to return failed equipment to working order, possibly causing greater release in ensuing downtime.

5. Transportation

Transportation is perhaps the greatest threat present in Lancaster County when it comes to hazardous materials. A majority of the facilities that use or store hazardous materials in the county do not produce the materials on site and must have them shipped by road or railway to them. Because of the major state and U.S. highways and rail line that traverse the county, there is a significant risk of transport accidents involving hazardous materials and daily commuters or the general population of the county. As with equipment failure, the unpredictable nature of events such as these can cause variation in the severity of the events.

6. Infrastructure Compromise

As do homes and other businesses, the facilities that handle hazardous materials in the county rely heavily on existing infrastructure such as roads, bridges, water and sewer, and electrical utilities for normal day-to-day operations. The loss of any number of these resources could mean an interruption in operation, an inability to move or contain materials, or an uncontrolled release of a dangerous substance into the environment.

Two examples of recent hazardous materials release in Lancaster County were minor incidents and were both controlled after release. One occurred on October 7th 2019 at the water plant in Catawba. It was determined that the leak was a chlorine based disinfectant. County fire units responded to the scene. There were no casualties or injuries at this location and the road leading to the plant was blocked until deemed safe to use. The second incident was at Southern Paws Animal Hospital on October 1st 2020. This incident occurred as a result of human error. The pool personnel mixed the wrong chemicals and mustard gas was released. Lancaster County personnel responded and the area was evacuated. Roads and routes leading to the facility were blocked to public entry. This incident resulted in seven patients that were treated by units on-scene. There were no casualties.

As shown above, many of the risks associated with hazardous materials in Lancaster County are interrelated. One event could propagate a series of failures that lead to the release of a dangerous substance, potentially affecting hundreds or thousands of people. It is not the position of this plan to push for businesses and industries in Lancaster County to avoid the use, sale, or storage of hazardous materials. When used and managed properly, it is safe and can be beneficial to use hazardous materials for industrial or commercial processes. The purpose of this plan is to recognize and address the situations which would place the population of Lancaster County at risk in the event of a release of hazardous materials.

B. Train Derailment

The Lancaster and Chester Railroad services more than sixty miles of track, thirty of which lies in Lancaster County and is headquartered in the City of Lancaster. As natural and technological disasters intersect, there are instances of infrastructure failure that impact railroads in the United States. Incidents such as derailments, bridge and rail failures, human error and hazardous materials spills plague the railroads. Local, regional and national incidents assist in the design of this Hazard Mitigation Plan.

In Lancaster County, a majority of the material transported by rail is soybean grain and other soybean products. Recently, however, railcars filled with propane have begun to populate the rail line. In addition to the dangers presented by trains crossing major highways and other roads, the new danger of a collision or derailment involving a railcar filled with highly flammable propane has surfaced.

Past Occurrences

In Lancaster County, we have experienced many technological failures leading to notable rail incidents. Lancaster and Chester Railroad, formerly Cheraw and Chester Railway Company, opened in 1873 and by 1896 was sold due to financial struggles. Colonel Leroy Springs purchased the railroad to move his textile products from mill to mill within the Lancaster County area. According to Lancaster and Chester Railroad, "in April 1899 the wooden trestle over the Catawba River burned" and "within a month the depot at Lancaster was destroyed by fire." All were rebuilt and on June 30, 1913 the railroad experienced the "worst wreck in the railroad's history." This was a derailment where the freight and several passenger cars left the track and 'plunged to the bottom of the creek" which led to the collapse of Hooper's Creek Trestle. Five people lost their lives in the wreck. "A train also derailed and crashed into the Buy-Rite Discount Beverage in downtown Lancaster in February 2007. Two people were inside the store when the cars came crashing through, one of those people was airlifted to the hospital. Railroad officials say the train's engineers accidentally shoved the train's cars about 30 feet off the track while trying to add a rail car to the line. The store was demolished." Also, in 2010 and 2011, trains derailed in the city, blocking traffic for hours (WBTV News).

C. Infrastructure Failure

While there is not a history of major road and bridge failures in Lancaster County unrelated to weather events such as heavy flooding, there is a large number of old bridges and roads that require regular maintenance and repair. Many of these roads and bridges have been scheduled for evaluation and repair by SCDOT, but with the heavy damage in the Columbia area from the October flooding, some of these projects have been postponed due to a reallocation of resources to other parts of the state. The danger is ever-present during heavy rain events or other incidents that put these structures under greater stress than they normally experience.

D. Water/Sewer System and Power System Failures

As with other county infrastructure, there has been no recent history of major water/sewer and power system failure due to malfunction or error alone, however they are both subject to the same dangers from certain weather events that can adversely affect their normal operation or create dangerous situations. In recent years, though, there has been an increased risk nationwide of domestic or foreign terrorism that could target critical systems such as these. While this plan does not address terrorism specifically due to its complex and far-reaching nature, a mitigation plan is contingent upon exploring all sources of hazards to certain systems and structures.

E. Cyber-Attacks and Viruses

Since the last update of this plan in 2017, one of the newest threats present in the county are cyber-attacks and viruses. According to the Computer Security Resource Center, a cyber-attack is defined as "An attack, via cyberspace, targeting an enterprise's use of cyberspace for the purpose of disrupting, disabling, destroying, or maliciously controlling a computing environment/ infrastructure; or destroying the integrity of the data or stealing controlled information." The same source defines a virus as "A computer program that can copy itself and infect a computer without permission or knowledge of the user. A virus might corrupt or delete data on a computer, use e-mail programs to spread itself to other computers."

In Lancaster County a majority of emergency communications are delivered using computer software. Computer software is used to send out county-wide emails to employees, notify first responders of impending calls, and many other important tasks. A significant amount of Lancaster County employees use computers daily, so a cyber-attack or virus could be detrimental to daily operations. A virus could also be used to leak sensitive information. In order to combat this issue, the county utilizes anti-virus software on its computers and many sensitive files are password protected and only accessible by few employees.

Through researching cyber-attacks and viruses affecting Lancaster County, there was only one occurrence found in the City of Lancaster. According to the Lancaster News, who had an interview with the county IT director, there was a virus that effected the City of Lancaster's e-mail server on December 18, 2021. The virus was able to affect city computers only because it was an entirely new virus that security companies had "never seen before." The incident involved a virus that caused several e-mails addresses associated with the city to distribute messages containing an attachment to spread the virus and infect other computers. This could have been detrimental to the county, however the quick response of the information technology department prevented this. There was no danger associated with the emails. The city's anti-virus "stripped the virus off of the documents." It was also beneficial that all accounts affected were blocked by 8:45 AM when the attack only began at 8 AM the same morning. This

quick response prevented the city's database from being affected and no data was lost.

F. Geomagnetic Disturbances

Geomagnetic Disturbances (GMDs) are disruptions in the Earth's magnetosphere that primarily result from solar activity. The most significant source of these disturbances is a Coronal Mass Ejection (CME), which is when a massive volume of plasma is released by the Sun and, if directed towards the Earth, can cause severe magnetic and electrical disturbances to satellites, aircraft, ground-based electronics, and other systems. The Earth is constantly subject to solar radiation that causes no immediate threat to human life and technology, however, the relatively short warning time (a few days to less than 24 hours) of a CME can limit preparation time for sensitive systems on which society relies.

An electromagnetic pulse (EMP) is a burst of energy resulting from an atmospheric nuclear detonation from an adversarial attack. These bursts of energy are harmless to humans, but they can affect key resources that are essential to the well-being and daily activities of local government operations. Among the many items that can be affected by an EMP are the power grid, computers, satellites, radio receivers, and traffic lights. Perhaps the most vulnerable system to an EMP attack would be the telecommunications systems utilized by emergency services. Some vehicles would survive only because the chassis would protect the electronic systems within them, but not all. Fully electric vehicles would likely be damaged to the point of inoperability, as well as some of the electronic components with today's gas and diesel powered vehicles. The majority of activities in everyday life require some kind of electronics, leaving the entire country vulnerable to an EMP.

There is no history of A GMD affecting Lancaster County. Two notable instances of GMDs are the Carrington Event of 1859 and the Quebec Blackout of 1989. The Carrington Event was the result of "The Perfect Solar Superstorm," resulting in a solar flare sending electrified gas charged with subatomic particles toward Earth. The Carrington Event caused the atmosphere to be so charged with electricity that telegraph machines (the only electronic means of communication at the time) could be unplugged and transmissions could still be sent intermittently. After the event, citizens were reporting skies filled with light. Since society had not yet come to rely on electrical power to sustain everyday life, the results of this event were far less devastating than if it had occurred today. In Quebec in 1989, however, the aftermath of a CME was more alarming and had a greater impact on those affected. This event caused a twelve-hour blackout of Hydro-Quebec's power grid, putting millions out of power. This event, while not extremely long in duration, highlighted the susceptibility of power grids, and all other electronic systems by extension, to these disturbances.

XVI: Infectious Diseases

An infectious disease is described by Merriam-Webster as, “a disease caused by the entrance into the body of pathogenic agents or microorganisms which grow and multiply there.” A pathogen is an organism that can produce diseases. Three categories are used to describe infectious disease outbreaks. They are pandemic, endemic and epidemic. An epidemic is a disease that affects a community population or region and a pandemic is an epidemic that has spread to multiple countries or continents. An endemic is an infectious disease that “never goes away.”

The prevalence of this biological hazard has recently been brought to light due to COVID-19, but infectious diseases have been afflicting civilizations for millennia. One example of a historical infectious disease is smallpox. Because smallpox pustules were found on a 3,000-year-old mummy, it is possible that this disease has been around since the Egyptian Middle/New Kingdom periods. Smallpox was an infectious disease that was caused by the variola virus and resulted in fever and a progressive skin rash. Three in ten individuals who contracted the disease died. No naturally occurring cases of smallpox have been discovered since 1977 and the last known case was in 1978. The 1978 case was transmitted through airborne pathogens from a smallpox investigation in a microbiology lab. The World Health Assembly declared the world free of Smallpox in 1980. The Black Plague, or Black Death, was an epidemic that occurred in Europe and Asia in the 1300s. The first known case of the plague was in October of 1347. On this date, many ships arrived from the Black Sea. When the boats docked those waiting for their arrival were met with boats full of dead sailors. Those that were still alive were deathly ill and covered in black boils. Authorities ordered the ships out of the harbor, but transmission had already occurred. The Black Death claimed the lives of twenty-five to fifty million people over five years. This disease was exceptionally contagious as a touching of clothes could contaminate the healthy. The plague was effective as a perfectly healthy person could go to sleep and be dead by the morning. This plague is caused by the bacillus Yersina pestis. It travels from carrier to carrier through the air and can be caused by the bite of an infected flea or rat. This disease never really ended and came back years after it calmed in Europe. However, it did slow through a mandatory 40-day quarantine for incoming sailors. There are now antibiotics that can be used to treat the Black Death, or as we now call it the plague, but the World Health Organization reports 1,000 to 2,000 cases of the plague every year with 7 in the United States. The Plague usually causes painful and swollen lymph nodes which are called bubos, along with fever, chills, and coughing. It has a case-fatality ratio of 30-60% when treated and is always fatal when left untreated.

Another well-known historical infectious disease is malaria, which is carried by mosquitoes and caused by a parasite known as plasmodium falciparum. A bite from an infected mosquito or a transfusion from an infected individual can cause malaria. Individuals with malaria often exhibit the symptoms of a high fever, chills, and present flu-like symptoms. There are about 2,000 cases of malaria diagnosed in the United States each year. According to the Public Health Emergency Collection, as of 2016 the five-year average for malaria cases within South Carolina was 8.4. There is a

malaria vaccine that was approved and recommended for wide use in 2021. It is also recommended that precautions be taken by those planning to travel to malaria-endemic areas. Impoverished communities are at a greater risk as they are less likely to have the resources needed to treat and prevent malaria. There are drugs such as chemoprophylaxis that are used to treat malaria and bed nets prove to reduce childhood morality by 15-35 percent. High transmission of malaria is known in Africa and according to WHO it kills over 1 million people in Africa yearly.

A. Public Health Effects of Disease Outbreaks

Any type of disease outbreak can greatly affect any population. Infectious disease can lead to increase mortality rates in infants and children due to transmission in utero. Behavioral changes can also take place in an area's population due to the prevalence of a disease. These changes could be fear of contracting the disease leading to an aversion of many places. Some ways to combat infectious disease are through passive and active immunity. An example of passive immunity is through the passage of maternal antibodies through placenta. This transmission of immunity will become greater over time with increased exposures. Active immunity is acquired through an exposure to a disease and building antigens to fight it, this is the most commonly referred to type of immunity. Another type of active immunity is artificial and an example having a vaccine that allows the immune system to create antigens to help fight future exposures to the disease. Historical vaccines have been created in response to many well-known infectious diseases. For example, the creation of the malaria vaccine began in 1987 and was approved in October of 2021. The vaccine is known as the RTS, S vaccine and studies show that it decreased hospitalizations from severe malaria by about 30%. Another well-known vaccine is the influenza vaccine. The first known development of an inactivated flu vaccine was in the 1940s by Thomas Francis and Jonas Salk. This first vaccine was for the influenza A virus. Influenza viruses continue to adapt annually, so vaccines must adapt.

B. Secondary Effects of Disease Outbreaks

An infectious disease outbreak can cause economic damage through medical supply shortages, employee shortages due to illness, and the inability to purchase items due to inflation as a result of reduced stock. If large numbers of society members avoid going to highly populated areas like work, grocery stores, and other public places the economy can suffer greatly. If there is a worker shortage, a supply shortage could ensue, leading to a decrease in needed supplies to fight the disease. An example of the previously mentioned disruptions to supply chains can be found in the recent COVID-19 pandemic. According to the FDA there is a shortage of personal protective equipment (gloves and masks), testing supplies and equipment, and ventilation-related products. These shortages are likely due to the increased amounts being used in the COVID-19 outbreak and an insufficient production system. The FDA suspects these shortages to last through the duration of the pandemic. A response to a large outbreak could also result in monetary losses for a government or community and lead to an economic decline.

C. Measures Developed for Disease Outbreaks

As mentioned repeatedly above, a widespread disease outbreak can be detrimental to a society if there are not measures in place to counteract the disease's effects. The Center for Disease Control, the federal government, and state governments attempt to prevent these outbreaks and assist individuals, businesses, and corporations during an outbreak. These organizations are critical to quick response to this type of hazard.

1. Center for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) attempts to halt outbreaks before they begin through the Global Health Security Agenda (GHSA). This agenda accelerates progress toward strengthening global health capacities. In an effort to strengthen the immunity of the globe, immunizations are given, antibiotics are promoted, and laboratories containing harmful pathogens have rigorous safety precautions in place. The CDC also monitors and keeps real time surveillance of all suspected cases of diseases to prevent an outbreak. When there are outbreaks, the CDC links with emergency operation centers and law enforcement and deploys personnel to assist countries in distress. The CDC also recommends the wearing of face coverings in public indoor settings and for employees to be tested for COVID-19 if they have had a known exposure. This guidance is essential to ensure worker well-being. The well-being of employees ensures an adequate workforce, in turn providing an adequate supply of goods. This supply of goods keeps the economy running.

2. State Governments

According to the U.S. Constitution, a state government shares a major role with the federal government when responding to disease outbreaks. The 10th Amendment of the United States Constitution grants that all powers not specifically delegated to the federal government are given to the states. This gives state governments the authority to respond to public health emergencies. This authority allows state governments to set quarantines and curfews as needed. In response to the latest COVID-19 pandemic the state of South Carolina implemented Accelerate SC. This website provides citizens with an online resource to see economic revitalization efforts, as well as COVID-19 statistics. The website also addresses the subjects of education, business, and the social and economic impact of the pandemic. In addition to this resource, the state governor issued multiple executive orders pertaining to response to COVID-19. These executive orders included measures that prevented price gouging on goods, which is necessary to ensure available goods are not out-of-reach to citizens. Another executive order was used to ensure that some restaurants could still operate, which is essential to keep the economy flowing.

3. Federal Assistance Programs

Federal assistance programs may be established to address the many underlying effects that a disease outbreak, such as the COVID-19 pandemic, can have on a nation. During the COVID-19 pandemic, the federal government enacted many initiatives, programs, and funds to provide assistance to states, local governments, and individual families. One of these programs was the Families First Coronavirus Response Act. This act was put into place to ensure that the economy was still flowing regardless of worker shortages due to quarantine time, school, or daycare closures. It called for certain employers to provide up to 10 weeks of paid and 2-week unpaid emergency family medical leave. In addition to this program the federal government also issued a grant to relieve the financial burden of pursuing a higher education to ensure that learning continues despite the ongoing pandemic. This grant is issued in order to assist in the cost of tuition, food, housing, healthcare, or emergency costs that arise due to the virus.

XVII: Changes from the Last Plan

As a result of the last plan update being in 2017, this section was updated to include more recent statistics. Any definitions included to describe each event were updated to match the National Weather Service's most recent definitions. The frequencies of hazardous occurrences were updated, along with the damages that they caused and the probabilities of reoccurrence. All maps and graphs were updated to include current information and statistics. In addition to these changes, the topics of climate change, cyber-attacks and viruses, earthquakes, and infectious diseases were added.

SECTION - 3
VULNERABILITY ASSESSMENT

I. Vulnerability Assessment

As a result of the Hazard Identification process, some of the hazards identified necessitate a Vulnerability Assessment. This assessment is performed to establish the impact these hazards will have on the manmade environment and how our citizens' safety may be affected. With the data collected from the hazard identification, it was determined that a vulnerability assessment focusing on specific hazards should be conducted. The requirement for the vulnerability assessment was to target natural, technological and manmade hazards which have caused major damage in the county or that have a relatively short frequency of occurrence. Therefore, the vulnerability assessment considered flooding, severe thunderstorms, tropical cyclones, winter storms, technological, and manmade hazards affecting Lancaster County.

A. Development Trends

An assessment of development trends was necessary to understand the vulnerability of the built environment within each community. The assessment directs us to consider the types and locations of future development within Lancaster County and accordingly, to conclude how to best strengthen it to be hazard resistant. As noted in Section 1, Lancaster County is South Carolina's fourth fastest growing county by percentage of population change, with an overall population increase of 30% from the 2010 population. This brings significant development of residential structures as well as commercial structures and infrastructure to keep up with the resulting demands.

1. Lancaster County

Unincorporated Lancaster County continues to grow with considerable residential and commercial development occurring in areas close to the North Carolina state line along the Highway 521 corridor in the community of Indian Land. The community of Buford also has seen some significant growth over the past decade as well. Despite this growth, 17.1% of family households and 21% of individual households are below the U.S. poverty line. Based on U.S. Census data, it is estimated that the overall population growth in the unincorporated county was 12 percent from 2010 - 2015 with a 7.8 percent increase in the number of housing units from 2010. The U.S. Census population estimate for 2015 is 85,842.

2. City of Lancaster

According to U.S. Census data, the City of Lancaster's population increased by 5.1 percent between 2010 and 2014, and the number of housing units in the City increased by 6 percent in this time period. Population density of the city is low at 1,541 people per square mile. The City of Lancaster is experiencing growth in both residential and commercial development despite the loss of over 1000 jobs in textile and accessory industries during the mid-2000's. In addition,

the family household poverty rate is 27.4% and the individual household poverty rate is 31.5%. The median age in the City is 40.6. The population of the city increases by 68 percent with commuters to a total workday population of approximately 15,700. The city's land area is relatively small, 5.81 square miles, and will thus serve as a limit to growth in the future.

3. Town of Kershaw

According to U.S. Census data, the Town of Kershaw's population increased by 19.5 percent to 1,965 between 2000 and 2009 but there were no new homes built during the same period. According to the 2020 Census data estimates, the population of Kershaw has grown to 2,404. Using this estimate the population density is now 1,300 per square mile. This number has risen from 1,061 in 2010, and can largely be attributed to the continued growth of Haile Gold Mine. The mean population of the Town of Kershaw is 43.9 years with a 16.7% poverty rate according to 2019 estimates. The Town of Kershaw was founded in 1888 near the Haile Gold Mine where gold was discovered in 1825 and grew further with the textile industry boom of the last century. In the mid 1990's a 9 acre textile plant closed followed by mining operations leaving hundreds without jobs. Over the past decade additional gold deposits have been discovered and the once closed gold mine has been bought and reopened. New mining and processing facilities have been built and full-scale mining began in early 2017. Haile Gold Mine is currently employing 550 people, and 89% of their workforce resides in Lancaster County and its surrounding areas. Kershaw is also home to three public schools, Kershaw Elementary, Andrew Jackson Middle School, and Andrew Jackson High School. The town's land area is relatively small, 1.85 square miles, and will thus serve as a limit to growth in the future.

