

Clarendon County

**City of Manning
Town of Turbeville
Town of Summerton
Town of Paxville**

Hazard Mitigation Plan Update

October 2009

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Outline of Clarendon County Hazard Mitigation Plan

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SECTION 8-1

HAZARD IDENTIFICATION AND ANALYSIS

INTRODUCTION

This section identifies, describes and analyzes the natural hazards present in Clarendon County that can threaten human life and damage property. It is broken down into the following three sections:

1. Potential Hazards (includes descriptions, historical occurrences, and map attachments)
2. Hazard Profile Risk Index
3. Conclusions on Hazard Risk

POTENTIAL HAZARDS

Due to its geographical setting, Clarendon County is vulnerable to a wide array of natural hazards that threaten life and property. **Shown in Table A-1 are the potential hazards that could impact the local jurisdictions in Clarendon County**

Table A-1
Hazard Identification and Assessment
Jurisdiction Affected by Hazard Type
Clarendon County and Local Governmental Units

Local Government	Flooding	Hurricane or Tropical or Coastal Storm	Tornado	Winter Storm/freezing /ice/snow	Dam Failure	Severe storm/wind/hail/lightning	Wildfire	Earthquake	Drought/Heat
Unincorporated Clarendon County	X	X	X	X	X	X	X	X	X
City of Manning	X	X	X	X	X	X	-	X	X
Town of Paxville	X	X	X	X	-	X	-	X	X
Town of Summerton	X	X	X	X	-	X	-	X	X
Town of Turbeville	-	X	X	X	-	X	-	X	X

("X" indicates that the governmental entity could potentially experience the type hazard indicated)

Some of these hazards are interrelated (i.e., hurricanes can cause flooding and tornadoes), and some consist of hazardous elements that are not listed separately (e.g., severe thunderstorms can cause lightning). This section provides general descriptions for each of the above listed hazards along with their hazardous elements and provides information on historical hazard occurrences in Clarendon County. Historical records are used to help us identify the level of risk, with the methodological assumption that the data sources cited are reliable and accurate.

A. FLOODING

Description:

Flooding is the most frequent and costly natural hazard in the United States. Floods are generally the result of excessive precipitation, and can be classified under two categories: *flash floods*, the product of heavy localized precipitation in a short time period over a given location; and *general floods*, caused by precipitation over a longer time period and over a given river basin. The severity of a flooding event is determined by a combination of stream and river basin topography, precipitation and weather patterns, recent soil moisture conditions and the degree of vegetative clearing.

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

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

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

A "floodplain" is the lowland area adjacent to a river, lake or ocean. Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood.

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

Identification of floodplain areas within the county and the incorporated municipalities was based on the most recent Flood Insurance Rate Maps (FIRM) produced by FEMA. These maps display the locations of all of the major water bodies in the county and delineate the 100-year floodplain boundaries (Zone A). These are areas that have a one percent chance of equaling or exceeding the recorded base flood elevation during any year. Based on these maps the unincorporated areas of Clarendon County and two out of the four incorporated municipalities have 100-year floodplains within their jurisdictions.

Digital (Q3) FEMA flood hazard maps are not available for any of the jurisdictions. If they become available they will be incorporated into future plan updates. In the absence of digital FEMA flood hazard maps, plan developers marked area maps or included copies of appropriate sections of FIRMS to further indicate the location of the flood hazard areas. These maps are included in the Appendix. In addition, FEMA Flood Insurance Rate Maps and Flood Hazard Boundary for Clarendon County (unincorporated areas only) and the City of Manning and the Town of Summerton are available at the office of the Santee Lynches Regional Council of Governments.

Table A-2
Clarendon County Flood Hazard Areas

Jurisdiction	FEMA Mapped Special Flood Hazard Area	NFIP Participant in Good Standing
Clarendon County (Unincorporated Areas Only)	Yes	Yes
City of Manning	Yes	Yes
Town of Summerton	Yes	Yes
Town of Paxville	Yes	Yes
Town of Turbeville	No	No

The Town Turbeville **does** not have Special Flood Hazard Areas or locally identified flood prone areas within their jurisdictional boundaries. Flood hazard area maps for those jurisdictions are not included in the plan.

Historical Occurrences:

Clarendon County has experienced moderate flood events in the past. This can be attributed to the low elevation of the topography, the presence of a lake, and a river basin that is located in the center of the county. Most areas along these rivers determined to be in the 100-year floodplain are undeveloped or lie within forested areas. The exception to this is the area east of the City of Manning, which borders the Pocotaligo River.