4. Town of Heath Springs

According to U.S. Census data, the Town of Heath Springs' population increased by 23.1 percent to 1,064 between 2000 and 2009 but there were only 2 new homes built during the same period. According to the 2020 Census data estimates, the population of the Town of Heath Springs has decreased to 1054. This would make the population density low at Population density of the town is low at 818 people per square mile. The population of Heath Springs has a 23.7% poverty rate and a median age of 39.8 years according to the 2019 estimates. The town of Heath Springs has increased in size as it annexed .10 of a square mile into the town limits in 2006. This annexation brought land into the town that has become an industrial park and business has moved into the park. The town's land area is relatively small, 1.30 square miles, and will thus serve as a limit to growth in the future.

5. Town of Van Wyck

According to the town of Van Wyck's website, the community was first called Cocheeco in 1764. This Indian named community was home to an Indian Fort, likely from the early 1700's when the Catawba Indians established it. The name of the community was changed to Little Waxhaw in the 1800's and then to Heaths. In 1887 the name of the community was changed to Van Wyck. The Town of Van Wyck was incorporated as a result of an incorporation vote held August 15, 2017. Residents voted 67-7 for incorporation. Since the town of Van Wyck is relatively new, the 2010 ZCTA (Zip Code Tabulation Area) will not include the population for the town itself. The new 2020 census will be used for an updated population. The ZCTA (see Community of Indian Land for description) for the town of Van Wyck is 29720, which makes it more difficult to find the exact population. However, according to its zip code of 29744 the town of Van Wyck has an estimated population of 920 in 2019. This is a 34.7% increase from its population of 683 in 2018. According to 2020 Census population estimates, the population of the Town of Van Wyck is 1120.

6. Community of Indian Land

The census data for Indian Land is more difficult to find than that of Heath Springs or Kershaw because it is not incorporated. However, the zip code of 29707 includes the northern panhandle of the county where Indian Land is located, but also includes the town of Fort Mill. The zip code of 29707 had to be aligned with the ZCTA (Zip Code Tabulation Area) used by the Census Bureau for the U.S. Census. The ZCTA that aligned with the zip code of 29707 was 29707. According to the 2010 census, the ZCTA of 29707 had a population of 17,742. In the 2020 census the ZCTA of 29707 had a population of 920. The community of Indian Land is located in the northern panhandle of the county where SC 160 intersects Hwy 521. The many new construction projects reflect the growth in the community. As of April 26, 2021 the Lancaster County Council approved a new development with Redwood USA that included a rezone of 37.45 acres of Indian Land. This company's intent is to build 15 triplexes and 15 quadraplexes on the land. A new apartment complex named 'The Mason' was built off of Six Mile Creek road in 2020. This apartment complex includes 300 units. Another new development in Indian Land are the Villas at Covington that is operating as a senior community. Indian Land is also home to the Sun City development. The Sun City development includes over 3,160 homes. In addition to the housing developments mentioned above, the Indian Land community continues to expand such as the construction of a new high school on Charlotte Highway built to accommodate 2,000 students, according to Lancaster County superintendent.

Increased development, especially in the northern panhandle region of the county, is reducing the amount of permeable ground surface available to absorb precipitation. As a result, runoff during large precipitation events is a growing concern. The close proximity of this region with the Catawba River, which forms the western boundary of the County, allows for most of this runoff to be directed towards the river and does not always pose a threat to citizens. Certain precipitation conditions either upstream or downstream of Lancaster County, however, may limit the ability of dam operators to release water in the right times to avoid flooding some normally dry areas. As property development continues and previously rural areas become urbanized, the natural paths for runoff and absorption will change and new, man-made runoff management systems will need to adequately prevent flooding in these heavily populated areas.

B. Inventory Information

In order to assess the vulnerability of the community, particularly to natural hazards, an inventory of the county's structures and critical facilities was performed. Critical facilities are those facilities that warrant special attention in preparing for a disaster and/or facilities that are of vital importance to maintaining citizen life and health safety, and community order during and/or directly after a disaster event. Lancaster County has prepared an inventory of critical facilities that includes emergency response facilities such as police stations, fire departments, emergency medical services stations (EMS) and medical centers/hospitals; public facilities including schools and local government buildings; and important transportation facilities including airports. Hazard Mitigation Planning Committee Members reviewed and updated the county's list during the planning process. A count of the types of facilities in each community is provided in Table 3-1.

Table 3-1
CRITICAL FACILITY INVENTORY

FACILITY TYPE	City of Lancaster	Town of Kershaw	Town of Van Wyck	Town of Heath Springs	Unincorporated County
Airport	-	-		-	4
Public Facilities	4	1		2	3
Judicial Facilities	2	-		-	1
Electrical Utility Facilities	2	1		-	11
Schools	7	2	1	1	17
Emergency Services (Fire Stations, EMS Stations, Sheriff, and Police Stations)	5	1	1	2	21
Communication Facilities	5	-		-	4
Water & Sewer Facilities	13	3		2	49

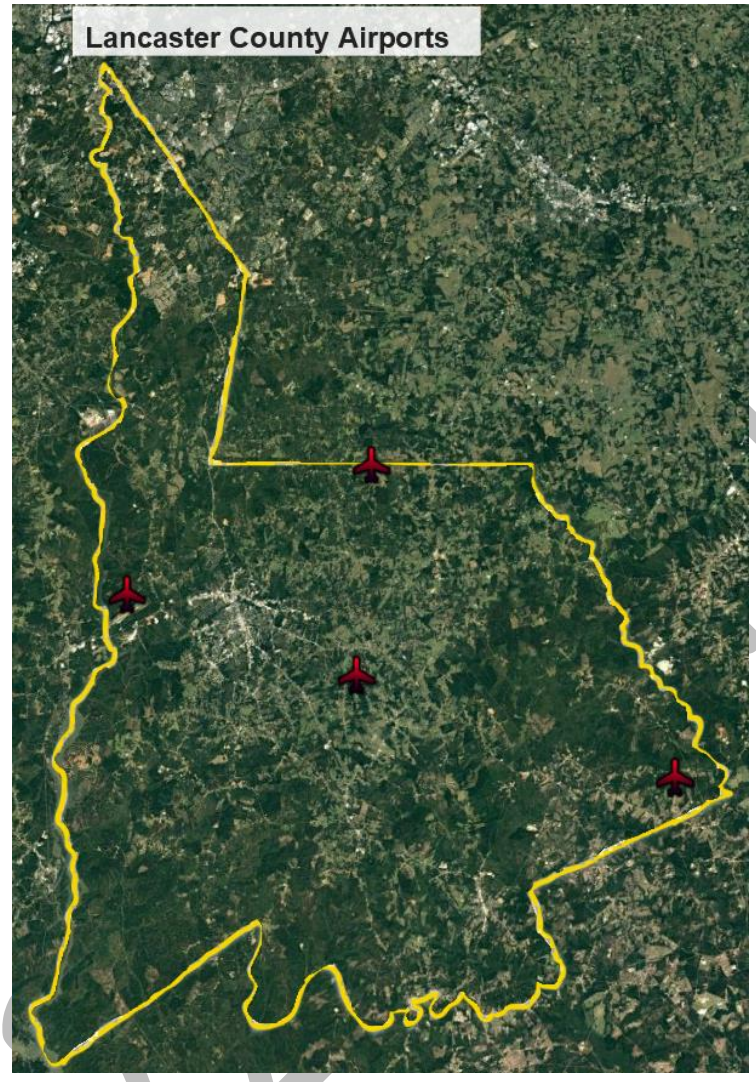


Figure 3-1

Lancaster County Airport, also known as McWhirter Field, is a county-owned, public-use airport located four miles (7 km) west of the central business district of Lancaster, in Lancaster County, South Carolina. Coordinates for this airport are 34°43'22.45"N / 80°51'16.52"W. (See figure 3-1)

Kirk Air base is a privately owned, public use airport located five miles southeast of the central business district of Lancaster, in Lancaster County, South Carolina. Coordinates for this airport are 34°40'27.54"N / 80°40'56.25"W. Unity Aerodrome is a privately owned, private use airport located nine miles east of the central business district of Lancaster, in Lancaster County, South Carolina. Coordinates for this airport are 34°48'9.54"N / 80°40'48.24"W. Bermuda High Soaring is a privately owned glider-port located nineteen miles southeast of the central business district of Lancaster, in Lancaster County, South Carolina. Coordinates for this airstrip are 34.61233°N 80.45056°W.

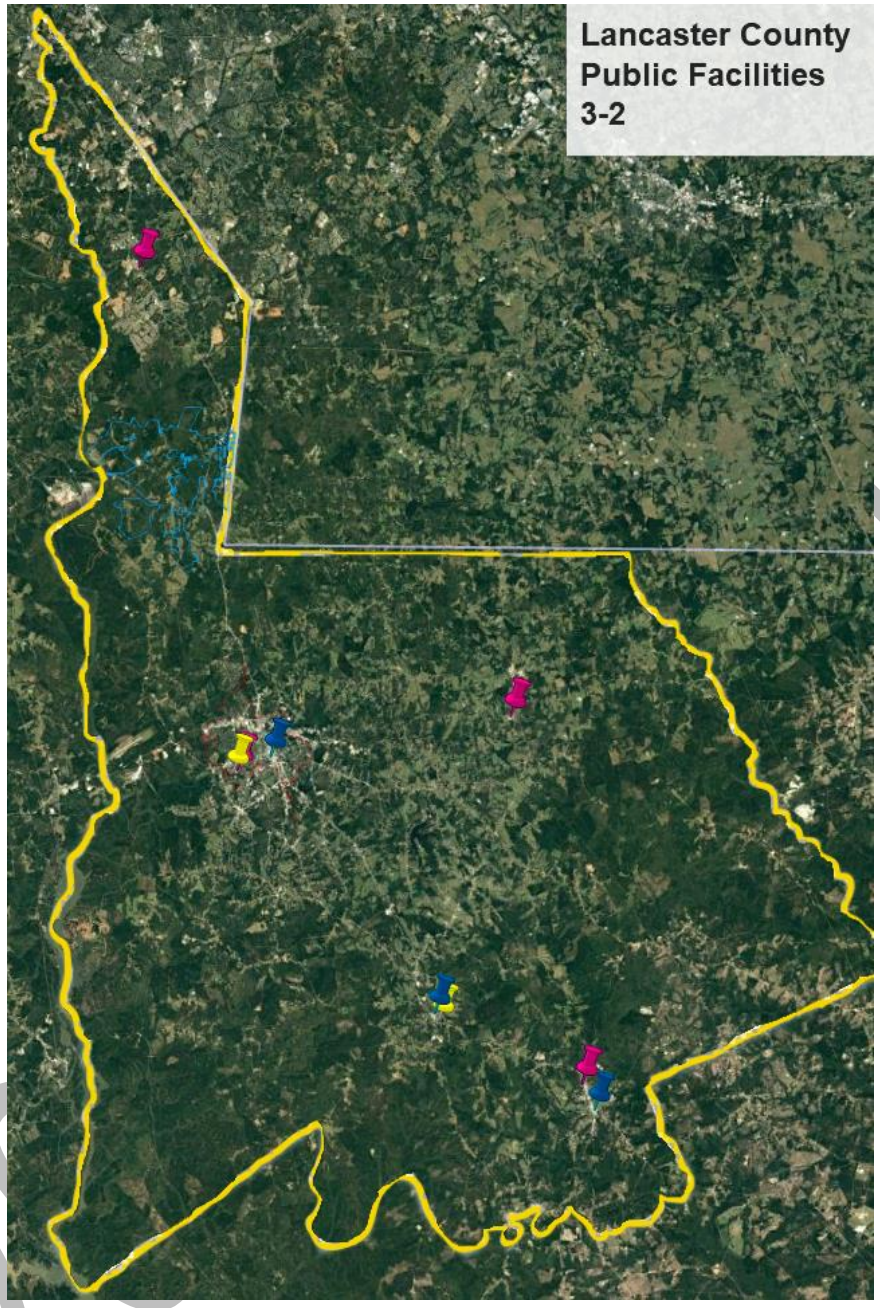


Figure 3-2

Public facilities in Lancaster County include Department of Parks and Recreation buildings located in the Indian Land Community, Town of Kershaw, Buford Community, and City of Lancaster. These sites have been identified for use as Disaster Recovery Centers. Additionally, this list includes properties used by the Lancaster County Council on Aging. These are located in Heath Springs, Lancaster, and the Indian Land communities. (See figure 3-2).

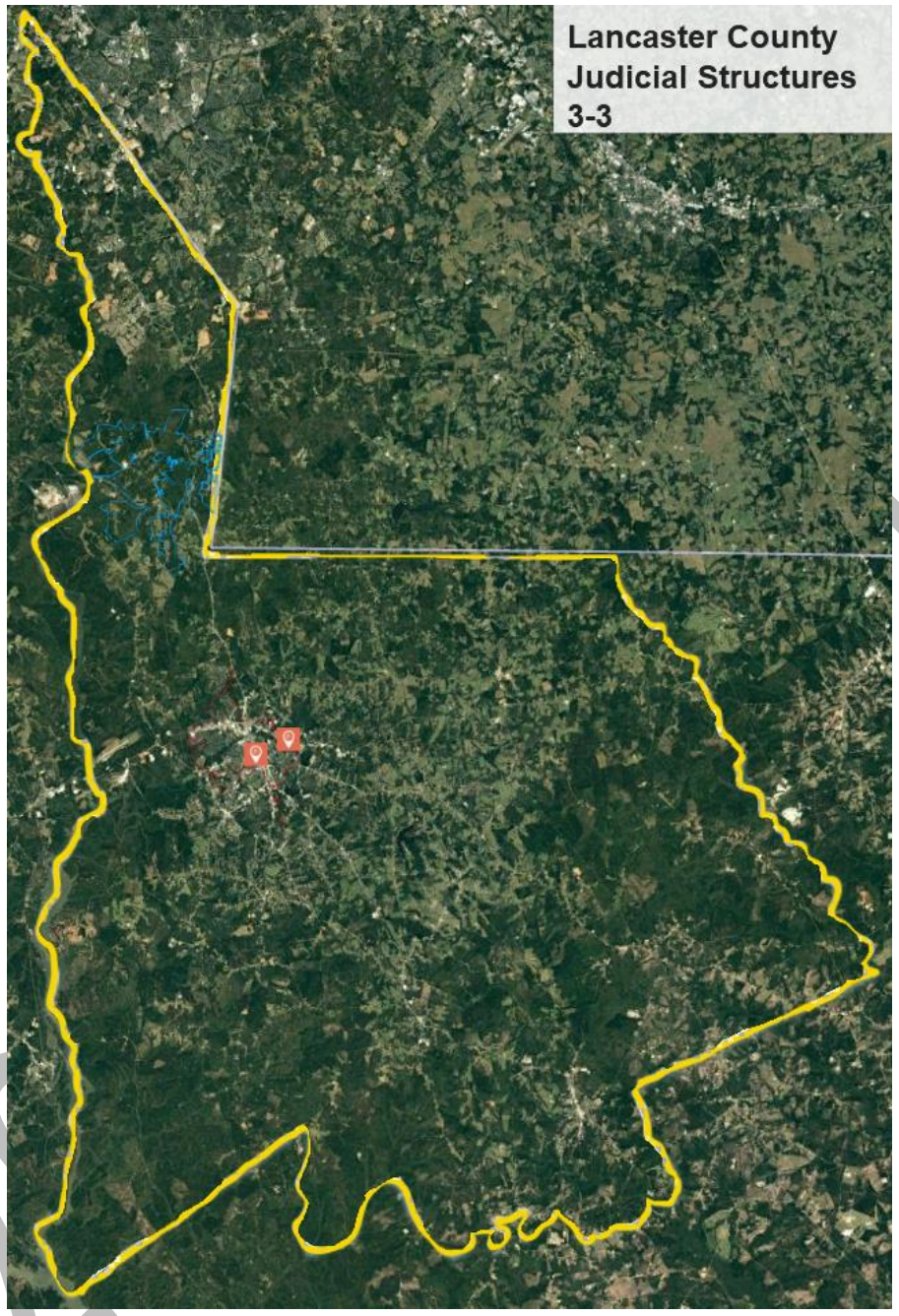


Figure 3-3

Judicial Facilities, namely courthouses are accounted for in our inventory of critical infrastructure. There are three such facilities in Lancaster County. Of these, two are located in the City of Lancaster and the remaining one is located in unincorporated Lancaster County. (See figure 3-3).

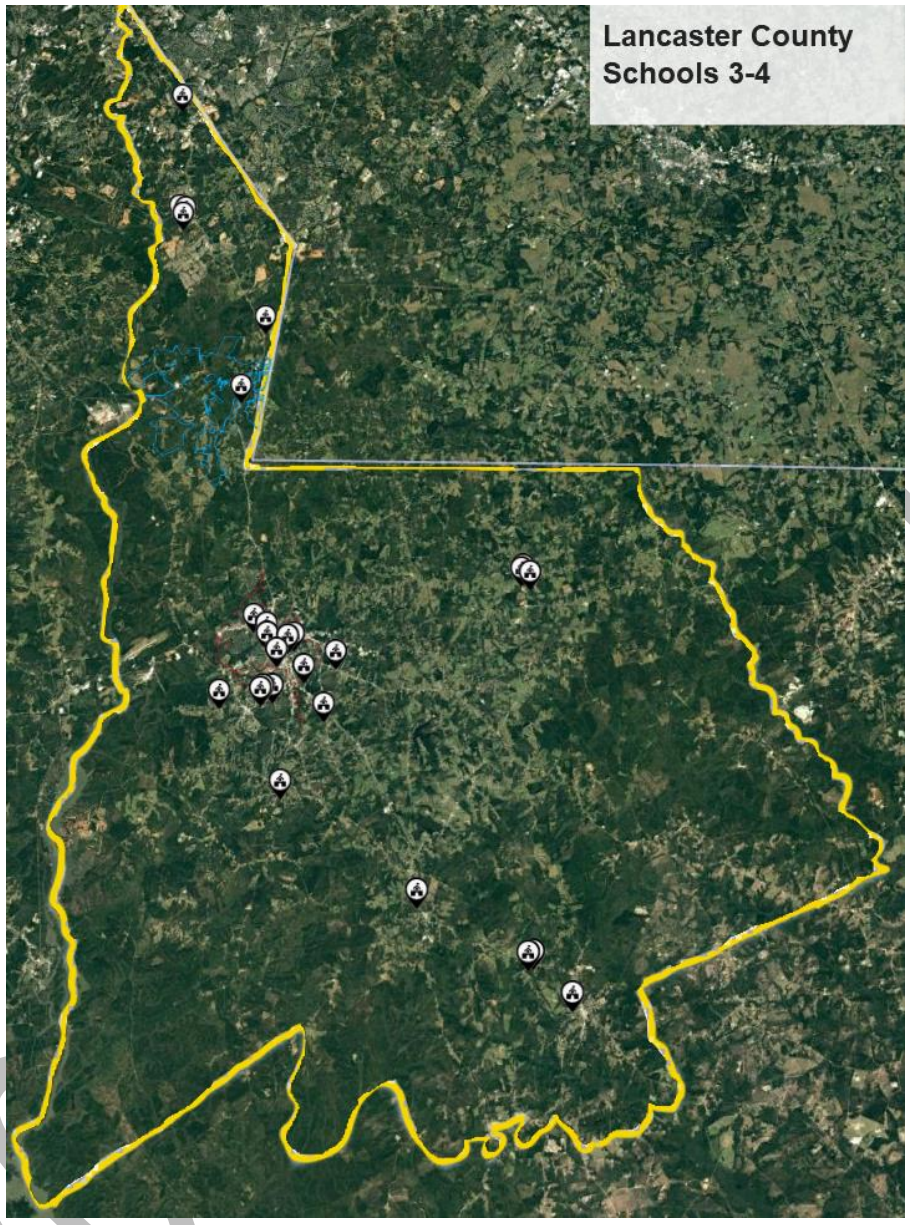


Figure 3-4

Lancaster County is home to 27 schools. These include 23 public schools belonging to Lancaster County School District, two privately owned Christian school, one adult education center and University of South Carolina at Lancaster. These facilities represent a product of considerable investment and many serve integral roles in our response and recovery plans. (See figure 3-4).