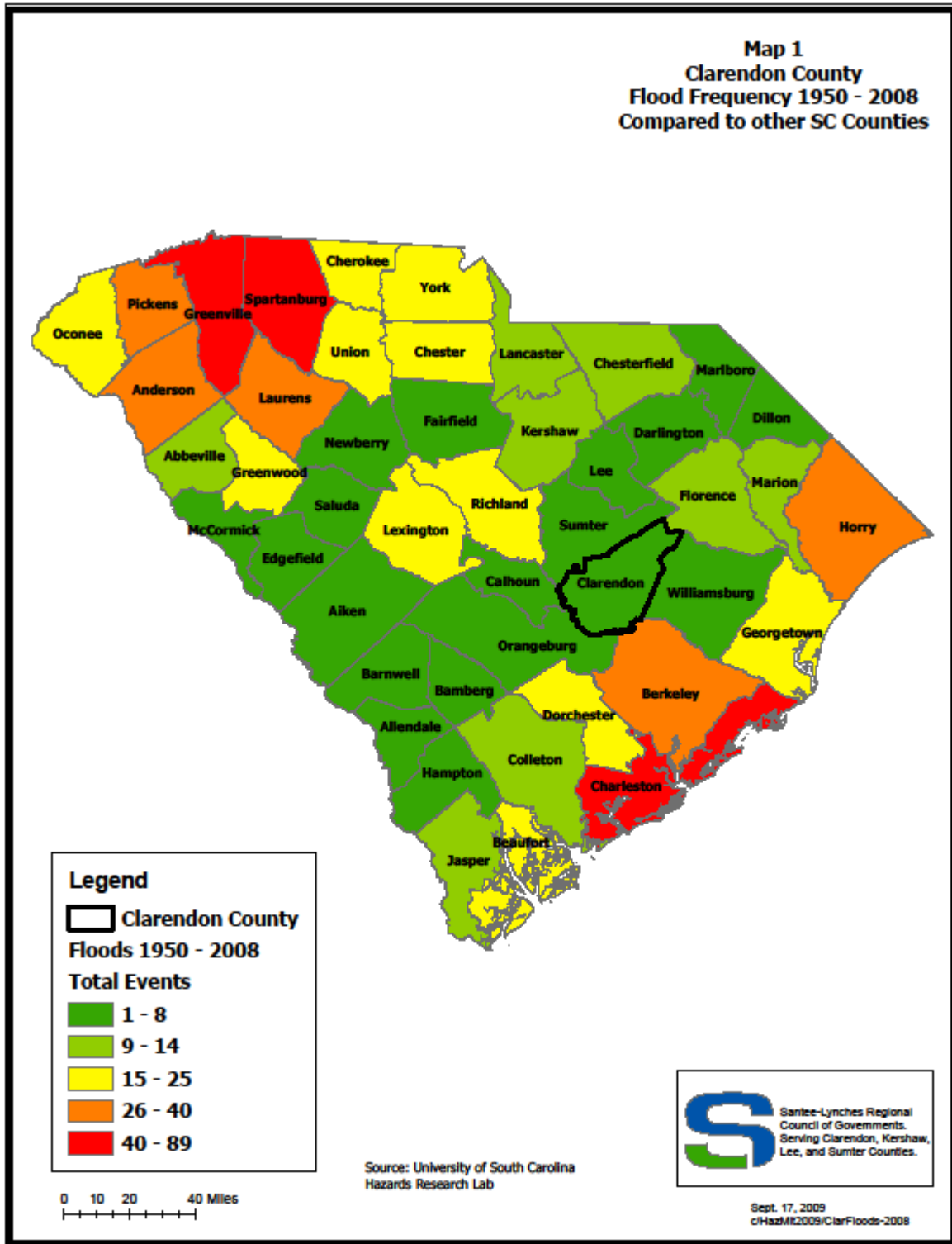
According to historical flood data compiled by the National Climatic Data Center, there were **6** floods that occurred in Clarendon County between 1995-2009 that resulted in \$385,000 in property damage. **No** lives were lost nor injuries suffered due to flooding during that **time** period. **Map 1** demonstrates how Clarendon County compares to other areas of South Carolina within this period of time. **Map 2**, on the other hand, illustrates those areas of the county that are prone to flooding. (Note: **Map 2** was created by Santee-Lynches Regional Council of Governments using existing hydrograph and topography data obtained by the South Carolina Department of Natural Resources. It is meant to be used as a general location map of areas that are within a 100-year flood plain).