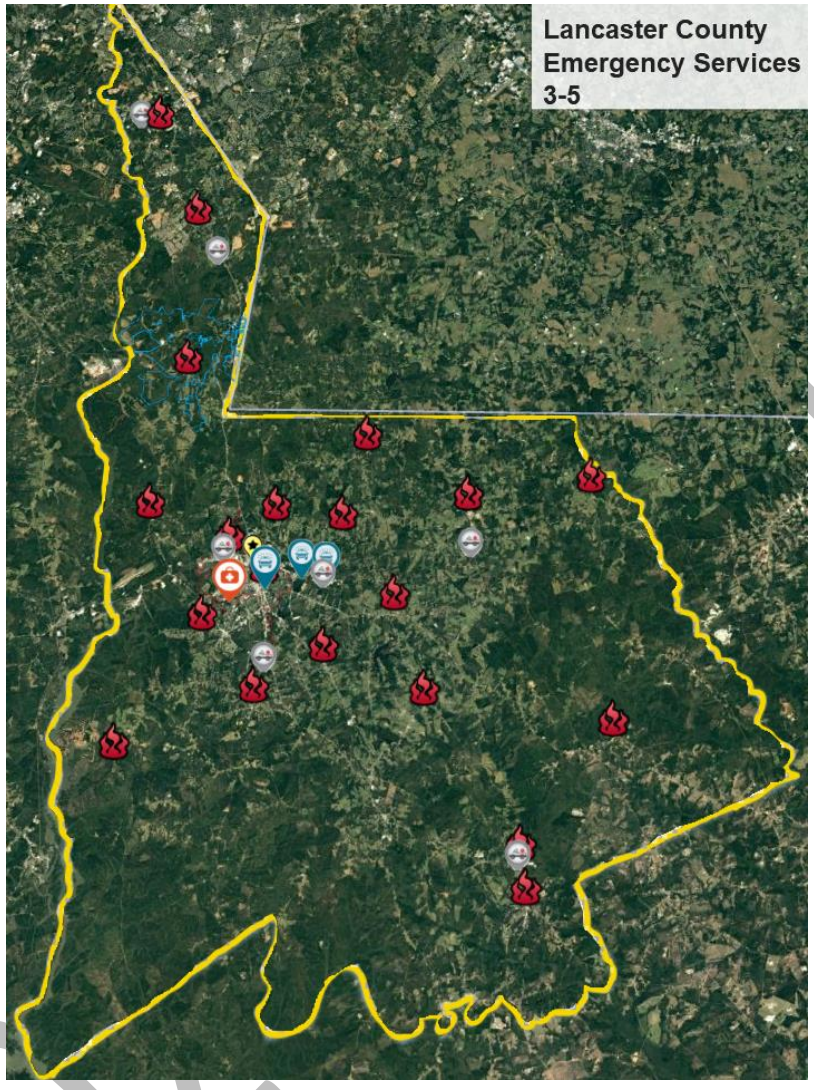


Figure 3-5

Emergency service facilities include fire stations, EMS stations, hospital, Emergency Operations Center, police departments, Sheriff's Department and the county jail. These facilities are some of the most important facilities in the county with regard to emergency response to disasters. These facilities house personnel and indispensable equipment. (See figure 3-5).

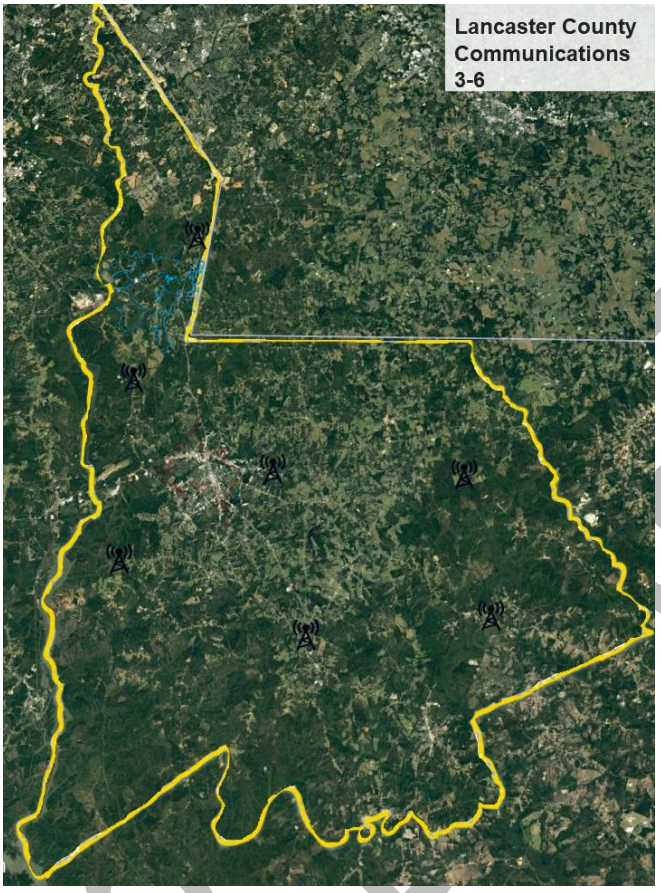


Figure 3-6

Communications facilities identified in this plan include those required for emergency services to communicate and respond to emergency incidents. As with emergency services, this infrastructure is indispensable to response and recovery efforts. (See figure 3-6).

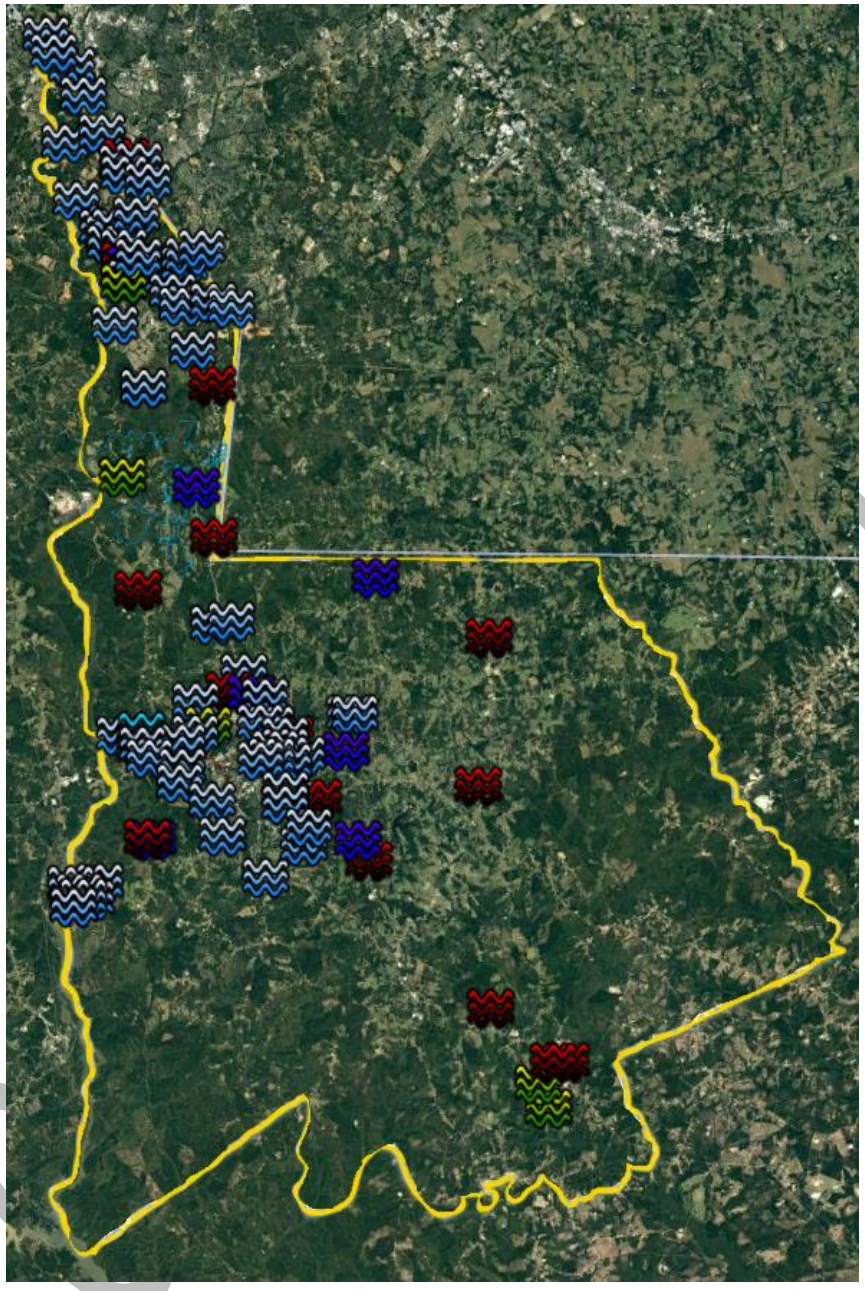


Figure 3-7

Other facilities that are essential to the health and safety of our citizens are water and sewer facilities. We have identified 67 installation points crucial to the effective operation of water and sewer systems operating within Lancaster County. (See Figure 3-7).

1. Lancaster County

Lancaster County owns and/or operates facilities across the county that are critical to the response of emergency services and recovery of its citizens to disaster (Appendix 12). Many of these locations are shown on the maps located in this section of the plan (figures 3-1 through 3-7). Please note that these figures do not include Lancaster County Water and Sewer District Properties. LCWSD property information is located in appendix 14.

Lancaster County Owned/Operated Properties	
Indian Land Recreation Center 8286 Charlotte Highway	$1,848,200
Springdale Recreation Center 260 South Plantation Road	$926,300
Buford Recreation Center 4073 Hurley Walters Road	$956,300
Andrew Jackson Recreation Center 6354 N. Matson Street	$695,100
Lancaster County Council On Aging South Plantation Rd	$1,441,400
Lancaster County Library (Indian Land) 7669 Charlotte Hwy	$3,167,900
Lancaster County Council on Aging 212 Spring Street, Heath Springs	$451,500
Lancaster County Courthouse 128 N. Main St.	$39,450,500
County Magistrates Offices 761 Lancaster Bypass East	$653,700
Lancaster County Sherriff's Office 1514 Pageland HWY	$3,069,700
County Administration Building 101 N. Main Street	$8,722,300
Lancaster County Airport 286 Aviation Blvd.	$2,806,200
Old County Jail 208 W. Gay St.	$340,600
Lancaster County Dept. of Social Services 1833 Pageland Hwy.	$3,009,700
Lancaster County Health Department 1228 Colonial Commons St. 100	$1,368,100
Lancaster County Coroner's Office 717 South Main St.	$234,100
Lancaster County Emergency Management 111 Covenant Place	$800,400
Lancaster County Public Library 313 South White Street	$2,203,600
Lancaster County Economic Development 1033 W. Meeting St.	$616,200
Lancaster County Family Court 104 N. Main Street	See Lancaster County Court House
Kershaw Branch Library 3855 Fork Hill Rd. Kershaw	$1,446,700

Lancaster County School District Properties	
Southside Early Childhood Center 500 Hampton Road, Lancaster	$307,700
Clinton Elementary 110 Clinton School Road	$707,300
Discovery School/GT 302 W. Dunlap Street	$1,071,900
Erwin Elementary 1477 Locustwood Avenue	$3,519,700
Harrisburg Elementary. **10251 Harrisburg Road, Indian Land**	$13,929,600
Heath Springs Elementary **158 Solar Road, Heath Springs**	$1,499,800
Indian Land Elementary **4137 Doby's Bridge Road, Indian Land**	$12,054,100
Kershaw Elementary **108 N. Rollins Drive, Kershaw**	$4,046,500
McDonald Green Elementary **2763 Lynwood Drive, Lancaster,**	$1,043,300
North Elementary and Adjoining Sports fields **1100 Roddey Drive, Lancaster**	$5,271,400
Van Wyck Elementary **4945 Charlotte Hwy, Lancaster**	$13,252,600
A.R. Rucker Middle **422 Old Dixie Road, Lancaster**	$1,608,500
Indian Land Intermediate **8361 Charlotte Highway, Indian Land**	$7,480,900
Indian Land Middle **8063 River Road, Indian Land**	$16,110,200
Buford High **4290 Tabernacle Road, Lancaster**	$11,345,900
Indian Land High **8063 River Road, Indian Land**	$2,311,100
Lancaster High **617 Normandy Road, Lancaster**	$19,418,800
Lancaster High Career Center **625 Normandy Rd, Lancaster**	$4,545,600
Andrew Jackson Middle and High School/ Arts Building **2865/2925 Kershaw Camden Hwy, Kershaw**	$9,468,000
Buford Middle/ Elementary Schools **1890 N. Rocky River Road, Lancaster**	$14,188,400
South Middle School/ Brooklyn Elementary School **1555 Billings Drive, Lancaster**	$9,404,200
Barr Street Adult Education Center **610 E Meeting Street, Lancaster**	$2,780,900

Lancaster County EMS Stations	
EMS Station 1, County Jail, Public Works Campus 1941 Pageland Hwy, Lancaster	$5,794,500
EMS Station 2 1101 Crestfield Avenue, Lancaster	$145,600
EMS Station 3 1301 McIlwain Road, Lancaster	$104,900
EMS Station 4/9 9576 Old Bales RD	$1,848,200
EMS Station 5 **365 Rocky River Rd.**	$303,200
EMS Station 6 3855 Fork Hill Road, Kershaw	See Kershaw Library
EMS Station 7 309 Hart Street, Heath Springs	See Heath Springs Fire Department
EMS Station 8 10209 Walnut Creek Parkway, Indian Land	$425,800

Lancaster County Volunteer Fire Departments	
Antioch Fire Dept. **3015 Taxahaw Rd., Lancaster**	$186,800
Bell Town Fire Dept. **4600 Great Falls Hwy., Lancaster**	$52,400
Buford Fire Dept. **1893 N. Rocky River Rd., Lancaster**	$222,400
Camp Creek Fire Dept. **2386 Camp Creek Rd., Lancaster**	$17,500
Van Wyck Fire Dept. 4455 Old Hickory Rd.	$117,100
Elgin Fire Dept. 114 Tram Rd.	$48,300
Flat Creek Fire Dept. **7563 Flat Creek Rd., Kershaw**	$165,400
Gooches Fire Dept. **1594 Grace Ave., Lancaster**	$24,800
Indian Land Fire Dept. **185 Six Mile Creek Road, Indian Land**	$1,922,300
McDonald Green Fire Dept. **2787 Lynwood Dr.**	$84,400
Pleasant Valley Fire Dept. **9370 Possum Hollow Rd, Indian Land**	$2,441,600
Rich Hill Fire Dept. **3089 Rocky River Rd., Heath Springs**	$369,600
Riverside Fire Dept. **1875 Riverside Rd., Lancaster**	$149,600
Shiloh Zion Fire Dept. **703 Monroe Hwy.**	$267,500
Tradesville Fire Dept. **2145 Old Camden Monroe Hwy., Lancaster**	$100,700
Unity Fire Dept. **2495 Shiloh Unity Rd., Lancaster**	$64,200

Of social, economic, cultural, and public service importance during the recovery phase of a county wide disaster are the recreation centers. These locations are identified as Disaster Recovery Centers and discussed in the South Carolina Recovery Plan which is Appendix 6 of the South Carolina Emergency Operations Plan.

Critical infrastructure and facilities comprise all public and private facilities deemed essential for the delivery of vital services, protection of special populations, and the provision of other services of importance for that community. This plan concentrates on a group of facilities that are crucial for protecting the health and safety of the population: health care, educational, and emergency response facilities. (Appendix 10)

2. City of Lancaster

The City of Lancaster provided a list of structures and facilities (Appendix 11) that were critical to the City's infrastructure and to the citizens of the City. Please note that these figures do not include Lancaster County Water and Sewer District Properties. LCWSD property information is located in appendix 14.

City of Lancaster Properties	
Lancaster County Council of Arts Building and City Hall (201 West Gay Street)	$2,222,400
City Services Building (916 15th Street)	$278,070
Municipal Justice Center (405 East Arch Street)	$1,889,600
Fire Station #1 (401 East Arch Street)	$508,900
Fire Station #2 (818 Hubbard Drive)	$663,800
Building at Police Dept. Firing Range (1451 Reservoir Road)	$16,585
Building & Grounds Dept. (120 West Arch Street)	$191,900
Public Works Complex (1309 Lynwood Drive)	$2,458,032
Vehicle Maintenance Building (1320 Lynwood Dr.)	$936,787

As the County Seat, the City of Lancaster has the greatest population density and is home to most of the vital structures in the county. In addition to those properties owned and maintained by the City there are numerous other facilities, including some critical infrastructure within the City Limits of Lancaster.

Of utmost importance to public health is the hospital. MUSC's Lancaster Medical Center is located at 800 West Meeting Street in the City of Lancaster. This location was previously known as Springs Memorial Hospital, but was bought by the Charleston-based Medical University of South Carolina in March of 2019. The merge brought an expansion in telehealth and the access to cutting-edge technology. MUSC contains 225 beds and an emergency Center. MUSC is the only hospital in Lancaster County.

Of social, economic, cultural, and public service importance are the Lancaster County Administration Building, Lancaster County Economic Development, Lancaster County Chamber of Commerce, Lancaster County School District Administration Building, and University of South Carolina at Lancaster Campus. These are just a few of the facilities located within the City of Lancaster that are not City owned properties. Central to the operation of City Government is the City Hall. It houses administration, building, planning, and zoning, City Council Chambers, and city finance departments.

Other social, cultural, and historic sites within the City of Lancaster include:

- Lancaster County Courthouse designed by Robert Mills and built in 1828. The structure is listed on the National Historic Landmark Register.
- Kimbrell Building built in 1875 and located on the corner of Main and Dunlap Street. Until 1930 it was used as a hospital.
- 114 South Main Street was constructed 1888-1889 and housed the first Bank of Lancaster, L&C Railroad and Leroy Springs Cotton Company offices.
- First Methodist Church, organized in 1839, was the first church in the town of Lancaster.
- Old Lancaster County Jail was designed by Robert Mills and built in 1823. It is listed as a National Historic Landmark.
- Former A.M.E. Zion Church located on West Gay St. was the first A.M.E. church in Lancaster and was organized in 1870.
- Old Presbyterian Church and Cemetery was built in 1862 and was the first brick church in the county. It is listed on the National Register of Historic Places and owned by the Society for Historic Preservation.
- Springs House, built 1820-1830 the building served as the Lancaster City Hall from 1957 to 2000. It is listed on the National Register of Historic Places.
- Moore Building, Northeast corner of Main and East Gay. This is perhaps the oldest commercial building located in downtown Lancaster. Possibly built in the late 1860's or early 1870's, it is two stories high and is built of red Flemish bond brick. This block was known as the McKenna Block. William McKenna was the largest landowner in downtown Lancaster in the 1830's and 1840's.

The Waste Water Treatment Plant and lift stations are, of course, a necessity for public health and a public service offered by the Town, as are the potable water system and the solid waste collection. (Appendix 14)

3. Town of Kershaw

The Town of Kershaw provided a list of structures and facilities (Appendix 12) that were critical to the Town's infrastructure and to the citizens of the Town. Please note that these figures do not include Lancaster County Water and Sewer District Properties. LCWSD property information is located in appendix 14.

Town of Kershaw Properties	
Town Hall	$1,229,000
Clyburn First Steps Facility	
Fire Station	$339,400
111 S. Hampton St. Equipment Shelter/Maintenance Shop	$29,200
Helipad N. Matson Street	$12,200

One of the most important structures in the Town of Kershaw is the Town Hall. This building houses the Mayor's Office, Town Administrator's Office, Town Clerks Office, Sheriff's Sub-Station, and Council Chambers. This structure is the center for public services, public safety, and economic, cultural and social activities. It was constructed in 2009 to meet or exceed current building codes. The building is equipped with a sprinkler system as well as an alarm system. It is well above flood plains and is most susceptible to damage from a tornado strike or possibly high winds from a severe thunderstorm due to its shingled roof.

Another important structure in the Town of Kershaw is the Fire Station. It was built in 1979. The station has a wood truss gambrel style asphalt shingled roof with masonry load bearing walls. The roof is prone to wind damage due to its style of construction.

The Waste Water Treatment Plant and lift stations are of course a necessity for public health and a public service offered by the Town. As is the potable water system which includes the Floyd Street and Hwy 601 elevated water tanks. (Appendix 14)

4. Town of Heath Springs

The Town of Heath Springs provided a list of structures and facilities (Appendix 13) that were critical to the Town's infrastructure and to the citizens of the Town.