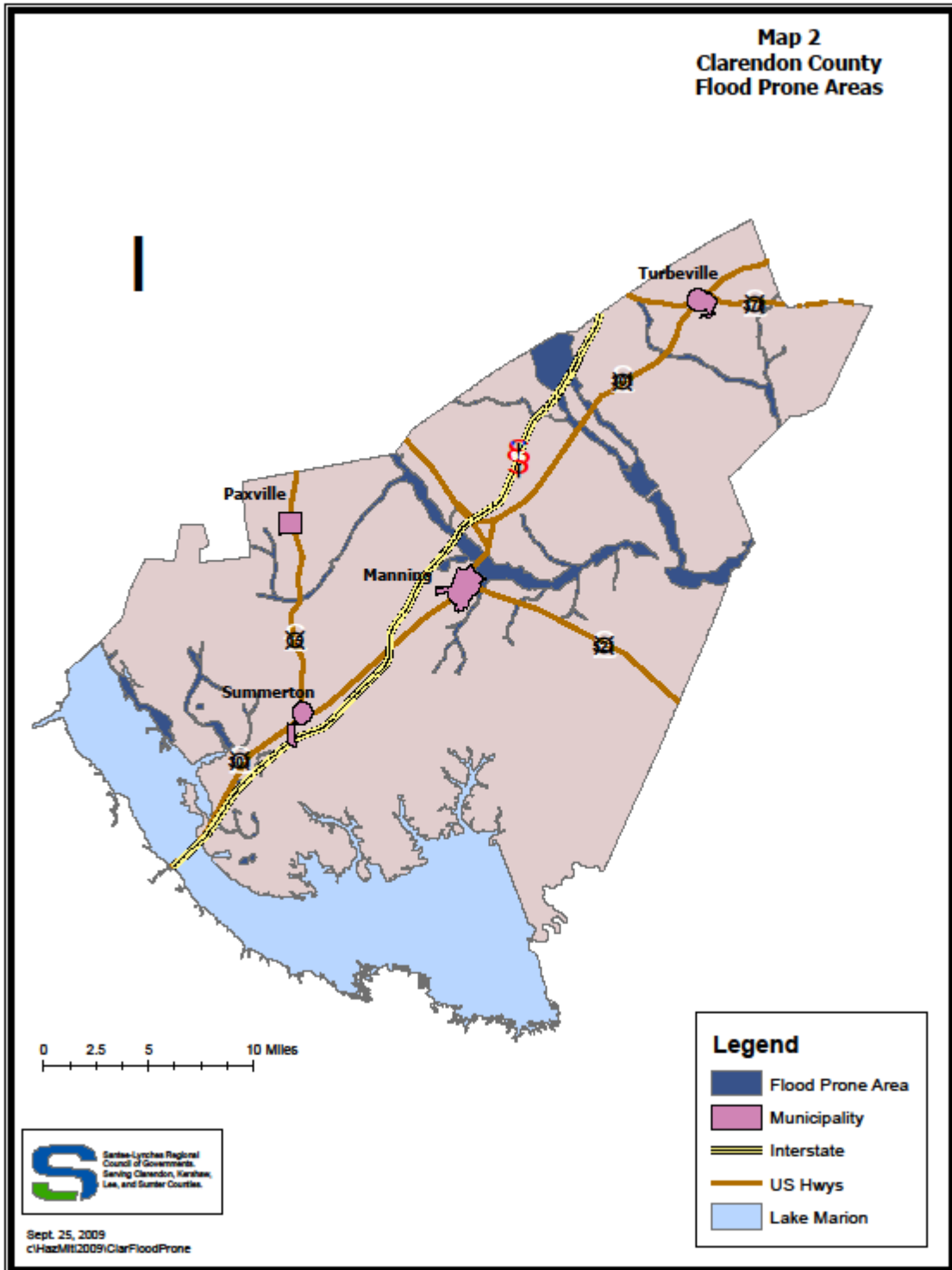
Table A-3
Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
100 Year Flood	*	*	100	1.00%
500 Year Flood	*	*	500	0.20%

Flood Occurrences in Clarendon County since 2002

Flash flood on June 30, 2004 at 12:15 pm – Emergency services reported 2 to 3 inches of rain just east of Paxville, flooding streams and fields. Some secondary roads were flooded.