The single most important structure in the Town of Heath Springs is the Town Hall/Fire Station. The original building was built in the late 1970's but it has been twice remodeled and added on to with the last addition and renovation completed in 1987 when the Fire Station portion of the building was expanded and a public works garage added. This building houses the Mayor's Office, Town Clerks Office, Sheriff's Sub-Station, Town Hall, Fire Station, and Public Works. This structure is the center for public services, public safety, and economic, cultural and social activities.

There are current plans to expand the building once again. The building in its existing configuration is designed to for 40-50 MPH Wind Loads. According to the 2006 International Building Code, the basic wind design for buildings in this zone should be

100 MPH. As this structure is considered critical infrastructure, the newest portions of the structure will be designed to withstand 120 MPH wind loads and the existing portions upgraded to withstand at least the 100 MPH loads the 2006 IBC requires.

The most historically important structure in the Town of Heath Springs is the Train Depot. The Depot was originally built in 1882 but it was destroyed by fire in December 1899. A replacement Depot was completed in April of 1900. Once again the Depot was destroyed by fire July 25, 1903. This was a historic fire in that it spread to and destroyed the better part of the business district of the Town of Heath Springs. In fact, this fire was the very reason Town Council passed an ordinance forbidding building of wood frame buildings on the burned block. Once again the Depot was rebuilt in December 1903. On January 14, 1909 the Depot was robbed and set on fire to cover the robbery. The current structure was rebuilt in 1910 and still stands today.

The Depot is a social and cultural center point of the Town as it is the site of annual Fourth of July celebration. It is used as a meeting place by the Town of Heath Springs and as a class room by the Heath Springs Fire Department and rented out for special occasions to private citizens and groups. The Town of Heath Springs properties are located in appendix 13. Please note that these figures do not include Lancaster County Water and Sewer District Properties. LCWSD property information is located in appendix 14.

Town of Heath Springs Properties	
Town Hall	$1,890,500
Fire Station	*See Town Hall
Train Depot	* See Town Hall

II. Flooding

Having investigated the different flooding issues of concern in Lancaster County, a series of analyses designed to assess current, relative vulnerability of structures in the county to flood events was performed. Less than .025% of all NFIP payments in the state of South Carolina over the last 32 years have gone to covered properties in Lancaster County (see table 3-2). Generally, flooding issues with homes and businesses are not the bulk of the problems faced by Lancaster residents, rather flooded and washed out roads and bridges account for our largest number of losses. Some of these “wash outs” can affect entire neighborhoods causing them to have to be evacuated because the only road in or out of their neighborhood may be partially or totally washed away.

National Flood Insurance Program Loss Statistics Jan. 1, 1978 Through July 31, 2016					
	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
South Carolina	33,858	22,794	157	10,907	$ 581,435,379.44
Lancaster County	23	-	-	9	$333,761.72

Closed Without Payment - CWOP

Table 3-2

Thunderstorms and tropical cyclones bring torrential rains. These rains, most in excess of (1) one inch per hour, cause riverine flooding as well as occasional overbank flooding depending on the timing and duration of the rain event.

Flooding problems resulting from runoff of surface water generally increase as areas become more urbanized such as in the City of Lancaster. Greater population density generally increases the amount of impervious area, e.g., pavement and buildings. This reduction in the amount of natural ground that can absorb rainfall results in an increase in the amount of surface runoff generated. Uncontrolled, this runoff may be channeled to areas that cause flooding of structures and roadways. This is especially true where the predevelopment land surface has a gently sloping surface with no defined channels. Such areas are subject to shallow sheet flooding during storms, but urbanization and other development speeds the accumulation of floodwater.

The damages caused by flash floods can be more severe than ordinary riverine floods because of the speed with which flooding occurs (possibly hindering evacuation or protection of property), the high velocity of water, and the debris load. Channel velocities of 9 feet per second, typically realized in flash floods, can move a 90 pound rock. The density of water enables it to pack a destructive punch. Water moving at 10 miles per hour exerts the same pressure on a structure as wind gusts at 270 miles per hour.

"During the 20th century, floods were the number one natural disaster in the United States in terms of the number of lives lost and property damage".
"March 2000, U.S. Geological Survey"

Sudden destruction of structures and washout of roads can result in loss of life. A high percentage of flood-related deaths result from motorists underestimating the depth and velocity of flood waters and attempting to cross swollen streams.

1. Lancaster County

Lancaster County Building and Zoning submitted a report to the HMPC dated November 2, 2010 (See Section 7 Appendix 6 Exhibit #2 under the previous cover). The report details new flood maps that will become effective after the completion of this document. Additionally, the report list zoning ordinances and regulations adopted by the county including an updated Flood Damage Prevention Ordinance found in the Lancaster County Municode Chapter 8.1.7a Flood Damage Prevention.

The report detailed some homes that have been or may be subject to flooding. These include three apartment buildings, two mobile homes and five stick built homes on 8th Street which is in a low lying area along Bear Creek. See figures 3-8 and 3-9.

Additionally the report lists a home located along Rum Creek at 2265 Country Club Drive (See figure 3-10). This structure is used for commercial purposes.

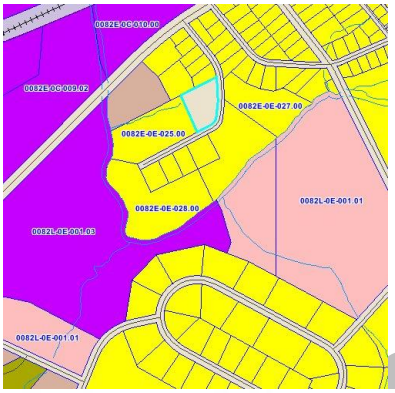


Fig. 3-8

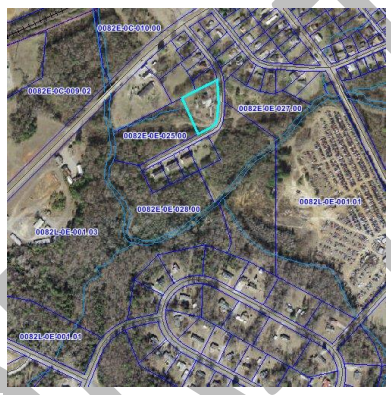


Fig. 3-9

Fig. 3-10

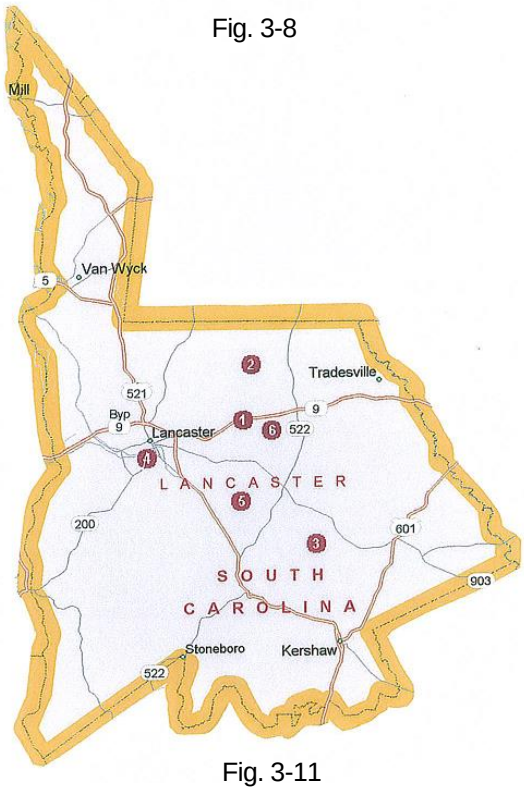


Fig. 3-11

History has shown there are many creek crossings throughout the County that experience problems with flooding. With rainfall of as little as one inch per hour, several of these creek crossings overflow their banks, washing away the roads that cross them. These washouts pose a real danger to anyone foolish enough to attempt to cross them. But again, history has shown there are citizens that fail to realize the dangers of crossing water covered roads despite warnings. Creek crossings such as these identified in figure 3-11

and listed below not only are costly to maintain and repair but also pose a hazard to those that attempt to cross them when flooded and the emergency workers that risk their lives to rescue them. (Appendix 15) Figure 3-11 shows the following roads that have creek crossings that are problematic: (1) Doster Road, (2) Daystar Road, (3) Fish Hatchery Road, (4) Old Farm Road, (5) Kirk Air Base Road, and (6) Langley Road. As an example of these hazards Figures 3-12, 3-13, 3-14, and 3-15 are presented here to underscore the assessment of these crossings.

Fig. 3-12

Doster Road September 2012 (South Branch Wildcat Creek) exhibiting significant road wash due to flooding exposing infrastructure and minimizing the roadway to one lane of travel.

Fig. 3-13

Daystar Road November 2015 (Camp Creek Crossing)

Fig. 3 -14

Old Farm Rd. November 2015 (Camp Creek Crossing)

In 3-14 and 3-15 you see examples of roadways in Lancaster County that are completely inundated with water. These present hazards to and threaten the lives of our residents, while placing our rescuers in perilous positions as they are faced with rescue situations. According to NOAA, it takes less than one foot of water to float most vehicles. Incidents such as those listed above as well as 3-16 below isolate neighborhoods and pose evacuation and response challenges.

Fig. 3 -15
Fish Hatchery Road November 2015 (Hanging Rock Creek) Road failure due to extreme wash downstream from an earthen dam.

2. City Of Lancaster

The City of Lancaster Building and Zoning Department submitted to the committee information pertaining to storm water management regulations. The City of Lancaster has adopted Article XII. "Flood, Drainage, Storm-water, Sediment, And Erosion Controls" as part of their City Code. The purpose of this ordinance is to protect the safety and welfare of the citizen of Lancaster while restricting or prohibiting land uses that may increase erosion, increase flood heights or velocities. This ordinance also ensures that uses of land vulnerable to floods, including facilities which serve such uses be protected against flood damage at the time of initial construction and it establishes control of the alteration of natural floodplains, stream channels and natural protective barriers which are involved in the accommodation of floodwaters. Additionally, the ordinance prevents or regulates the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

According to information obtained from the Director of Public Works for the City of Lancaster, flooding and drainage problems are a rare problem for the City. The one exception is indicated in figure 3-16 by the number 1. This area, the intersection of Clinton Street Extension and Almetta Street, is frequently flooded by rains in excess of 1 inch per hour. These streets must be watched for flooding and, once flooded,

barricaded to prevent motorists from driving through the waters. There are also four homes in the immediate area of this intersection that threatened when heavy precipitation falls.

Lancaster City Fire Department has placed six flood gauges around the city due to flooding. These gauges are used to monitor the depth and speed of rising flood waters. These gauges were installed and maintained by the fire department so their swift water rescue teams will have information required to determine rescue tactics. Some of these gauges are placed in locations where flash flooding has been known to occur and where swift water rescues have had to be performed. Figure 3-17 indicates the location of these flood gauges as follows; 1) Woodland Drive mounted on metal power transmission tower, 2) Clinton Avenue just past 448 Clinton Avenue on the west side of the road, 3) Melvin Steele Soccer Field at the intersection of Meeting Street and Woodlawn Dr. 4) On the west side of Plantation Road approximately 1000 feet north of the Meeting Street and Plantation Road intersection, 5) East of Woodland Drive and North Main Street along the creek bank in Constitution Park, 6) Near the Roddey Drive entrance to Constitution Park.

Hannah's Creek unites with Gills Creek in the City of Lancaster just before Gills Creek intersects Clinton Avenue near Almetta Street. Gills Creek then runs across the City of Lancaster from east to west roughly paralleling Woodland Drive before emptying into Cane Creek and on to the Catawba River. Heavy downpours across the City and to the west of the City can cause flash floods as these creeks come together. Often after heavy downpours the rush of water is slowed as Gills Creek and other smaller tributaries merge into Cane Creek causing flooding of areas along the creeks on the west side of the City of Lancaster. This flooding often results in the Melvin Steele Soccer Fields as well as the ball fields at the Lancaster County Parks and Recreation Complex on Plantation Drive to become completely submerged.

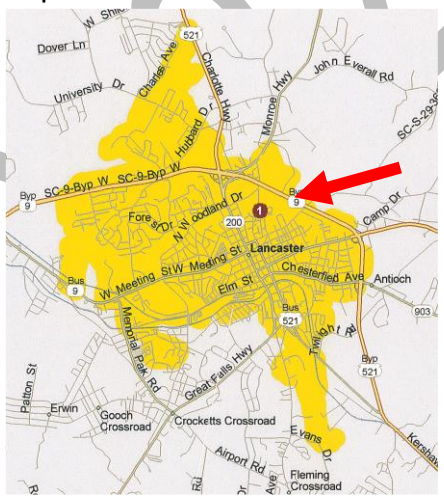


Fig. 3-16

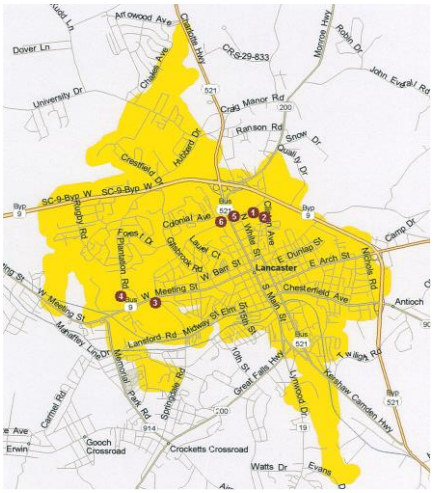


Fig. 3-17

3. Town of Kershaw

The Town of Kershaw has adopted an ordinance for flood control. The Flood, Drainage, Storm-water, Sediment, And Erosion Controls ordinance was enacted to protect human life and health, minimize expenditure of public money for costly flood control projects, to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public; to minimize prolonged business interruptions, to minimize damage to public facilities and utilities; to help maintain a stable tax base by providing for sound use and development of flood-prone areas in such manner as to minimize future flood blight areas; and to insure that potential home buyers are notified that property is in a flood area.

To achieve the aforementioned goals this ordinance prohibits uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities; prevent alteration of natural floodplains, stream channels and natural protective barriers which are involved in the accommodation of floodwaters; and prevent the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.
Zoning matters in the Town of Kershaw are administered through a collaborative process where Lancaster County Planning Commission holds public hearings meetings on behalf of the Town of Kershaw. The findings and recommendations are then presented to Kershaw Town Council in open public hearings. Kershaw Town Council may adopt or decline to adopt the recommendations of the county Planning Commission.

The Town of Kershaw has relatively few problems with flooding. The one exception is an area located on the west side of town, on Blackmon Circle (see figure 3-18 and 3-19). A house located at 138 Blackmon Circle is regularly threatened by flood waters from Lick Creek that runs along the boundary of the property. Rain events that exceed a rate of (1) one inch per hour can cause the creek to overflow its banks and endanger the property.

Independence Park February 11, 2011

Independence Park June 1, 2006 after a late morning thunderstorm.

4. Town of Heath Springs

The Town of Heath Springs has adopted an ordinance for flood control. The Flood, Drainage, Storm-water, Sediment, And Erosion Controls ordinance was enacted to protect human life and health, minimize expenditure of public money for costly flood control projects, to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public; to minimize prolonged business interruptions, to minimize damage to public facilities and utilities; to help maintain a stable tax base by providing for sound use and development of flood-prone areas in such manner as to minimize future flood blight areas; and to insure that potential home buyers are notified that property is in a flood area.

To achieve the aforementioned goals this ordinance prohibit uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities; prevent alteration of natural floodplains, stream channels and natural protective barriers which are involved in the accommodation of floodwaters; and prevent the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.
Zoning matters in the Town of Heath Springs are administered through a collaborative process where Lancaster County Planning Commission holds public hearings meetings on behalf of the Town of Heath Springs. The findings and recommendations are then presented to Heath Springs Town Council in open public hearings. Heath Springs Town Council may adopt or decline to adopt the recommendations of the county Planning Commission.

As the Town of Heath Springs has an average elevation of over 490 feet above sea level there are relatively few flooding issues in the Town of Heath Springs.

Fig. 3-18

Fig. 3-19

III. Severe Thunderstorms

A. Having investigated the different wind hazard issues of concern in Lancaster County, a series of analyses designed to assess current, relative vulnerability of structures in the County to Severe Thunderstorms and their accompanying high wind hazards was performed.

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When the upper air which is cold sinks and the warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, in clusters or in lines. Severe thunderstorms can bring in heavy rains which can cause flash floods, strong winds, lightening, hail and tornadoes.

Having previously addressed flooding problems, our attention turns to another aspect of these storms that causes the greatest amount of damage; strong or high winds. High Winds are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. High wind advisories in South Carolina are normally included as part of some other watch or warning such as a severe thunderstorm.

Experts agree that structures built to meet or exceed current building code high-wind provisions have a much better chance of surviving violent windstorms. A roof's ability to withstand wind forces is critical in determining how well it can serve its primary function of dramatically increasing property losses due to the accompanying water-related damage.

Damage to the roof is extremely significant in the estimation of losses. Even small damage can be a significant contributor to the total damage of a structure because of the entrance of rain into the building. According to statistics from the National Weather Service, thunderstorm wind events alone caused more than $2 million worth of property damages from 1960 to 2016. This amount is the total for Lancaster County alone.

In the early 1970's there was increasing interest among building designers to incorporate wind loads into model building codes. The problem, however, was that existing standards from Washington, D.C.- based American National Standards Institute were based on testing high-rise buildings. Low-rise buildings, frequently constructed of metal reacted differently to wind based on boundary layer flow and the action of turbulence.

During the 1980's the Standard Building Code adopted low-rise building standards, and in the 1990s the American Society of Civil Engineers, Reston, VA incorporated the standards in its standard, ASCE 7, "Minimum Design Loads for Buildings and Other Structures." The new International Building Code, which combines the

regionally focused National Building Code, Standard Building Code and Uniform Building Code, recognizes the ASCE wind-design loads.

Building codes generally require metal roofs to resist design wind-load pressures without any damage to roof systems. The 2000 IBC, for example is very explicit in requiring that metal-roofed buildings adequately address wind uplift. The code addresses issues of roof design and product testing.

Many factors influence the magnitude of wind velocity across a roof deck and the resulting uplift pressures. Wind gusts for the building location, the shape of the roof deck, edge configuration and the surrounding structures all influence a roof's wind resistance. Spacing and physical properties of supporting structural members such as gauge, yield strength and grade influence design and can affect fastener attachments.

Furthermore, wind resistance is influenced by secondary supports, such as beams, purlins and joists, as well as their connections to main structural members and construction details along edges and near openings like skylights.

1. Lancaster County

Lancaster County first began enforcing building codes in the 1990's. Structures constructed prior to the 1990's may not meet minimum construction standards. Throughout Lancaster County, emergency service facilities and some recreational facilities were built prior to the enforcement of building codes. Many of the structures that house our emergency services may be subject to the very disasters for which they will be called to respond to.

Eighteen out of our twenty-two fire stations and sub-stations were built by volunteer firefighters with funds raised by their respective communities. These structures, for the most part, were built for as little money as possible and constructed anywhere from the 1950's through today. Several are pole barns adapted for use as a fire station without any understanding or consideration of the term "critical infrastructure" or NFPA Standards.

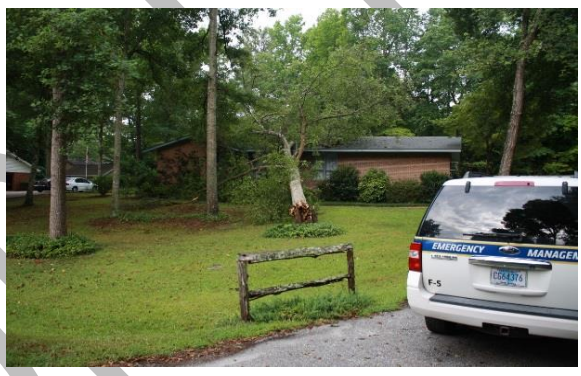
Likewise, our Emergency Medical Service headquarters is in a house built in 1937. Some of the county offices have been moved into new government buildings that are up to current building codes and specifications. Most of those remaining buildings had facelifts or were modernized in the late 1970's and early 1980's. Some of emergency service and public service buildings are mobile homes. Some of the essential services in the county are not in buildings built specifically for the purpose for which they are being used.

Many of these structures are subject to wind and hail damage. Most were not designed to address the pressures and uplift of high winds. It is doubtful that they were designed with shear forces or snow loads in mind.

Fork Hill Road July 2015

Rocky River Road July 2015

Flat Creek Road July 2015



Windsor Drive July 2015

EMS 1 Wind Damage September 2015

The photographs above are indicative of the types of wind damage associated with severe thunderstorms in Lancaster County. These photographs were taken in Lancaster County to document damage associated with severe thunderstorms. In the storm affecting the Fork Hill Road area, there were substantial straight line winds gusting to greater than 20 mph according to local weather stations. This pattern led to overturned outbuildings, downed trees and power lines as well as roof damage to several structures.

The damage seen in a late day thunderstorm in September 2015 lifted the roof from a garage structure that houses EMS Response Units at Lancaster County

Emergency Medical Service on Pageland Highway. The wind gusts reached greater than 30 mph during the storm.

The photographs below were taken after severe weather events that battered Lancaster County with thunderstorm force winds. Some reported possible gusts up to 70 mph winds and penny-sized hail. According to NOAA, there were reports sent in from Indian Land, Elgin, and Kershaw. The report that was sent in from Indian Land was 20 miles NNW of Lancaster and reported multiple downed trees. The report from Kershaw was 2 miles North of Elgin and reported 66 mph winds. Elgin also reported trees down along the highway near Cimmeron Road and Hwy 9.

Rocky River Road April 2020

Shiloh Unity Road April 2020

Kershaw Camden Hwy April 2020

Flat Creek Road April 2020

2. City Of Lancaster

The City of Lancaster has identified 34 structures or facilities which they have determined to be susceptible to identified hazards in that the hazard could either cause damage to or otherwise interfere with operations. Many of these structures were constructed and inspected to meet standard building codes.

The City of Lancaster's Building and Zoning department has been enforcing building codes since 1969 and the Fire Department's code enforcement program

dates back to the 1950's. These preventative measures have helped to mitigate many problems before they could arise.

Most of the City's critical infrastructure was built to withstand the average extremes of our naturally occurring environment. All emergency services structures are located well away from areas prone to flooding and are constructed substantially well. Of course with severe thunderstorms comes the risk of strong winds, flooding, and lightning. Very few public structures can completely resist the strongest severe thunderstorms we may anticipate.

At greatest risk are the historical structures. Many are wood framed balloon construction with asphalt shingled roofs. While some may have had slate roofs, many of those have been covered with asphalt shingles due to the excessive cost of using slate. These are subject to wind and hail damage which often accompanies severe thunderstorms.

3. Towns of Kershaw and Heath Springs

The Town of Kershaw has identified six structures or facilities which they have determined to be susceptible to identified hazards in that the hazard could either cause damage to or otherwise interfere with operations. Additionally, an assessment was made of how the loss of the structure or facility would affect the Social, Cultural, Economic, Environmental, Public Health, Public Safety, and Public Services. Table 3-3 shows the susceptibility for each structure or facility as determined by the Town of Kershaw. Table 3-4 shows the impact loss of the facility or structure would have on Social, Cultural, Economic, Environmental, Public Health, Public Safety, and Public Service sectors of the community as determined by the Town of Kershaw.

To determine susceptibility to thunderstorms, a commonsense approach was used taking into account the conditions present during average thunderstorms and the condition of the structure being considered. Age and structural condition were considered as well as the maximum intensity of past thunderstorms. The results of this study may be subjective but past performance is the only objective proof available for comparison.

Town of Kershaw Susceptibility to Thunderstorm				
Structure or Facility Name	**HIGH**	**MEDIUM**	**LOW**	**NONE**
Waste Water Treatment Plant			**X**	
Town Hall			**X**	
Floyd Street Water Tower			**X**	
Hwy 601 Water Tower			**X**	
Prison Waste Water Lift Station		**X**		
South Street Waste Water Lift Station			**X**	

Table 3-3

Additionally, the same subjective commonsense approach was used to make an assessment of how the loss of the structure or facility would affect the Social, Cultural, Economic, Environmental, Public Health, Public Safety, and Public Services. This approach made judgments based on the premise that the structure or facility was destroyed and the local governmental body would have to replace it without insurance or outside help. Also the assessment looked at the service(s) these structures or facilities provide and considered what impact there would be if these services no longer were available.

Town of Kershaw Impact Loss							
Structure or Facility	**Social**	**Cultural**	**Economic**	**Environmental**	**Public Health**	**Public Safety**	**Public Service**
Waste Water Treatment Plant	**High**	**High**	**High**	**High**	**High**	**Low**	**High**
Town Hall	**Medium**	**Medium**	**High**	**None**	**Low**	**Medium**	**High**
Floyd Street Water Tower	**Low**	**Low**	**High**	**Medium**	**Medium**	**Low**	**Medium**
Hwy 601 Water Tower	**Low**	**Low**	**High**	**Medium**	**Medium**	**Low**	**Medium**
Prison Waste Water Lift Station	**None**	**None**	**Medium**	**High**	**High**	**Low**	**Low**
South Street Waste Water Lift Station	**None**	**None**	**Medium**	**High**	**High**	**Low**	**Low**

Table 3-4

The Town of Kershaw demolished its former Town Hall which was built in 1955 and replaced it with a new structure in 2010. The new building was built to meet and, in many instances, exceed current building codes. The new structure was built to easily resist the normally occurring weather elements as well as withstand our hazardous weather extremes.

Additionally, the building is equipped with a fire suppression sprinkler system and fire alarms. The roof of the structure is covered with conventional asphalt shingles which could lift during an extreme wind event, but the overall design and construction of the new building by far surpasses that of the previous Town Hall.

The Severe Thunderstorm vulnerability of the structures in both Kershaw and Heath Springs is dependent on several factors including:

- Ability of structures to withstand wind loads commensurate with the level of design attention (a measure of the level of engineering design for the structure)
- Quality of materials and construction
- Beneficial or adverse effects of nearby trees and structures
- Age and condition
- Emergency backup power generators
- Obscured access to personnel needed to operate and maintain facility

An example of a possible problem with this site could be: The 2006 Edition of the International Building Code requires structures should be designed to withstand a 100 mile per hour wind gust for 3 seconds. The Waste Water Lift Station near the State Prison on Hwy 601 was designed and built over 15 years ago, prior to a uniform inspection practices and mandated adherence to building codes. Its ability to withstand a Severe Thunderstorm with accompanying high wind event and lightning is suspect.

Another possible problem could be: The soil in this area is extremely sandy which is problematic when it comes to adequate grounding to disperse lightning adequately. This in turn increases the chance that stray voltage from lightning strikes could leave this Lift Station inoperable.

The Town of Heath Springs has identified thirteen structures or facilities which they have determined to be susceptible to identified hazards in that the hazard could either cause damage to or otherwise interfere with operations. Table 3-5 shows the susceptibility for each structure or facility as determined by the Town of Heath Springs. Table 3-6 shows the impact that loss of the facility or structure would have as determined by the Town of Heath Springs.

Town of Heath Springs Susceptibility to Severe Thunderstorm				
Structure or Facility Name	**HIGH**	**MEDIUM**	**LOW**	**NONE**
Town Hall/Fire Station			X	
Train Depot		X		
Waste Water Treatment Plant			X	
WWTP Lab Building		X		
WWTP Storage Building		X		
WWTP Chemical Building		X		
WWTP Equipment Building		X		
Lift Station #1			X	
Lift Station #2			X	
Lift Station #3			X	
Lift Station #4			X	
Lift Station #5			X	
Lift Station #6			X	

Table 3-5

Town of Heath Springs Impact Loss							
Structure or Facility	**Social**	**Cultural**	**Economic**	**Environmental**	**Public Health**	**Public Safety**	**Public Service**
Town Hall/Fire Station	High	High	High	High	High	High	High
Train Depot	High	High	Medium	None	None	None	Low
Waste Water Treatment Plant	Medium	Low	High	Medium	Medium	Low	Medium
WWTP Lab Building	Medium	Low	High	Medium	Medium	Low	Medium
WWTP Storage Building	None	None	Medium	Medium	Medium	Low	Low
WWTP Chemical Building	None	None	Medium	High	Medium	Low	Low
WWTP Equipment Building	None	None	Medium	Medium	Medium	Low	Low
Lift Station #1	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #2	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #3	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #4	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #5	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #6	Low	None	Medium	Medium	Medium	Low	Low

Table 3-6

The Heath Springs Fire Department and Town Hall underwent a structural upgrade and addition during 2010 and 2011 to strengthen structural components against the effects of severe thunderstorms and tropical cyclones. Shear walls were added, massive four foot wide and four foot deep footings were poured to resist wind lift. The exterior metal façade, which included a steel and sheet metal three to four foot overhang and parapet, was removed and reworked to include hardy board and brick which will better resist wind and the deteriorating effects of rain. Some structural changes were made to strengthen the roof against and prevent excessive snow loads. This structure was originally built prior to a code enforcement program being in place. After a review by a structural engineer it was determined to have been constructed with a wind load rating of approximately 40 miles per hour. The renovated structure was built to bring this load rating up to approximately 130 miles per hour.

As with the City of Lancaster, at greatest risk are the historical structures in Kershaw and Heath Springs. Many are wood framed balloon construction with asphalt shingled roofs. While some may have had slate roofs, many of those have been covered with asphalt shingles due to the excessive cost of using slate. These are subject to wind and hail damage which often accompanies these types of storms.

The vulnerability of Town owned structures was determined, for the purposes of this document by persons not licensed to perform such analysis and therefore may have overlooked engineering flaws not readily apparent to laymen.

IV. Tropical Cyclones

A. Having investigated the different wind hazard issues of concern in Lancaster County, a series of analyses designed to assess current, relative vulnerability of structures in the County to high wind hazards was performed. Tropical cyclones are one of the events considered most probable to have a widespread effect on the County.

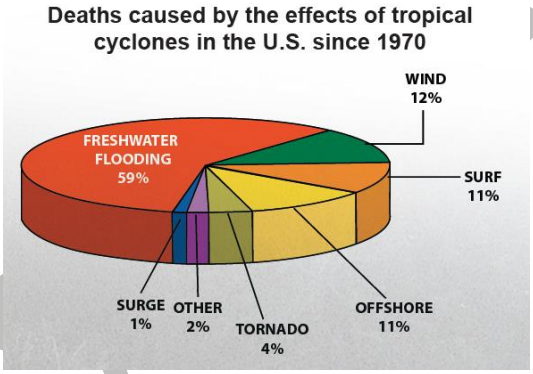
A tropical cyclone is a storm system characterized by a large low-pressure center and numerous thunderstorms that produce strong winds and heavy rain. They strengthen when water evaporated from the ocean is released as the saturated air rises, resulting in condensation of water vapor contained in the moist air. They are fueled by a different heat mechanism than other cyclonic windstorms such as nor'easters and polar lows.

The term "tropical" refers to both the geographic origin of these systems, which form almost exclusively in tropical regions of the globe, and their formation in maritime tropical air masses. The term "cyclone" refers to such storms' cyclonic nature, with counterclockwise rotation in the Northern Hemisphere. The category of tropical cyclones includes tropical depressions, tropical storms, and hurricanes.

Tropical cyclones can produce extremely powerful winds, torrential rain, and they are also able to spawn tornadoes. They develop over large bodies of warm water, and lose their strength when they move over land due to increased surface friction and loss of the warm ocean as an energy source. For Lancaster County, tropical cyclones present a combination of flooding, high winds, and severe thunderstorms. There is a chance of these storms spawning tornadoes, yet alone, tropical cyclones are made up of sustained winds of 39 to 74-plus miles per hour. The greatest danger to Lancaster County, however, is the torrential rain.

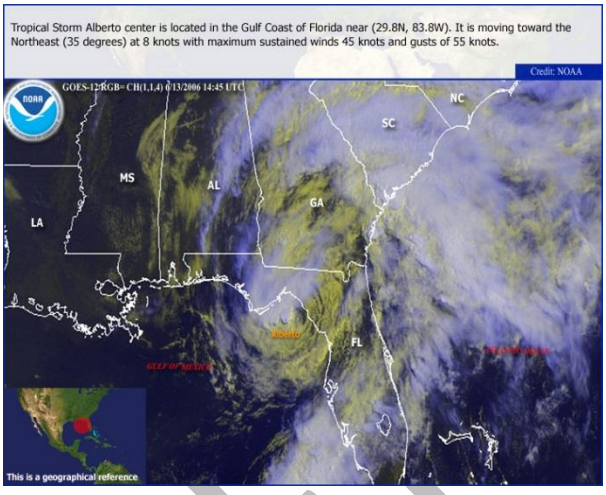
It is recorded in a brochure produced in 2005 by National Oceanic and Atmospheric Administration, National Weather Service titled "*Tropical Cyclone Flooding a Deadly Inland Danger*" - that *"Since the 1970s inland flooding has been responsible for more than half of all deaths associated with tropical cyclones in the United States."*

Copied from National Oceanic and Atmospheric Administration, National Weather Service titled "*Tropical Cyclone Flooding A Deadly Inland Danger*"



1. Lancaster County

Lancaster County has seen the torrential rains that tropical cyclones can bring. According to National Weather Service at Columbia South Carolina Between the hours of 4:04 am Tuesday June 13, 2006 and 10:24 am Wednesday June 14, 2006 2.5"-3" of rain fell across Lancaster County as Tropical Storm Alberto made its way across Lancaster County. Alberto began its progression across the state in the early morning hours of that Wednesday with 40 mile per hour winds and a northeastern forward progression of 15 to 25 miles per hour dissecting the state of South Carolina diagonally from Barnwell County to Marlboro County.



During its track past Lancaster County, Alberto caused the closings of at least 36 roads in the county. Four of these were closed due to trees blown down from the 22 miles per hour winds coupled with saturated grounds while the others were closed for flooding. Nine creeks overflowed their banks and crossed roads. 5 roads suffered significant damage. Additionally 4 to 7 homes were reported flooded and damaged along Country Club Road. In the City of Lancaster five roads remained closed due to being submerged as of the morning of the 15th. Ten other roads throughout the county remained closed through the 15th of June with two not being opened again until after June 16th and 19th. There were no reported deaths due to this storm but the City of Lancaster Fire Department conducted at least two separate swift water rescues during the event.

From these events it is shown that within Lancaster County there are at least five roads that are subject to severe damage due to the torrential rains associated with tropical cyclones. Additionally, there are nine creeks that flooded out of their banks and rushed across roads. Our major vulnerability in this area is the loss of roads due to torrential flooding rains associated with this type of storm.

As mentioned in an earlier section of this document, many structures built prior to the 1990's may be subject to wind damage due to possible sub-par building practices conducted prior to code enforcement. Additionally, buildings with asphalt shingled roofs as well as some built up roofs may have difficulty withstanding the constant torrent of 20 to 39 mile per hour wind driven rains of a slow moving storm.

It is estimated that as many as 18 of the 22 county fire stations/substations and 6 of the 8 EMS stations may be vulnerable to damage caused by tropical cyclones. The vulnerability of county owned structures was determined, for the purposes of this document by persons not licensed to perform such analysis and therefore may have overlooked engineering flaws not readily apparent to laymen.

Additionally, the problems associated with debris management must be considered. Lancaster County is limited in its ability by both manpower and equipment to contend with any large debris producing event without outside assistance from private contractors.

2. City of Lancaster

The City of Lancaster, like Lancaster County has many of the same vulnerabilities to flooding. The torrential rains associated with these storms can quickly overwhelm the storm water drainage systems causing flooding of city streets.

Additionally, the confluence of Gills Creek and Hanna's Creek as well as that of Gills Creek and Cane Creek makes the low lying areas around these creeks in the City of Lancaster susceptible to flooding.

Many structures built prior to building inspection services may be subject to wind damage due to possible sub-par building practices conducted prior to code enforcement. Additionally, buildings with asphalt shingled roofs as well as some built up roofs may have difficulty withstanding the constant torrent of 20 to 39 mile per hour wind driven rains of a slow moving storm.

Most of the City's critical infrastructure was built to withstand the average extremes of our naturally occurring environment. All emergency services structures are located well away from areas prone to flooding and are constructed relatively well. Of course with tropical cyclones comes the risk of strong winds, flooding, lightening, and hail. Very few public structures can completely resist the strongest tropical cyclones we may anticipate.

At greatest risk are the historical structures. Many are wood framed balloon construction with asphalt shingled roofs. While some may have had slate roofs, many of those have been covered with asphalt shingles due to the excessive cost of using slate. These are subject to wind and hail damage which often accompanies these types of storms.

The vulnerability of city owned structures was determined, for the purposes of this document by persons not licensed to perform such analysis and therefore may have overlooked engineering flaws not readily apparent to laymen.

3. Towns of Kershaw and Heath Springs

The Town of Kershaw has identified six structures or facilities which they have determined to be susceptible to identified hazards in that the hazard could either cause damage to or otherwise interfere with operations. Additionally, an assessment of how the loss of the structure or facility would affect the Social, Cultural, Economic, Environmental, Public Health, Public Safety, and Public Services. Table 3-7 shows the susceptibility for each structure or facility as determined by the Town of Kershaw. Table 3-8 shows the impact loss of the facility or structure would have on Social, Cultural, Economic, Environmental, Public Health, Public Safety, and Public Service sectors of the community as determined by the Town of Kershaw. To determine susceptibility to tropical

cyclones, the same commonsense approach was used as with the method used for the susceptibility measurements for severe thunderstorms previously in this plan.

Additionally, the same subjective commonsense approach was used to make an assessment of how the loss of the structure or facility would affect the Social, Cultural, Economic, Environmental, Public Health, Public Safety, and Public Services. This approach made judgments based on the premise that the structure or facility was destroyed and the local governmental body would have to replace it without insurance or outside help. Also the assessment looked at the service(s) these structures or facilities provide and considered what impact there would be if these services no longer were available.

Town of Kershaw Susceptibility to Tropical Cyclones				
Structure or Facility Name	**HIGH**	**MEDIUM**	**LOW**	**NONE**
Waste Water Treatment Plant	X			
Town Hall			X	
Floyd Street Water Tower		X		
Hwy 601 Water Tower		X		
Prison Waste Water Lift Station			X	
South Street Waste Water Lift Station			X	

Table 3-7

Town of Kershaw Impact Loss							
Structure or Facility Name	**Social**	**Cultural**	**Economic**	**Environmental**	**Public Health**	**Public Safety**	**Public Service**
Waste Water Treatment Plant	High	High	High	High	High	Low	High
Town Hall	Medium	Medium	High	None	Low	Medium	High
Floyd Street Water Tower	Low	Low	High	Medium	Medium	Low	Medium
Hwy 601 Water Tower	Low	Low	High	Medium	Medium	Low	Medium
Prison Waste Water Lift Station	None	None	Medium	High	High	Low	Low
South Street Waste Water Lift Station	None	None	Medium	High	High	Low	Low

Table 3-8

The Town of Kershaw demolished its former Town Hall which was built in 1955 and replaced it with a new structure in 2010. The new building was built to meet and, in many instances, exceed current building codes. The new structure was built to easily resist the normally occurring weather elements as well as withstand our hazardous weather extremes.
Additionally, the building is equipped with a fire suppression sprinkler system and fire alarms. The roof of the structure is covered with conventional asphalt shingles which could lift during an extreme wind event, but the overall design and construction of the new building by far surpasses that of the previous Town Hall.

The Town of Heath Springs has identified thirteen structures or facilities which they have determined to be susceptible to identified hazards in that the hazard could either cause damage to or otherwise interfere with operations. Table 3-9 shows the susceptibility for each structure or facility as determined by the Town of Heath Springs. Table 3-10 shows the impact loss of the facility or structure would have on the community as determined by the Town of Heath Springs.