Flash Flood on August 29, 2004 at 6:30 pm – Heavy rains from Tropical Storm Gaston caused several rural roads to flood and be temporarily closed in several areas of the county.

Multi-jurisdictional Occurrences:

Clarendon County

The critical facilities at risk for the County are the Forrester Fire Station on Kingstree Highway and the Alcolu Fire Station on US 521.

Manning

The City of Manning is at a rather high risk for flooding due to its location next to the Pocotaligo River and low elevation (see **Map 2**). Within the City of Manning, there are some critical facilities that are at risk due to their proximity to flood prone areas. The City of Manning's wastewater treatment plant is a prime target.

Summerton

Because it is at a higher elevation the Town of Summerton is not as threatened by floods as Manning. There are no critical facilities at risk in Summerton.

Turbeville

Situated in the Pudding Swamp Watershed; Turbeville, like Summerton, is not at as great a risk as Manning in terms of flooding.

Paxville

The Town of Paxville is not particularly threatened, nor are its assets.

Table A-4
Clarendon County
Multi-jurisdiction Analysis of Floods*

Jurisdictions	History	Vulnerability	Maximum Threat	Probability	Total Score	Jurisdiction Rating
Manning	10	25	100	35	170	1
Summerton	2	5	50	35	92	4
Turbeville	10	5	50	35	100	3
Paxville	2	5	10	35	52	5
Unincorporated	10	25	50	35	120	2

Source: National Climatic Data Center

*See Appendix G for an explanation of the scoring system used for this table.

Those jurisdictions with the highest numerical scores should and will be receiving priority attention for planning and/or mitigation purposes.

B. HURRICANES & TROPICAL STORMS

Description:

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

The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding. The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, sufficiently warm sea surface temperatures, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere.

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

As an incipient hurricane develops, barometric pressure at its center falls and **winds** increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour the system is designated a tropical storm, given a name and closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane.

Hurricane intensity is further classified by the Saffir-Simpson Scale, which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense. The Saffir-Simpson scale is shown in **Table A-5**.

TABLE A-5
The Saffir-Simpson Scale

Saffir-Simpson Scale / Category	Maximum Sustained Wind Speed (mph)	Minimum Surface Pressure (millibars)	Storm Surge (ft)
1	74-95	Greater than 980	5-Mar
2	96-110	979-965	8-Jun
3	111-130	964-945	12-Sep
4	131-155	944-920	13-18
5	155+	Less than 920	19+

Source: National Hurricane Center

The Saffir-Simpson scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure and storm surge potential, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as “major” hurricanes, and while hurricanes within this range comprise only 20% of total tropical cyclone landfalls, they account for over 70% of the damage in the U.S.

Table A-6 describes the damage that could be expected for each category hurricane.

TABLE A-6
Hurricane Damage Classification

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

Source: National *Hurricane Center*

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

Historical Occurrences:

Reliable classification of the intensity of tropical cyclones began in 1886. Since that time, there have been 951 tropical cyclones that have been recorded in the Atlantic Ocean and the Gulf of Mexico. Approximately 294 (31%) of those tropical cyclones passed within 300 miles of South Carolina.

According to the University of South Carolina's Hazards Lab, 97 tropical cyclones have made direct landfall in South Carolina or have entered via adjacent states since 1886. Of these, 72 were tropical storms, 21 were minor hurricanes and 4 were major hurricanes. 1989 saw the most costly hurricane to ever hit South Carolina, **Hurricane Hugo**. Hurricane Hugo made landfall as a Category 4 storm near Charleston and its progression inland resulted in unprecedented, widespread damage across South Carolina. The Category 4 storm made landfall near Sullivan's Island, South Carolina, at 2300 EST on September 21, 1989. The hurricane caused 13 directly related deaths, 22 indirectly related deaths, and injured several hundred people in South Carolina. Damage within the Palmetto State from Hurricane Hugo **was** estimated to **have** exceeded \$7 billion, including \$2 billion in crop damage. The estimated maximum sustained winds at landfall were 138 miles per hour.

According to the University of South Carolina's Hazards Lab and the National Climatic Data Center there have been 23 Hurricanes or tropical storms that have passed over Clarendon County since 1851.

Table A-7
Hurricanes/Tropical Storms in Clarendon County (1852-2009)

Name	Date	Wind mph	Category
Not Named	October 10, 1852	57	TS
Not Named	September 1, 1856	57	TS
Not Named	September 12, 1878	92	H1
Not Named	July 1, 1886	69	TS
Not Named	October 9, 1894	86	H1
Not Named	13-Jul-01	40	TS
Not Named	18-Sep-06	69	TS
Not Named	23-Oct-08	40	TS
Not Named	9-Oct-13	46	TS
Not Named	14-Jul-16	69	TS
Not Named	20-Oct-44	52	TS
Not Named	17-Sep-45	46	TS
Flossy	September, 26 1956	40	TS
Cindy	9-Jul-59	57	TS
Dora	13-Sep-64	46	TS
Alma	26-May-70	29	TD
Agnes	21-Jun-72	35	TD
Subtrop 3	15-Sep-76	40	SS
Hugo	22-Sep-89	138	H4
Gordon	21-Nov-94	23	TD
Allison	6-Jun-95	40	TS
Earl	4-Sep-98	46	TS
Not Named	29-Aug-04		TS

Hurricane and Tropical Storm Occurrences since 2002

Tropical Storm on August 29, 2004 at 9:30 am – Large branches and a few small trees were down in eastern Chesterfield County due to tropical storm force winds.

Map 3 displays the centerline of where the eye of these storms passed through Clarendon County. The name (if applicable) appears on the centerline itself. The eye to Hurricane Hugo passed over an area between two of Clarendon County's primary population centers.

Table A-8
Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
Tropical Storm/Tropical Depression	20	150	7.5	13.33%
Category 1	2	150	75	1.33%
Category 2	0	150	0	0
Category 3	0	150	0	0
Category 4	1	150	150	0.66%

Multi-jurisdictional Occurrences:**Clarendon County:**

Given their wide-ranging impact, hurricanes affect all parts of the county and put all of its critical facilities at risk. Those that would need the most attention, due to their role in emergency services, would be fire/EMS stations and sheriff departments.

Manning:

In addition to the need to protect fire and police structures, the City of Manning also must consider mitigation measures critical infrastructure, such as water, sewer, and power.

Summerton:

In addition to the need to protect fire and police structures, the Town of Summerton also must consider mitigation measures for critical infrastructure, such as water, sewer, and power.

Turbeville:

In addition to the need to protect fire and police structures, the Town of Turbeville also must consider mitigation measures for critical infrastructure, such as water, sewer, and power.

Paxville:

The Town of Paxville's primary critical facility is Town Hall and fire station, which could sustain damage during the occurrence of a hurricane.

C. TORNADOES***Description:***

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. It is most often generated by a thunderstorm (but sometimes results from hurricanes) and produced when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The 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 level of destruction caused by tornadoes may range from light to **catastrophic** 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 their impact.

Each year, an average of 800-1000 tornadoes are reported nationwide, and they are more likely to occur during the spring and early summer months of March through June. Tornadoes can occur at any time of day but are mostly likely to form in late afternoons and early evenings.

The Fujita-Pearson Scale for Tornadoes was developed to measure tornado strength, and is shown in **Table A-9**.

TABLE A-9
Fujita-Pearson Scale for Tornadoes

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

Source: The Tornado Project

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 1842 injuries. Typically, South Carolina tornadoes are less severe than in other parts of the country.

According to the Hazards Lab and the National Climatic Data Center there have been 26 confirmed tornado events in Clarendon County since 1950, which have resulted in 2 deaths and 27 injuries. The strongest tornado ever recorded in Clarendon County is an F2, which occurred on August 28, 1988 and resulted in seriously injuring one person and killing another.

Table A-10 lists all tornado events reported for Clarendon County between 1950 and June 30, 2009.

TABLE A-10
Tornadoes in Clarendon County (1950 – October 2009)