Town of Heath Springs Susceptibility to Tropical Cyclones				
Structure or Facility Name	**HIGH**	**MEDIUM**	**LOW**	**NONE**
Town Hall/Fire Station			X	
Train Depot	X			
Waste Water Treatment Plant		X		
WWTP Lab Building	X			
WWTP Storage Building	X			
WWTP Chemical Building	X			
WWTP Equipment Building	X			
Lift Station #1			X	
Lift Station #2			X	
Lift Station #3			X	
Lift Station #4			X	
Lift Station #5			X	
Lift Station #6			X	

Table 3-9

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Town of Heath Springs Impact Loss							
Structure or Facility	**Social**	**Cultural**	**Economic**	**Environmental**	**Public Health**	**Public Safety**	**Public Service**
Town Hall/Fire Station	High	High	High	High	High	High	High
Train Depot	High	High	Medium	None	None	None	Low
Waste Water Treatment Plant	Medium	Low	High	Medium	Medium	Low	Medium
WWTP Lab Building	Medium	Low	High	Medium	Medium	Low	Medium
WWTP Storage Building	None	None	Medium	Medium	Medium	Low	Low
WWTP Chemical Building	None	None	Medium	High	Medium	Low	Low
WWTP Equipment Building	None	None	Medium	Medium	Medium	Low	Low
Lift Station #1	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #2	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #3	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #4	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #5	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #6	Low	None	Medium	Medium	Medium	Low	Low

Table 3-10

The tropical cyclone vulnerability of these structures is dependent on several factors including:

- Ability of structures to withstand wind loads due to the level of design attention (a measure of the level of engineering design for the structure)
- quality of materials and construction
- beneficial or adverse effects of nearby trees and structures
- age and condition
- Insulation and heating factors
- Emergency backup power generators
- Process and functions in non-climate controlled areas
- Obscured access to personnel needed to operate and maintain facility

The Heath Springs Fire Department and Town Hall underwent a structural upgrade and addition during 2010 and 2011 to strengthen the structure against the effects of severe thunderstorms and tropical cyclones. Shear walls were added, massive four foot wide and four foot deep footings were poured to resist wind lift. The exterior metal façade, which included a steel and sheet metal

three to four foot overhang and parapet, was removed and reworked to include hardy board and brick which will better resist wind and the deteriorating effects of rain. Some structural changes were made to strengthen the roof against and prevent excessive snow loads. This structure was originally built prior to a code enforcement program being in place. After a review by a structural engineer it was determined to have been constructed with a wind load rating of approximately 40 miles per hour. The renovated structure was built to bring this load rating up to approximately 130 miles per hour.

Many structures built prior to building inspection services may be subject to wind damage due to possible sub-par building practices conducted prior to code enforcement. Additionally, buildings with asphalt shingled roofs as well as some built up roofs may have difficulty withstanding the constant torrent of 20 to 39 mile per hour wind driven rains of a slow moving storm.

Again, at greatest risk are the historical structures. Many are wood framed balloon construction with asphalt shingled roofs. While some may have had slate roofs, many of those have been covered with asphalt shingles due to the excessive cost of using slate. These are subject to wind and hail damage which often accompanies these types of storms.

The vulnerability of town owned structures was determined, for the purposes of this document by persons not licensed to perform such analysis and therefore may have overlooked engineering flaws not readily apparent to laymen.

V. Winter Storms

A. Having investigated the different Winter Storm issues of concern in Lancaster County, a series of analyses designed to assess current, relative vulnerabilities of structures in the County to Winter Storm hazards was performed. Winter storms are one of the types of events considered most probable to have a wide spread effect on the County.

1. Lancaster County

The vulnerability to these storms is directly linked to the size of the winter storm. Any storm with less than 1/8 of an inch of ice or less than 2 inches of snow and of short duration can be weathered quite easily. However, any storm producing more than 1/8 of an inch of ice or more than 2 inches of snow or a combination of the two is of great concern. (See Table 13a)

Winter Events Affecting All Jurisdictions Within Lancaster County					
Type of Winter Event	**Schools & Local Government Offices**	**Roads**	**Bridges & Overpasses**	**Electrical Utilities**	**Severity**
< 2" of Snow < ¼" of Ice Above 32° F	Possible Delay or Early Dismissal	Generally Passable with Caution	Generally Passable with Caution	Outages Typically < 500	MILD
< 2" of Snow < ¼" of Ice Below 32° F	Likely Delay or Early Dismissal	Generally Passable with Few Minor Incidents. Caution Urged When Driving.	If Treated: Generally Passable with Few Minor Incidents	Outages Typically < 500	
2" – 4" of Snow or ¼" – ½" of Ice Below 32° F	Likely Closed	Passable with Some Minor Incidents. Necessary Travel Only.	If Treated: Passable with Caution. Minor Incidents Likely.	Outages 500 to 2,000 Likely	MODERATE
Over 4" of Snow or Over ½" of Ice Below 32° F	**Closed**	**Most Secondary Roads Not Passable. Travel Not Advised.**	**Dangerous. Travel Not Advised**	**Outages >2,000 Likely**	**SEVERE**

Table 3-11 a

At the first mention of a possible winter storm, Emergency Management begins monitoring the threat and reviewing emergency plans. Other agencies are notified of the possible threat and warnings are issued. If the threat develops into an actuality, personnel are sent into the field to monitor conditions and assist any citizens that may be stranded in the storm. Once it is determined that the road conditions are hazardous schools are closed and all nonessential County offices are closed. If there is a chance for wide spread power outages, the Red Cross is notified to prepare to open shelters as needed.

Lancaster County emergency services (Fire, EMS, & Sheriff) have limited access to vehicles capable of all-weather operation. During winter storms travel by emergency services is limited to only emergency response. Response with lights and siren is suspended. County Fire Service and EMS four wheel drive vehicles are dispatched with ambulances to access road conditions assist stuck ambulances, and in some cases transport patients from their homes to the ambulances for transport to the hospital.

When a winter storm hits Lancaster County almost everything shuts down. Authorities recommend that travel be limited to only what is absolutely necessary and for the most part citizens comply. Lancaster County does not own any dedicated snow removal equipment, but uses motor graders to scrape county roads. Fire trucks and ambulances are not equipped with chains or all-wheel drive. For the most part everyone is asked to simply stay home and wait out the storm.

Most vulnerable to the effects of winter storms are roofs and roads throughout the county. Winter storms that end with prolonged periods of thawing and refreezing cause the most damage. Evidence of this can be found with the after effects of the winter storms of 2011.

As a result of the thawing and refreezing action that immediately followed the 2011 storms, the LCEMS training building had ice build under the shingles of the roof. As ice thawed and refroze it lifted the shingles and pushed water into the building. This cycle continued of over a week with each cycle causing additional damage. Eventually water damaged extended from the roof to the floor.

Secondary roads throughout the county did not fare much better during the thaw and refreeze cycle. Water from the thaw penetrated deeper into the cracks in the asphalt during the day where it then froze and expanded overnight. In many cases this caused large sections of some roads to heave upward and crumble apart. As a result many secondary roads across Lancaster County are pot hole filled and terrible to travel on. Lancaster County spent over $14,300 in material, equipment and labor in addition to inmate labor used to repair roads damaged by this winter storm.

2. City of Lancaster

The City of Lancaster is susceptible to winter storms. The vulnerability to these storms is directly linked to the size of the winter storm. Any storm with less than 1/8 of an inch of ice or less than 2 inches of snow and of short duration can be weathered quiet easily. However, any storm producing more than 1/8 of an inch of ice or more than 2 inches of snow or a combination of the two is of some concern.

In the event of an ice related winter storm the City of Lancaster Public Works responds to clear any storm debris that would prohibit or interfere with streets, storm drains, and right of ways. The City reportedly has all equipment necessary to complete their assigned mission including chainsaws, vacuum trucks, knuckle boom trucks and backhoes.

3. Towns of Kershaw and Heath Springs

The six structures or facilities previously mentioned for the town of Kershaw vulnerable to severe weather have also been examined in relation to winter storms. Table 3-11b shows the susceptibility for each structure or facility as determined by the Town of Kershaw. Table 3-12 shows the impact that loss of the facility or structure would have on the community as determined by the

Town of Kershaw. The results of this study may be subjective but past performance is the only objective proof available for comparison.

Town of Kershaw Susceptibility to Winter Storms							
Structure or Facility	Social	Cultural	Economic	Environmental	Public Health	Public Safety	Public Service
Waste Water Treatment Plant	High	High	High	High	High	Low	High
Town Hall	Medium	Medium	High	None	Low	Medium	High
Floyd Street Water Tower	Low	Low	High	Medium	Medium	Low	Medium
Hwy 601 Water Tower	Low	Low	High	Medium	Medium	Low	Medium
Prison Waste Water Lift Station	None	None	Medium	High	High	Low	Low
South Street Waste Water Lift Station	None	None	Medium	High	High	Low	Low

Table 3-11b

Town of Kershaw Impact Loss				
Structure or Facility Name	HIGH	MEDIUM	LOW	NONE
Waste Water Treatment Plant		X		
Town Hall			X	
Floyd Street Water Tower				X
Hwy 601 Water Tower				X
Prison Waste Water Lift Station				X
South Street Waste Water Lift Station			X	

Table 3-12

The six structures or facilities previously mentioned for the town of Heath Springs vulnerable to severe weather have also been examined in relation to winter storms. Table 3-13 shows the susceptibility for each structure or facility as determined by the Town of Heath Springs. Table 3-14 shows the impact that loss of the facility or structure would have on the community as determined by the Town of Heath Springs.

Town of Heath Springs Susceptibility to Winter Storms				
Structure or Facility Name	**HIGH**	**MEDIUM**	**LOW**	**NONE**
Town Hall/Fire Station			X	
Train Depot			X	
Waste Water Treatment Plant		X		
WWTP Lab Building		X		
WWTP Storage Building		X		
WWTP Chemical Building		X		
WWTP Equipment Building		X		
Lift Station #1			X	
Lift Station #2			X	
Lift Station #3			X	
Lift Station #4			X	
Lift Station #5			X	
Lift Station #6			X	

Table 3-13

Town of Heath Springs Impact Loss							
Structure or Facility	**Social**	**Cultural**	**Economic**	**Environmental**	**Public Health**	**Public Safety**	**Public Service**
Town Hall/Fire Station	High	High	High	High	High	High	High
Train Depot	High	High	Medium	None	None	None	Low
Waste Water Treatment Plant	Medium	Low	High	Medium	Medium	Low	Medium
WWTP Lab Building	Medium	Low	High	Medium	Medium	Low	Medium
WWTP Storage Building	None	None	Medium	Medium	Medium	Low	Low
WWTP Chemical Building	None	None	Medium	High	Medium	Low	Low
WWTP Equipment Building	None	None	Medium	Medium	Medium	Low	Low
Lift Station #1	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #2	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #3	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #4	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #5	Low	None	Medium	Medium	Medium	Low	Low
Lift Station #6	Low	None	Medium	Medium	Medium	Low	Low

Table 3-14

The winter storm vulnerability of these structures is dependent on several factors including:

- Ability of structures to withstand snow loads due to the level of design attention (a measure of the level of engineering design for the structure)
- quality of materials and construction
- beneficial or adverse effects of nearby trees and structures
- age and condition
- Insulation and heating factors
- Emergency backup power generators
- Process and functions in non-climate controlled areas
- Obscured access to personnel needed to operate and maintain facility

The Town of Kershaw does not own any snow removal equipment or pretreatment equipment. Kershaw is dependent upon South Carolina Department of Transportation to clear state owned roads throughout Town. Kershaw's Public Works department is very limited in staff and resources. The department lacks the equipment and manpower to adequately respond to any winter storm or major debris causing event such as an ice producing winter storm.

The waste water treatment plant is somewhat vulnerable to the effects of a winter storm. Should icing and/or fallen trees cause a power interruption, the facility has a generator to temporarily restore power. The most critical component to the operation of the plant could be the lack of personnel to operate it should ice and snow prevent travel to the site. Additionally, there is a possibility of damage due to icing should there be a prolonged power outage.

An example of a possible problem with this site could be: The 2006 Edition of the International Building Code requires structures in the Kershaw area to be designed with a 10 pound per square foot snow load as a minimum. Certain structures in both Kershaw and Heath Springs were designed and built over 50 years ago, prior to a uniform inspection practices and mandated adherence to building codes. Its ability to withstand a major winter storm event is suspect.

Another possible problem could be: Winter Storm travel to and from facilities may be difficult at best. Some facilities that require personnel to attend to them may be neglected for days due to weather conditions. During these periods of time damages may go unnoticed and may compound without immediate intervention.

The Heath Springs Fire Department and Town Hall underwent a structural upgrade and addition in 2011 to strengthen the structure against the effects of severe weather events. The exterior metal façade, which included a steel and sheet metal three to four foot overhang and parapet, will be removed and reworked to better resist wind and the deteriorating effects of rain. Some structural changes will be made to strengthen the roof against overloading by snow. This structure was originally built prior to a code enforcement program being in place. After a review by a structural engineer it was determined to have been constructed with a wind load rating of approximately 40 miles per hour. The renovated structure was built to bring this load rating up to approximately 130 miles per hour.

VI. Technological and Manmade Hazards

Technological hazards related to manmade structures and certain business and industrial activity pose a potential threat to our citizenry, economy and our environment. The purpose of this plan is to address where natural disasters affect or contribute to technological or manmade hazards. The hazards identified as posing the most significant threat in Lancaster County are dam failure, hazardous materials release, train derailment and infrastructure failures.

A. Dams

South Carolina Department of Health and Environmental Control Geologists and Hydrologists with the Bureau of Water, responsible for surface water monitoring and dam safety, have identified fifty dams in Lancaster County. Of the fifty, six are considered to be high hazard, four significant hazard and forty low hazard dams. Recent South Carolina events have drawn attention to the potential threat associated with inundation and dam failure.

The high hazard dams contain range of 219,900,000 to 3,258,500,000 gallons of water at full pond. Four of the six dams that are considered high hazard dams are of earthen construction with an earthen core. Two of these that create an impoundment for the city water supply are of a soil and rock construction. A dam failure at these locations would create substantial flooding for down-stream residents and potentially compromise transportation routes.

B. Hazardous Materials

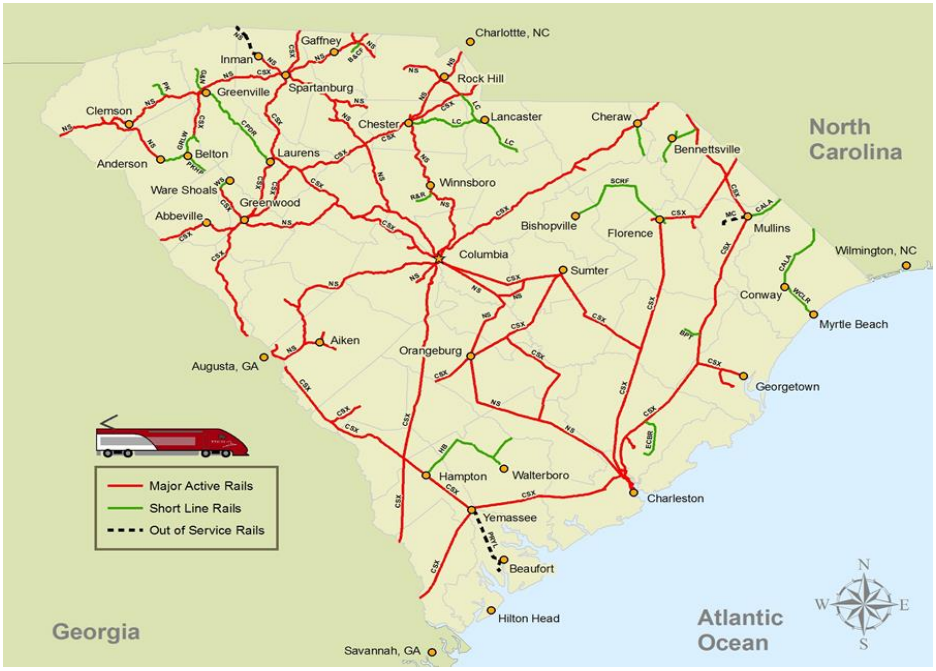
No community in our county is immune to the potential release of hazardous materials whether from a facility, pipeline or transportation routes. Lancaster County Emergency Management developed a Hazard Materials Response Plan in 2016 that identifies the risks from greatest to least hazardous.

The production, transportation, and misuse of hazardous materials pose a threat to our community, as do process failures at facilities. Proximity is the most

significant vulnerability associated with hazardous material release or containment failures. Currently, there are no provisions for separating residential development, churches and schools from facilities or pipelines that manufacture, store, transport or use hazardous materials.

C. Train Derailment

Lancaster County is situated on the South Carolina and North Carolina state line and has two rail lines running through the county. The CSX rail line runs east to west across the northern end of the county running parallel to Highway 75. The CSX rail line has seen three derailments from 2010 – 2016 in a 5.8 mile stretch splitting the state line. Fortunately for the communities surrounding the tracks, there were no hazardous materials in the involved cars. The most significant loss was 1.6 million dollars according to the National Transportation Safety Board.



CSX Derailment May 2011 at the NC/SC State Line.

Train derailment is not a well-known occurrence in Lancaster County. However, that does not mean that this hazard does not occur. John Webb, a manager at a crane company that responds to derailments, stated, “On average, every 48 hours there’s a derailment in the state.” Since 2007 there have been five derailments on the Lancaster Chester Railway alone.

The first of these incidents is the most well-known as it caused the most damage to Lancaster County residents. On February 7, 2007 a train slow moving train derailed and wedged into the back of Buy-Rite Beverage on Main Street. The president of Lancaster and Chester Railway announced that the crash was a result of an improper maneuver when a train was backing up off of an offloading track. The beverage store was a mere 30 feet from where the track ends. There was one customer injury from the crash and three store employees, including the owner, described the event as an earthquake with products flying off the wall. The owner stated that the crash made the whole ceiling fall as the train was lodged eight feet into the store’s interior.

Three of the remaining derailments occurred in the same location as the February 7th accident. On August 27th of 2010 a track failure caused two hopper cars to derail near the Market Street and Main Street Crossings. This caused traffic to be blocked for hours at both intersections. Once again, on September 2, 2011 a derailment occurred at the Market Street crossing. This derailment occurred between the switch point on Market and Main Street. This 2011 derailment only caused traffic blockages for Market Street. On April 14, 2015 a derailment was caused when a

train rolled over the switch point that guides the trains towards Catawba or Chester. This derailment caused no damage other than traffic blockages for Market Street.

The most recent derailment for Lancaster Chester Railway was on June 4, 2018. This derailment was near Meeting Street on the rail that runs parallel to Peach Farm Road. It occurred around 3:30 PM and there were no injuries or casualties. This derailment was caused by a mechanical issue. Out of the seven cars in the line, four were left standing and three were thrown on their side spreading soy bean meal in the areas surrounding the track. The train cars were carrying the meal from ADM in Kershaw to the Chester facility. There were no hazardous materials or personal health concerns with the soy bean spill.

June 2018 Derailment

September 2011 Derailment

D. Infrastructure Failure

Infrastructure failure is the failure of critical public or private utility infrastructure resulting in the temporary loss of essential functions or services. According to the latest census data, Lancaster County is the twenty-sixth fastest growing county in the nation. With the vast network of water and sewer lines, treatment facilities, the electrical grid, communication and transportation, failures can occur anywhere.

Incidents of failure frequently involve widespread areas and are not concentrated in one neighborhood. Citizens and businesses are dependent on utility infrastructure to provide essential services such as power, gas, sewer disposal and treatment and communications.

When the water or wastewater treatment systems in a community are inoperable due to a system failure, serious public health concerns arise that must be addressed immediately to prevent outbreaks of disease. Typically, it is the most vulnerable members of society that are the most heavily impacted. If the failure involves more than one system, or is large enough in scope and magnitude, whole communities can be severely impacted.

Lancaster County has had few incidents of failure related to infrastructure unrelated to outside influence such as severe weather. Our primary failures impact transportation

and safety and are directly related to natural events such as flooding that undermines streets or removes the surface from the roadway cutting off access.

VII. Assessment Summary

A. Assessment

Having investigated the different hazards to Lancaster County and the municipalities of Lancaster, Kershaw, and Heath Springs and determined the level of susceptibility of each jurisdiction we can determine the vulnerability of the county as a whole to these hazards.

1. Lancaster County

Lancaster County and its municipalities are at risk in the following ways:

- Severe Thunderstorms
  - *486% Annual chance of severe thunderstorm*
  - *Typically Low losses as the localized nature of the storms generally affect less than 50% of the population at any one time.*
- Flash Floods and Flooding
  - *75% annual chance of a flooding event, 1% Chance of 100-year flood and .2% Chance of 500-year flood event.*
  - *Typically Low losses as the localized nature of the flood zones generally affect less than 10% of the population at any one time.*
- Winter Storms
  - *73.01% Annual chance of winter storm event*
  - *Typically Low to Medium losses as the widespread nature of these storms generally affects 100% of the population at any one time, however actual damages are not usually significant unless the storm is a heavy ice producer.*
- Tropical cyclones
  - *25.15% Annual chance of being affected by a tropical system.*
  - *Typically Medium to High losses as the widespread nature of these storms generally affects 100% of the population at any one time, however actual damages depend significantly on the size, duration, speed, and strength of the storm. Producers of significant heavy precipitation and high wind are a rare event.*
- Technological and Manmade Hazards
  - *Present a potential threat to our citizenry, economy and our environment.*
  - *Represent the potential collision between natural disasters and technological or manmade hazards.*
  - *Those identified as posing the most significant threat in Lancaster County are:*
    - *Dam failure*
    - *Hazardous materials release*
    - *Train derailment*
    - *Infrastructure failures*
    - *Water/Sewer System and Power System Failures*
    - *Geomagnetic Disturbance (GMD)*

- *Cyber-Attacks and Viruses*
- *Infectious Diseases*

~ *Increased demands, aging equipment and structures coupled with slow inadequate funding options to repair, replace or enhance current infrastructure present as a vulnerability.*

VIII. Changes from the Last Plan

Due to the last revision of this plan being in 2017, the Census data was updated for the 2022 revision using the 2020 Census Data. The US Census Bureau estimated some of the population values for incorporated areas due to COVID-19 interruptions. The Town of Van Wyck and the Community of Indian Land were added under the development trends heading in this section. The most recent changes to this section also include an updated critical infrastructure list with up to date property values. This section also saw a revision of the maps of the critical infrastructure locations, as well as an update to the assessment summary that reflects current data.

SECTION - 4
MITIGATION CAPABILITY ASSESSMENT

I. Mitigation Capability Assessment Introduction

The planning process has identified the natural, manmade, and technological hazards posing a threat to Lancaster County and described and quantified the vulnerability of the County and communities to these risks. The next step, prior to forming goals and objectives for improving each jurisdiction's ability to reduce the impacts of these risks, is to assess what loss prevention mechanisms are already in place. Doing so provides the County's "net vulnerability" to natural, manmade, and technological disasters and more accurately focuses the goals, objectives and proposed actions of this plan. This part of the planning process is referred to as the Mitigation Capability Assessment.

The HMPC took two approaches in conducting this assessment. First, an inventory of existing policies, regulations and plans was made. These policy and planning documents were collected and reviewed to determine if they contributed to reducing hazard related losses, or if they inadvertently contributed to increasing such losses. Second, an inventory of other mitigation activities was made through the use of a matrix. The purpose for this effort was to identify activities and actions beyond policies, regulations and plans that were either in place, needed improvement, or could be undertaken, if deemed appropriate.

The HMPC collected and analyzed the documents presented in Table 4-1.

Table 4-1. Document Used for Capability Assessment			
Lancaster County	**City of Lancaster**	**Town of Kershaw**	**Town of Heath Springs**
Lancaster County Emergency Operations Plan July 2018	Signatory	Signatory	Signatory
Flood Damage Management Ordinance of Lancaster County, Municode Chapter 9 Ordinance 1095 August 23, 2016	Ordinance #O17-02 Flood, Drainage, Storm-water, Sediment, & Erosion Controls April 25, 2017	Follows County	Follows County
Ordinance #847 Building and Construction Standard Codes Adopted Sept. 10, 2007	Ordinance #O08-12 Technical Codes Adopted June, 24, 2008	Follows County	Follows County
Hazard Mitigation Plan January 28, 2012	Signatory	Signatory	Signatory
Section 108, Unsafe Structures, International Property Maintenance Code, 2012	Ordinance #O08-12 Technical Codes Adopted June, 24, 2008	Follows County	Follows County
Ordinance #309, Unified Development Ordinance Sept. 28, 1998	Code of Ordinances Section 31-267 Development permit and certification requirements.	Ordinance #60 Unified Development Ordinance	Follows County
Lancaster County Debris Management Plan March 23, 2010	Ordinance #O06-02 Bulk Collection March 28, 2006	Follows County	Follows County
Ordinance #921 Fire Prevention Code June 2, 2008	Ordinance #O02-04 Fire Prevention Code May 14, 2002	Follows County	Ordinance #15A Fire Prevention Ordinance June 24, 1986
Lancaster County Hazardous Materials Response Plan 2015	Signatory	Signatory	Signatory

The following is a bulleted summary of how each of these documents contributes to an overall Hazard Mitigation framework. Each point identifies where and how mitigation concepts, principles and measures are integrated into the normal day-to-day activities of the local governments.

- **Lancaster County Emergency Operations Plan**

  Section 2 of the Lancaster County Emergency Operations Plan (EOP) contains a description of Emergency Support Function (ESF) 14 – Long-Term Recovery and Mitigation. The purpose of this ESF is to seek out, promote and build mitigation opportunities into the recovery process.

  In Support Annex 2 of the Lancaster County EOP is the Emergency Recovery Plan. This plan seeks to return county infrastructure to equal to or better than pre-incident condition through use of mitigation practices.

  Additionally, there is Support Annex 5 of the Lancaster County EOP titled Mitigation. This portion of the plan specifically states that Lancaster County agencies and emergency departments with responsibilities included in the EOP will develop standard operating procedures based on Hazard Mitigation.

- **Lancaster County Ordinance 1095, Municode Chapter 9 Flood Damage Management Ordinance – "Storm Water Management Ordinance"**

  The objective of this ordinance is to protect human life and health, to help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize flood blight areas, and to insure that potential home buyers are notified that property is in a flood area. The provisions of the article are intended to minimize damage to public facilities and utilities such as water and gas mains, electric, telephone, and sewer lines, streets and bridges located in the floodplain, and prolonged business interruptions. Also, an important floodplain management objective of this article is to minimize expenditure of public money for costly flood control projects and rescue and relief efforts associated with flooding.

- **City of Lancaster Ordinance # O017-02**

  The objective of this ordinance is to protect human life and health; to minimize expenditure of public money for costly flood control projects; to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public; to minimize prolonged business interruptions, to minimize damage to public facilities and utilities; to help maintain a stable tax base by providing for sound use and development of flood-prone areas in such manner as to minimize future flood blight areas; and to insure that potential home buyers are notified that property is in a flood area.

- **Lancaster County Ordinance # 847, Chapter 7 Buildings and Construction**

  The objective of this ordinance is to adopt the latest model building codes and standards so that Lancaster County Building and Zoning can insure the built environment will meet or exceed the latest minimum standards for safety.

- **City of Lancaster Ordinance # O08-12**

  The objective of this ordinance is to adopt the latest model building codes and standards so that City of Lancaster Building and Zoning can insure the built environment will meet or exceed the latest minimum standards for safety.

- **Lancaster County Hazard Mitigation Plan**

  FEMA requires state, tribal, and local governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. Jurisdictions must update their hazard mitigation plans and re-submit them for FEMA approval every five years to maintain eligibility. Through the Hazard Mitigation Assistance (HMA) grant programs (Hazard Mitigation Grant Program, Pre-Disaster Mitigation, and Flood Mitigation Assistance), FEMA offers planning grants that support state, tribal, and local governments in developing and updating mitigation plans.

- **International Property Maintenance Code, Section 111**

  Descriptive code that outlines code use and authority to declare a structure unsafe in the event of damage due to a natural or manmade disaster and compromise.

- **Lancaster County Ordinance # 309**

  The Unified Development Ordinance establishes zoning districts, setbacks from streams and designated floodplains, erosion control, storm water management, conditional uses, administrative procedures, flood damage prevention, and other rules regarding the use of land in Lancaster County.

- **City of Lancaster Code of Ordinances Section 31-267**

  The City of Lancaster adopted a Unified Development Ordinance to establish zoning districts, set setbacks from streams and designated floodplains, erosion control, storm water management, conditional uses, administrative procedures, flood damage prevention, and other rules regarding the use of land in the City of Lancaster.

- **Town of Kershaw Ordinance # 60**

  The Town of Kershaw adopted a Unified Development Ordinance to establish zoning districts, set setbacks from streams and designated floodplains, erosion control, storm water management, conditional uses, administrative procedures, flood damage prevention, and other rules regarding the use of land in the Town of Kershaw.

- **Lancaster County Debris Management Plan**

  This plan is designed to identify agencies and activities that are involved in debris operations to ensure a coordinated response which achieves removal, storage, and final disposition of debris deposited along or immediately adjacent to public right-of-way in the unincorporated areas of the County.

- **City of Lancaster Ordinance # O06-02**

  This ordinance establishes policy for the collection of yard debris, white goods, and solid waste collection by the City of Lancaster.

- **Lancaster County Ordinance # 921 Section 14-72**

  This ordinance is intended to prescribe regulations consistent with nationally recognized practices for the reasonable protection of life and property from the hazards of fire and explosion due to the storage, use or handling of hazardous materials, substances and devices, and from conditions hazardous to life or property in the use or occupancy of buildings or premises.

- **City of Lancaster Ordinance # O02-04**

  This ordinance is intended to prescribe regulations consistent with nationally recognized practices for the reasonable protection of life and property from the hazards of fire and explosion due to the storage, use or handling of hazardous materials, substances and devices, and from conditions hazardous to life or property in the use or occupancy of buildings or premises.

- **Town of Heath Springs Ordinance # 15A**

  This ordinance regulates the burning of materials outdoors within the Town Limits of Heath Springs. This ordinance is intended to prescribe regulations consistent with nationally recognized practices for the reasonable protection of life and property from the hazards of fire.

- **Lancaster County Hazardous Materials Response Plan**

  This plan was written to identify and establish an ordered list, reporting those materials that may pose a hazard to the citizens of Lancaster County. The plan also identifies recommended best practices for response and mitigation based on the DOT Emergency Response Guidebook. The inventory of materials is based on the most up to date Tier II data available.

II. Local Government Capability Matrix

In addition to the assessment of community policies, regulations and plans, the Hazard Mitigation Planning Committee also created a matrix (see table 4-2) as a way of taking inventory of additional mitigation capabilities in each community. The intent of this effort was to see if there were any similarities or gaps in community programs and tools that might indicate where some improvements could be made.

The matrix and the key to the matrix labels are located on the following pages. There are boxes that are shaded yellow, and others that are red. The yellow boxes highlight an opportunity to make an improvement, such as:

- Giving consideration to incorporating Hazard Mitigation principles throughout the various elements of a community's planning efforts or as a separate element itself.

The red boxes highlight issues that should generate a higher level of concern, and thus warrant further investigation. For example, the red highlighted boxes indicate:

- That no incorporated municipality has undertaken any special efforts to protect their critical facilities from wind damages. This could easily be a mitigation priority.

Table 4-2 Capability Matrix				
	Lancaster County	City Of Lancaster	Town of Kershaw	Town of Heath Springs
Comp Plan	YES	COUNTY PLAN	COUNTY PLAN	COUNTY PLAN
Is HM included	YES	COUNTY PLAN	COUNTY PLAN	COUNTY PLAN
Land Use Plan	YES	YES	COUNTY	COUNTY
Subdivision Ordinance	YES	YES	NO	NO
Zoning Ordinances	YES	YES	YES	YES
Hazard Mitigation Plan	YES	COUNTY PLAN	COUNTY PLAN	COUNTY PLAN
NFIP Participation	YES	YES	YES	NO
FPM Ordinance	YES	YES	YES	YES
Administrator	YES	YES	YES	COUNTY PLAN
Sub. Damage	YES	YES	YES	YES
No. of FP Bldgs **	1	75 31 Mobile Homes 5 Apartment Bldgs 39 Other Bldgs	0	0
No. of policies	60	25	0	0
No. of RLs	2	4	0	0
CRS Rating	NONE	NONE	NONE	NONE
Storm-water Program	YES	YES	YES	YES
Building Official	YES	YES	COUNTY SERVICE	COUNTY SERVICE
Inspections	YES	YES	COUNTY SERVICE	COUNTY SERVICE
Local EOP	YES	COUNTY PLAN	COUNTY PLAN	COUNTY PLAN
Warning-sirens	NO	NO	NO	NO
Reverse 911	YES	NO	COUNTY	COUNTY
ReachSC	YES	COUNTY PLAN	COUNTY PLAN	COUNTY PLAN
Cable Override	NO	NO	NO	NO
NOAA Radio	YES	NO	NO	NO
Structural Protection Projects	YES 5 RESERVOIRS	YES	YES	NO
Property Protection Projects	NO	NO	NO	NO
Critical Facility Protection	SOME	SOME	NO	NO
Natural And Cultural Inventory	NO	NO	NO	NO
Erosion Control	YES	YES	YES	YES
Sediment Control	YES	YES	YES	YES
Pub. Info Prgrm	SOME	NO	NO	NO
Env. Ed Prgrm	NO	NO	NO	NO

*** Based on best available information.*

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

Comp Plan: Does the community have a Comprehensive Long-Term Community Growth Plan?

Land Use Plan: Does the community have a plan that designates type of Land Use desired/required?

Subdivision Ordinance: Does the community have an ordinance that dictates lot sizes, density, setbacks, construction type, etc?

Zoning Ordinance: Does the community have an ordinance that dictates type of Use and Occupancy in certain areas?

HM Plan: Does the community have an existing stand-alone Hazard Mitigation Plan?

FPM Ord: Does the community have a Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas.

Sub. Damage: Does the FPM Ordinance contain language on Substantial Damage/Improvements?

Administrator: Does the community have a Floodplain Administrator (someone responsible for enforcing the ordinance)?

 # Of FP Bldgs.: How many buildings are in the floodplain in the community?

 # Of policies? How many buildings in the floodplain are insured against flood through the NFIP?

 # Of RL's: How many NFIP Repetitive Losses are in the community? (Paid > $1,000, twice in the past 10 years)

CRS Rating: Is the community in the Community Rating System of the NFIP, and if so, what's the rating?

Storm-water Program: Does the community have a Storm-water Management program?

Building Official: Does the community have a Building Official?

Inspections: Does the community conduct building inspections during and after completion of the development process?

LEOP: Does the community have a Local Emergency Operations Plan (a disaster RESPONSE plan)?

Warning: Do you have any type of system, such as: Sirens? NOAA Weather Radio reception? Cable (TV) Override? “Reverse 911”?

Structural Protection Projects: (levees, drainage facilities, detention/retention basins)

Property Protection Projects: (buy-outs, elevation of structures, flood proofing, small "residential" levees or berms/floodwalls)

Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations. medical facilities ... that are at risk ... e.g., in the floodplain)

Natural And Cultural Inventory: Does the community have an inventory of resources, maps, or special regulations within the community? (Wetlands and historic structures/districts, etc.)

Erosion or Sediment Control: Does the community have any projects or regulations in place?

Public Information and/or Environmental Education Program: Does the community have an ongoing program even if its primary focus is not hazards? Examples would be regular flyers included in city utility billings, a website, or an environmental education program for kids in conjunction with Parks & Recreation.

III. Integrating Mitigation Principles into Other Plans

Much of the hazard mitigation planning process can be applied to other planning efforts across jurisdictions in Lancaster County. Principally, the data obtained to inform and guide the formulation of this plan is applicable to many other initiatives in the county. Examples include the Unified Development Ordinance, zoning ordinances, comprehensive planning, and infrastructure planning, among others. Participation in this planning process by a variety of public entities, such as public works, stormwater, planning & zoning, and building departments allows for coordination of resources and information to create goals and objectives as the county moves into the future. As often as possible, these goals and objectives will be applied to the other planning processes to maximize efficiency of funding and efforts by the aforementioned departments. On a continual basis, the Hazard Mitigation Planning Committee members will monitor planning efforts within their respective departments and organizations and will strive to accomplish the goals and objectives of the hazard mitigation plan when they overlap with the goals of other plans and funded projects.

Changes from the Last Plan

This section did not see major changes from the 2017 revision. All ordinances were reviewed, and if they were no longer active they were removed. If the codes identifying the ordinance were changed, they were updated to reflect that change.

SECTION - 5
GOALS AND OBJECTIVES

I. Introduction

The Lancaster County Hazard Mitigation Planning Committee worked together to develop goals and objectives for addressing hazard mitigation. The process for writing these goals and objectives aimed to make them **S**pecific, **M**easurable, **A**chievable, **R**elevant and **T**ime-oriented. In order to begin the discussion of goals, the committee first had to review the hazard identification and vulnerability assessment to determine the most significant threats to the county and communities. It is important that every mitigation project have the potential to reduce the effects of a future disaster or event.

II. Planning

The committee was presented with a review of existing policies, procedures and regulations for dealing with various hazards and threats posed by them. This is Section 4 of the plan, the Capability Assessment. The committee focused on communities' existing policies and practices towards protecting lives and property from its various threats. After discussing the results of the capability assessment and determining needs for addressing identified hazards, a set of goals was drafted. There are several pieces of the planning process that must be explained:

Goals: represent broad statements that are achieved through the implementation of more specific, action-oriented policies or projects. Goals establish the framework for mitigation projects.

Proposed Hazard Mitigation Policies: Policies are defined as an ongoing course of action agreed to by members of the Planning Team.

Proposed Hazard Mitigation Projects: Projects are defined as actions taken to address defined vulnerabilities to existing systems.

Mitigation Action Plan: a prioritized list of actions, each of which includes a categorization of the mitigation technique, the hazards addressed, the individual or organization responsible for implementation, an estimated timeline for completion, and series of funding sources.

III. Mitigation Goals

The following are a compilation of goals identified, currently underway, or needed to reduce the impacts of natural, man-made, or technological events. The purpose of this section is to describe general goals and objectives for Lancaster County and the municipalities included in its boundaries as they relate to the mitigation program.

- **Goal #1:** Minimize loss of life, injury, damage to property, the economy, and the environment from natural, man-made and technological hazards at all times through hazard mitigation.

- **Goal #2:** Lancaster County will have the capability to develop, maintain, and utilize hazard information during events of significance.

- **Goal #3:** The continuity of county government operations will not be significantly disrupted during any disaster due to lack of notification or a prioritized contact list.

- **Goal #4:** Enhance the Hazards Education, Notification, and Public Information Programs during this mitigation period.

- **Goal #5:** Identify structural and infrastructure projects that will reduce vulnerability and impact to the citizens of Lancaster County, while promoting resiliency during this mitigation period.

IV. Identification and Analysis of Mitigation Measures

FEDERAL REQUIREMENTS FOR LOCAL MITIGATION PLANS 44 CFR 201.6. The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

EMAP STANDARD 4.4.5: The mitigation plan shall be based on the natural and human-caused hazards identified by the Emergency Management Program and the risk and consequences of those hazards. The mitigation plan for the jurisdiction is developed through formal planning processes involving Emergency Management Program stakeholders and shall establish interim and long-term strategies, goals, objectives, and actions to reduce risk to the hazards identified. The Emergency Management Program implements a process and documents project ranking based upon the greatest opportunity for loss reduction and documents how specific mitigation actions contribute to overall risk reduction.

All activities chosen by the committee and those who are internal and external stakeholders fall into one of the broad mitigation techniques listed below:

A. Prevention (Goal #1)

Prevention activities are designed to limit vulnerabilities that the community faces during a disaster or event. Prevention activities include:

1. Resource identification and capability assessment
2. Hazard mapping
3. Building code revision
4. Floodplain regulation
5. Storm water management
6. Drainage system maintenance
7. Hazardous materials identification and location
8. Pipeline and rail line mapping
9. Capital improvement planning for infrastructure
10. Historic site identification

B. Property Protection (Goal #5)

Property protection measures are designed to help facilities survive the event while minimizing damage and loss. Property Protection mitigation activities include:

1. Acquisition of at-risk structures
2. Critical facilities protection
3. Retrofitting (wind or flood-proofing)
4. Incorporating hazard mitigation into Public Works
   a. Identification
   b. Notification
   c. Mitigation
   d. Reporting
5. Historic site protection and preservation

C. Natural Resource Protection (Goal #1)

Natural resource protection reduces the environmental impact of an event while protecting life, property, and the resources that impact us. Natural Resource Protection Activities include:

1. Floodplain protection
2. Erosion and sediment control
3. Wetland preservation and restoration
4. Habitat preservation
5. Runoff control
6. Water monitoring
7. Wildfire fuel breaks

D. Structural or Infrastructure Projects (Goal #5)

Structural or Infrastructure mitigation projects are projects to minimize the impact of a disaster or event with structural modifications or new construction, including:

1. Acquisition of structures in flood prone areas
2. Utility improvements
3. Structural retrofit to accommodate growth and system demands.
4. Floodwalls and retaining walls
5. Detention and retention structures
6. Culverts
7. Develop measures to protect at-risk vulnerable critical facilities
8. Shelter enhancement to include but not limited to back-up power

E. Emergency Response and Support Services (Goals #3 and #2)

Emergency response can significantly reduce the impact of a disaster or event if given the appropriate resources and training. Some associated enhancements include:

1. Warning, alerting and communication systems for response agencies and stakeholders.
   a. Continuity of government operations
   b. Identification of key players.
2. Data and information management during emergencies
3. Search and rescue priority planning
4. Evacuation planning and management
5. Flood "fighting" techniques
6. Hazardous materials planning

F. Public Information and Awareness (Goal #4)

Public Information and awareness activities are used to provide education, information, notification and direction. The utilization of numerous information dissemination mediums is important to reach the desired audience. Examples of activities that support mitigation include:

1. Warning, alerting and communication systems
2. Outreach and education
3. Demonstrations and events
4. Training
5. Event information and direction

After a review the hazard identification and vulnerability assessment, the committee of technical experts in their respective fields worked to identify the greatest threats that have the ability to impact the welfare of the county. The purpose of the Goals and Objectives Section is to provide a framework of ambitions set for the provision of the safety and resiliency of our community, the economy of the county and the environment.

V. Changes from the Last Plan

There were no changes to this section from the last revision in 2017.

SECTION - 6
MITIGATION PROJECTS / ACTION PLAN

Mitigation projects were developed based on the goals and objectives outlined in Section 5. The HMPC worked to develop projects to meet the mitigation needs of the County and all municipalities for each specific hazard faced. Some projects cover multiple hazards and multiple jurisdictions.

I. Guidelines to Evaluation and Prioritization of Goals and Mitigation Actions

To ensure that the mitigation strategies and actions associated with the projects listed meet the outlined goals, the HMPC will provide a prioritized project list based on potential losses and benefit cost analysis. Mitigation funding is limited and as projects are created, each one will identify the goal referenced, actions entailed, and a potential funding source. As new projects are added to the list, the HMPC will conduct analyses to determine the priority of new projects compared to old ones, as well as the best funding source for each project.

Guiding principles to assist with project identification and prioritization:

1. The project must be in conformance with the hazard mitigation plan.
2. The project must solve a problem independently or constitute a functional portion of a solution to ensure project completion.
3. The project should first reduce the impact of a disaster on the citizens of Lancaster County and meet several professional benchmarks such as cost effectiveness, reducing future risk or repetition, and inclusion of the provision for environmental sensitivity.
4. Review the historical data to gauge the effectiveness of a project. Is this a single occurrence or repetitive in nature?
5. Consider the available funding options for project completion.
6. Population density and development in potential project areas.

Project lead agencies will be responsible for project implementation as funding becomes available. The HMPC will coordinate with lead agencies to record project progress and update the Mitigation Action Plan as necessary.

II. Potential Projects Identified By Lancaster County Emergency Management

The projects listed are those that have been identified as a result of information obtained from outside agencies, internal sources, and previous plans. Projects listed here are included in this version of the plan in addition to projects from the previous version.

With the exception of increased focus on the rapid population growth in Lancaster County, the overarching mitigation planning priorities have not changed drastically.

A. Flood Mitigation of County Roads

1. Culvert replacements
2. Culvert retrofitting
3. Roadway elevation
4. Installation of stream gauges
5. Floodplain property acquisition

B. Channel and Basin Debris Removal

1. Map Storm-Water Run-Off Channels.
2. Institute Waterway Inspection Program.
3. Remove Debris Blocking Storm-Water Channels.

C. Enhance the Hazards Education/Public Information Program

1. Continued training of public officials and employees.
2. Incorporating hazard mitigation into Public Works projects.
3. Promote public awareness about mitigation and emergency preparedness by working with social media, local newspapers and television stations.

D. Improved Protection of Critical Facilities

1. Identify at-risk facilities.
2. Develop measures to address the risk to vulnerable critical facilities to prevent future damages.

E. Identification of Hazardous Materials Facilities, Products and Processes

1. Using Tier II data, update and enhance the Hazardous Materials Response Plan to identify risk.
2. Using Tier II data and plans to educate responders on potential needs to reduce impact and potential loss of life to the public and responders.
3. Identify and Map pipeline and rail lines in anticipation of an event or compromise.

F. Life Safety Protective Measures

1. Install generators at Red Cross approved shelter sites which are used as temporary shelters and Disaster Recovery Centers
2. Pre-wire emergency shelters for mobile generator connection
3. Lease/purchase mobile generators for use with emergency shelters.

III. Scope of Goals and Objectives Project Workbook

Lancaster County, South Carolina continues to grow at a rate faster than Richland, York, Greenville, and Charleston Counties in South Carolina, just to name a few. The

latest revision of our Hazard Mitigation Plan addresses several challenges associated with this growth and incorporates identified natural, man-made, and technological threats based on historical data while using forecast models and charts to predict possible future occurrences of events.

The goals and objectives for this mitigation cycle involve countywide projects. These projects are designed to protect life, reduce injury, lessen impact to infrastructure, safeguard the economy, and eliminate potential environmental demise.

In planning for this mitigation cycle the process led to the development of a Goals and Objectives project workbook. The workbook is divided into sections which correlate to the goals and objectives identified in the plan. The workbook, at a glance, will identify the hazard addressed, mitigation actions, committee-based identification of priority, and projected cost for the action.

Included in the workbook are some historical goals that have recently been completed. Projects highlighted in yellow are new projects for this mitigation cycle. Projects that are not highlighted are active projects from the previous mitigation cycle.

IV. Changes from the Last Plan

a. All of changes to this section are located in the appendices.
   i. Goal #1: The addition of FEMA floodplain managers has been completed and 2 employees are now certified as floodplain managers. This mitigation action was changed to green.
   ii. Goal #2: The inspection of storm water drainage systems was changed to green as it is now completed.
   iii. Goal #3: The status of warning, alerting, and communications to emergency responders was changed to ongoing.
   iv. Goal #4: Warning, alerting, and communications for the public was changed to an ongoing mitigation action.
   v. Prevention Activity (Mitigation Training for Public Works Officials): This was changed to green, as training has taken place and this activity is now complete.
   vi. Property Protection (Historic Site Protection): All of the projects listed within this property protection category were changed to green as they are complete.
   vii. Emergency Response and Support Services (Warning, Alerting and Communication Systems for Response Agencies and Stakeholders): Both of the projects within this category were changed to green highlighting. The status for this project was changed to ongoing.

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GOAL STATEMENT WORKSHEET

Goal #1: Minimize loss of life, injury, damage to property, the economy and the environment from natural, manmade and technological hazards at all times relating to hazard mitigation.

Mitigation Action	Hazards Addressed	Priority	Category	Associated Goal	Estimated Cost	Funding Source	Lead Agency	Implementation Schedule	Status	Milestones Achieved
Flood Mitigation of County Roads	Flood, Dam Failure, Storm Inundation	High	Prevention Activity	1	$63,000,000	FEMA PDM, other grant programs	Public Works	Immediate/ Continuing	In Progress	17 of 30 projects completed
Channel and Basin Cleanout	Flood, Dam Failure, Storm Inundation	High	Prevention Activity	1	$0	USDA Grant Funding	County Stormwater	Immediate/ Continuing		
Addition of FEMA Floodplain Managers	Flooding, Construction Methods/ Protective Measures	High	Prevention Activity	1	$0	County / City Budgets	County Stormwater	Proposed per Code Official	Complete	2 employees obtained training and certifications

GOAL STATEMENT WORKSHEET

Goal #2: Lancaster County will have the capability to develop, maintain and utilize hazard information during events of significance.

Mitigation Action	Hazards Addressed	Priority	Category	Associated Goal	Estimated Cost	Funding Source	Lead Agency	Implementation Schedule	Status	Milestones Achieved
Inspection of Storm Water Drainage System	Flooding, Dam Failure, Storm Inundation	High	Natural Resource Protection	2	$0	County Budget	County Stormwater	Annual	Complete	Drainage plans complete
Hazardous Materials Planning	All	High	Emergency Response and Support Services	2	$3,304	Hazardous Material Emergency Preparedness Grant	Emergency Management	Immediate/ Continuing	Complete	HAZMAT Response Plan Completed

GOAL STATEMENT WORKSHEET

Goal #3: The continuity of county government operations will not be significantly disrupted during any disaster due to lack of notification or a prioritized list.

Mitigation Action	Hazards Addressed	Priority	Category	Associated Goal	Estimated Cost	Funding Source	Lead Agency	Implementation Schedule	Status	Milestones Achieved
Warning, Alerting, & Communications for Emergency Responders	All	High	Emerg. Response & Support Services	3	$2,772.48	County Budget	Emergency Management & Public Safety Comms.	Immediate/ Annually	Ongoing	Notification process in progress
Data & Information Sharing During Emergencies	All	High	Emerg. Response & Support Services	3	$0	UASI Grant Funding	Emergency Management	Immediate/ Annually	Underway	Plans & Tier II Data Complete

GOAL STATEMENT WORKSHEET

Goal #4: Enhance the Hazards Education, Notification and Public Information Programs during this mitigation period.

Mitigation Action	Hazards Addressed	Priority	Category	Associated Goal	Estimated Cost	Funding Source	Lead Agency	Implementation Schedule	Status	Milestones Achieved
Continuing Mitigation Training for Building Officials	All	High	Property Protection	4	$0.00	City / County Budget	County Building & Zoning	Annual	Ongoing	Pertinent training classes identified
Mitigation Training for Public Works Officials	All	High	Prevention Activity	4	$0.00	City / County Budget	Lancaster County and City Public Works	Annual	Ongoing	Pertinent training classes identified
Outreach and Education for Hazard Mitigation and Emergency Preparedness	All	Medium	Public Information and Awareness	4	$5,891.00	Local Emergency Management Performance Grant	Lancaster County Emergency Mgmt.	Quarterly	Proposed	Print media ad pricing gathered
Warning, Alerting, and Communications for the Public	All	High	Public Information and Awareness	4	$851.48	County Budget	Lancaster County Emergency Mgmt.		Ongoing	Social Media and Web-based Comms. Established

GOAL STATEMENT WORKSHEET

Goal #5: Identify Structural and Infrastructure Projects that will reduce vulnerability and impact ot the citizens of Lancaster County while promoting resiliency during this mitigation period.

Mitigation Action	Hazards Addressed	Priority	Category	Associated Goal	Estimated Cost	Funding Source	Lead Agency	Implementation Schedule	Status	Milestones Achieved
Critical Facilities Fortification	Tornado Thunderstorm Hurricane		Structural or Inf.structure Projects	5	$1,950,000	USDA / County Budget	County Fire Rescue/ Emergency Mgmt.	Underway	Ongoing	Two projects funded. Several unfunded.
Retrofit (Wind or Flood Proofing)	High Wind, Flooding, Dam Failure, & Storm Inundation	High	Property Protection	5	$0	NFIP & County Budget	County Building & Zoning	Complete	Ongoing - As needed	UDO Revision as protection measure 11/2016
Emergency Shelter Retrofit for Emergency Backup Power	All	High	Structural or Inf.structure Projects	5	$678,000	Building Resilient Infrastructure & Communities Grant	Lancaster County Emergency Management	Pending Outside Concurrence		Costs Acquired

PREVENTION ACTIVITY

Prevention Activitiy	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Flood Mitigation of County Roads	Honeycutt Rd.	County	County Pub. Works	High	Flooding	Pending - Endangered Species			$0.00
	Bob Ormand Rd.	County	Co. Pub. Wrks.	High	Flooding	Pending			$0.00
	Plyler Mill Rd.	County	Co. Pub. Wrks.	High	Flooding	Pending			$0.00
	Stamp Mill Rd. - Big and Little Double Branch	County	County Pub. Works	High	Flooding	Approved (2019)			$0.00
	Waxhaw Village Rd.	County	County Pub. Works	High	Flooding	Absorbed by new development			$0.00
	Fernwood Rd.	County	County Pub. Works	High	Flooding	Pending FEMA Coordination			$0.00
	Feather Run Rd.	County	County Pub. Works	High	Flooding	Pending - Endangered Species			$0.00
	Decree Rd.	County	Co. Pub. Wrks.	High	Flooding	Pending			$0.00
	Walnut Rd.	County	County Pub. Works	High	Flooding	Approved (2019)			$0.00
	Stewart Place Rd.	County	County Pub. Works	High	Flooding	Approved (2019)			$0.00
	Henderson Rd.	County	County Pub. Works	High	Flooding	To be Completed in Fall 2018			$0.00
	Ander Vincent Rd.	County	County Pub. Works	High	Flooding	Possible SMS4 Project			$0.00
						Total	$0.00	$0.00	$0.00

PREVENTION ACTIVITY

Prevention Activitiy	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Channel and Basin Cleanout	Storm Water Drainage System Mapping	County	County Stormwater	Medium	Flooding	Ongoing	$0.00		$0.00
	Debris removal from storm water runoff channels	County	County Stormwater	High	Flooding	Proposed	$0.00		$0.00
						Total	$0.00	$0.00	$0.00
Addition of FEMA Floodplain Managers	Floodplain Management Training to increase number of certified FEMA Floodplain Managers	County	County Stormwater	High	Flooding	Ongoing	$0.00	$0.00	$0.00
						Total	$0.00	$0.00	$0.00
Mitigation Training for Public Works Officials	Incorporate Hazard Mitigation into Public Works Training	County	County Public Works	High	All	Ongoing			$0.00
						Total	$0.00	$0.00	$0.00

PREVENTION ACTIVITY

Prevention Activitiy	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Lancaster Soil and Water Conservation District Dam Improvement	Campbell Lake Site 7: Dam Raising and Repeat Flood Property Aquisition	County	Soil & Water Conservation District	High	Flooding	Proposed	$9,200,000		
	Ghent Reservoir Site 16: Dam Raising, Dam Widening, and Property Acquisition	County	Soil & Water Conservation District	High	Flooding	Proposed	$1,100,000		
	Gillis Creek Site 18A: Dam Raising, Dam Widening, and Property Acquisition	County	Soil & Water Conservation District	High	Flooding	Proposed	$12,800,000		
	Bear Creek Site 10D: Loweing the weir, Widening the Auxiliary Spillay, Armor Auxillary Spillway	County	Soil & Water Conservation District	High	Flooding	Proposed	$1,000,000		
	Little Lynches Creek Site 12: Dam Raising, Armoring auxillary Spillway	County	Soil & Water Conservation District	High	Flooding	Proposed	$5,100,000		
						Total	$29,200,000	$0.00	$0.00
Stream Gauging Stations	20 Named Streams of Lancaster County and 6 Flood Control Dams	County	County Stormwater	High	Flooding	Proposed	$195,000.00		
						Total	$195,000.00	$0.00	$0.00

PREVENTION ACTIVITY

Prevention Activitiy	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Culvert Retrofitting	50 Culvert Road Crossings to be retrofitted for better efficiency	County	County Public Works Dept.	High	Flooding	Proposed	$500,000		
						Total	$500,000	$0.00	$0.00
FEMA Flood Insurance Study Update	Restudy all streams in the county to create more accurate and up-to-date floodplain analysis	County	County Stormwater	High	Flooding	Proposed	$1,275,000		
						Total	$1,275,000	$0.00	$0.00
Floodplain Purchase/ Protection	Purchase of floodplain acreage along streams throughout the county	County	County Stormwater	Medium	Flooding	Proposed	$23,000,000		
						Total	$23,000,000	$0.00	$0.00
Culvert Replacements / Road Elevation	6 County Roads	County	County Public Works	Medium	Flooding	Proposed	$5,000,000		
	Black Horse Run Road	County	Co. Pub. Wrks.	High	Flooding	Proposed	$750,000		
	Man-O-War Road	County	Co. Pub. Wrks.	Medium	Flooding	Proposed	$800,000		
	Old Bailes Road	County	Co. Pub. Wrks.	High	Flooding	Proposed	$850,000		
	Calvin Hall Road	County	Co. Pub. Wrks.	Medium	Flooding	Proposed	$850,000		
	Ander Vincent Road	County	Co. Pub. Wrks.	High	Flooding	Proposed	$750,000		
						Total	$9,000,000	$0.00	$0.00

PROPERTY PROTECTION

Property Protection	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Training Building Code Officials	Including Hazard Mitigation Training into Curriculum of Building Official Training	Lancaster County & Lancaster City	County & City Building Depts.	High	All	Ongoing			$0.00
						Total	$0.00	$0.00	$0.00
Retrofitting and Floodproofing of Residential and Business Properties	Utilize Grant Funding to Fortify Vulnerable Private Structures	Lancaster County	Emergency Management	Medium	Flooding	Proposed			$0.00
						Total	$0.00	$0.00	$0.00

NATURAL RESOURCE PROTECTION

Natural Resource Protection	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Inspection of Storm Water Drainage System	Institute Waterway Inspection Program	Lancaster County	County Stormwater	High	Flooding	Proposed			$0.00
						Total	$0.00	$0.00	$0.00

STRUCTURAL OR INFRASTRUCTURE

Structural or Infrastructure Projects	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Critical Facility Fortification	New Station Construction for EMS 7	Town of Heath Springs	Lancaster County EMS	High	High Wind	Proposed	$800,000		$800,000.00
	EMS 3 Fortification	Lancaster County	Lancaster County EMS	Medium	High Wind	Proposed			$0.00
	Antioch Fire Station Fortification	Lancaster County	Antioch Fire Dept.	Medium	High Wind	Proposed			$0.00
	Bell Town Fire Station Fortification	Lancaster County	Bell Town Fire Dept.	Medium	High Wind	Proposed			$0.00
	Charlotte Rd./Van Wyck Fire Station Fortification	Town of Van Wyck	Town of Van Wyck	Medium	High Wind	Proposed			$0.00
	Elgin Fire Station Fortification	Lancaster County	Elgin Fire Dept.	Medium	High Wind	Proposed			$0.00
	Riverside Fire Station Fortification	Lancaster County	Riverside Fire Dept.	Medium	High Wind	Proposed			$0.00
						Total	$800,000.00	$0.00	$800,000.00
Shelter Retrofit to Facilitate Emergency Power	Wire Shelter locations for Emergency Power	Lancaster County	Emergency Management	High	All	Grant Applied for	$240,000.00		$240,000.00
	Generator Purchase for 2 shelters	Lancaster County	Emergency Management	High	All	Grant Applied for	$525,500.00		$525,500.00
						Total	$765,500.00	$0.00	$765,500.00

EMERGENCY RESPONSE AND SUPPORT SERVICES

Emergency Response and Support Services	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Warning, Alerting, and Communication Systems for Response Agencies and Stakeholders	Expansion of Active 911 System	Lancaster County	Emergency Management	High	All	Ongoing	$450		$0.00
	Everbridge Notification Group Enhancements	Lancaster County	Emergency Management	High	All	Ongoing	$396.48		
						Total	$846.48	$0.00	$0.00
Data and Information Management During Emergencies	Use existing plans and Tier II Data to educate responders	Lancaster County	Emergency Management	High	All	Ongoing	$0.00		$0.00
	Data and Information Sharing utilizing Palmetto EOC	Lancaster County	Emergency Management	Medium	All	Proposed	$0.00		$0.00
	Continuity of Government Operations Plan Maintenance	Lancaster County	Emergency Management	High	All	Ongoing	$0.00		$0.00
						Total	$0.00	$0.00	$0.00
Hazardous Materials Planning	Hazardous Materials Response Guide	Lancaster County	Emergency Management	High	Manmade / Tech. Hazards	Completed & Approved	$3,304.00	$3,304.00	$0.00
	Identify and Map Pipe and Rail Lines	Lancaster County	Emergency Management	Medium	Manmade / Tech. Hazards	Proposed			$0.00
						Total	$3,304.00	$3,304.00	$0.00

PUBLIC INFORMATION AND AWARENESS

Public Information and Awareness	Project Name	Jurisdiction	Lead Agency	Priority	Hazard Addressed	Status	Projected Cost	Actual Cost	Difference
Warning, Alerting and Communications	Everbridge Program Expansion	Lancaster County	County Public Safety Communications	High	All	Proposed	$396.48	$0.00	$396.48
	Enhanced Public Notification utilizing Social Media and Web Applications	Lancaster County	Emergency Management	High	All	Ongoing	$455.00	$0.00	$455.00
						Total	$851.48		
Outreach and Education	Print Media - Lancaster News 4 x's 1/4 Page	Lancaster County	Emergency Management	Medium	All	Proposed	$2,235.60		
	Print Media - Carolina Gateway 4 x's 1/4	Northern Lancaster	Emergency Management	Medium	All	Proposed	$1,586.40		
	Discover Magazine	Lancaster County	Emergency Management	Medium	All	Proposed	$1,299.00		
	Welcome to Indian Land Magazine	Lancaster County	Emergency Management	Medium	All	Proposed	$770.00		
	County Website	Lancaster County	Emergency Management	High	All	Ongoing	$0.00		
						Total	$5,891.00	$0.00	