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Clarendon	4/22/1958	1:30 PM	F2	1	1	25000	0
Clarendon	7/15/1961	5:30 PM	F1	0	0	25000	0
Clarendon	7/24/1962	3:00 PM	F1	0	0	3000	0
Clarendon	9/19/1966	11:00 AM	F	0	0	3000	0
Clarendon	8/8/1972	3:00 PM	F0	0	0	25000	0
Clarendon	5/11/1973	9:00 PM	F1	0	0	3000	0
Clarendon	2/24/1977	5:00 PM	F1	0	0	25000	0
Clarendon	5/4/1978	4:50 PM	F2	0	1	250000	0
Clarendon	7/23/1980	4:00 PM	F1	0	0	25000	0
Clarendon	7/3/1981	6:43 PM	F0	0	0	0	0
Clarendon	8/28/1988	2:15 PM	F2	1	1	2500000	0
Clarendon	5/5/1991	9:30 PM	F0	0	0	0	0
Manning	6/27/1995	7:30 PM	F0	0	0	20000	0
Summerton	11/2/1995	4:45 PM	F0	0	0	0	0
Clarendon	11/7/1995	4:25 PM	F0	0	0	0	0
Clarendon	11/7/1995	4:30 PM	F0	0	0	0	0
Clarendon	3/7/1996	12:31 PM	F0	0	0	1000	0
Turbeville	4/22/1997	9:10 PM	F1	0	2	0	0
Manning	3/8/1998	2:18 PM	F0	0	0	2000	0
Paxville	9/7/2004	8:48 AM	F0	0	0	0	0
Clarendon	9/27/2004	9:23 AM	F1	0	4	0	0
Manning	1/13/2006	9:35 PM	F1	0	18	500000	0
Manning	4/26/2006	2:45 PM	F0	0	0	0	0
Manning	11/16/2006	1:19 AM	F1	0	0	5000	0
Clarendon	3/15/2008	6:02 PM	F0	0	0	0	0
Clarendon	3/28/2009	4:31 AM	F1	0	0	0	0

Map 4 shows the location of these storms **within** Clarendon County. The red triangles on the map show where the tornadoes touched down. **They** were mapped according to the latitude and longitude coordinates collected by the University of South Carolina Hazards Research Lab.

Tornado Occurrences in Clarendon County since 2002

Tornado on September 7, 2004 at 8:48 am – Survey found an F0 a half mile long which took down trees in the Paxville area.

Tornado on September 27, 2004 at 9:23 am – An F1 tornado destroyed homes and damaged several others. Light to moderate damage occurred to the elementary school and its buses. Severe damage occurred to large open air outbuildings at a mill across the street from the school.

Tornado on January 13, 2006 at 9:35 pm – A strong F1 tornado touched down just west of Manning and continued NNE to Alcolu. Six mobile homes were completely destroyed, 9 had moderate damage, 16 had minor damage, 2 framed homes had minor damage and many trees and powerlines were down. There were 18 injuries, 9 of which were sent to the hospital, 4 of which were kept for a few days and released.

Tornado on April 26, 2006 at 2:45 pm – Storm survey found trees down along Highway 261 by an F0 tornado. The twister continued across county line into Williamsburg County and touched down again near Martins Crossroads.

Tornado on November 16, 2006 at 1:19 am – Storm survey found several touchdowns along the path. Damage was in the rural areas with only trees down. The tornado started out as an F0 and ended as a weak F1. A squall lined developed ahead of a cold front and produced wind damage, isolated flash flooding, and a tornado.

Tornado on March 15, 2008 at 18:02 pm – EM and broadcast media reported and showed video of a tornado moving across land then across the north portion of Lake Marion and continuing east. Damage survey found many trees and some powerlines down. Only minor damage to a few homes. Seven supercells tracked across our South Carolina County Warning Area and produced many long-lived tornadoes that did significant damage. Over 85 homes were destroyed, around 400 had moderate damage, and estimates for the total devastation were around \$ 40 million,

Tornado on March 28, 2009 at 16:31 pm – Two veteran spotters photographed and videotaped the tornado as it touched down in the wood off of Bill Davis Road and traveled northeast just east of Davis Station. Numerous trees were down but there was no structural damage as no homes or buildings were in its path. Photo courtesy of Gerard V. Jebaily, KI4LJT. A cold front moved through the area during the evening and produced a few severe thunderstorms in Orangeburg and Clarendon Counties. One tornado was confirmed.

Table A-11
Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
Tornadoes	26	59	2.27	44.07%

Multi-jurisdictional Occurrences:

According to the historical frequency of tornadoes in the County (see **Map 4**) the following deductions can be made for the jurisdictions within Clarendon:

Clarendon County

Given their unpredictable nature, tornados can occur anywhere, but by using the historical data as a sort of barometer, then it is apparent that the central part of the county is most vulnerable. County assets in this area include the fire stations in Forreston and Alcolu, as well as the sheriffs department located southwest of Manning.

Manning

Manning is highly vulnerable being located in an area that has experienced the most intense storm activity. Given the unpredictable nature of tornados all critical facilities are at risk .

Summerton

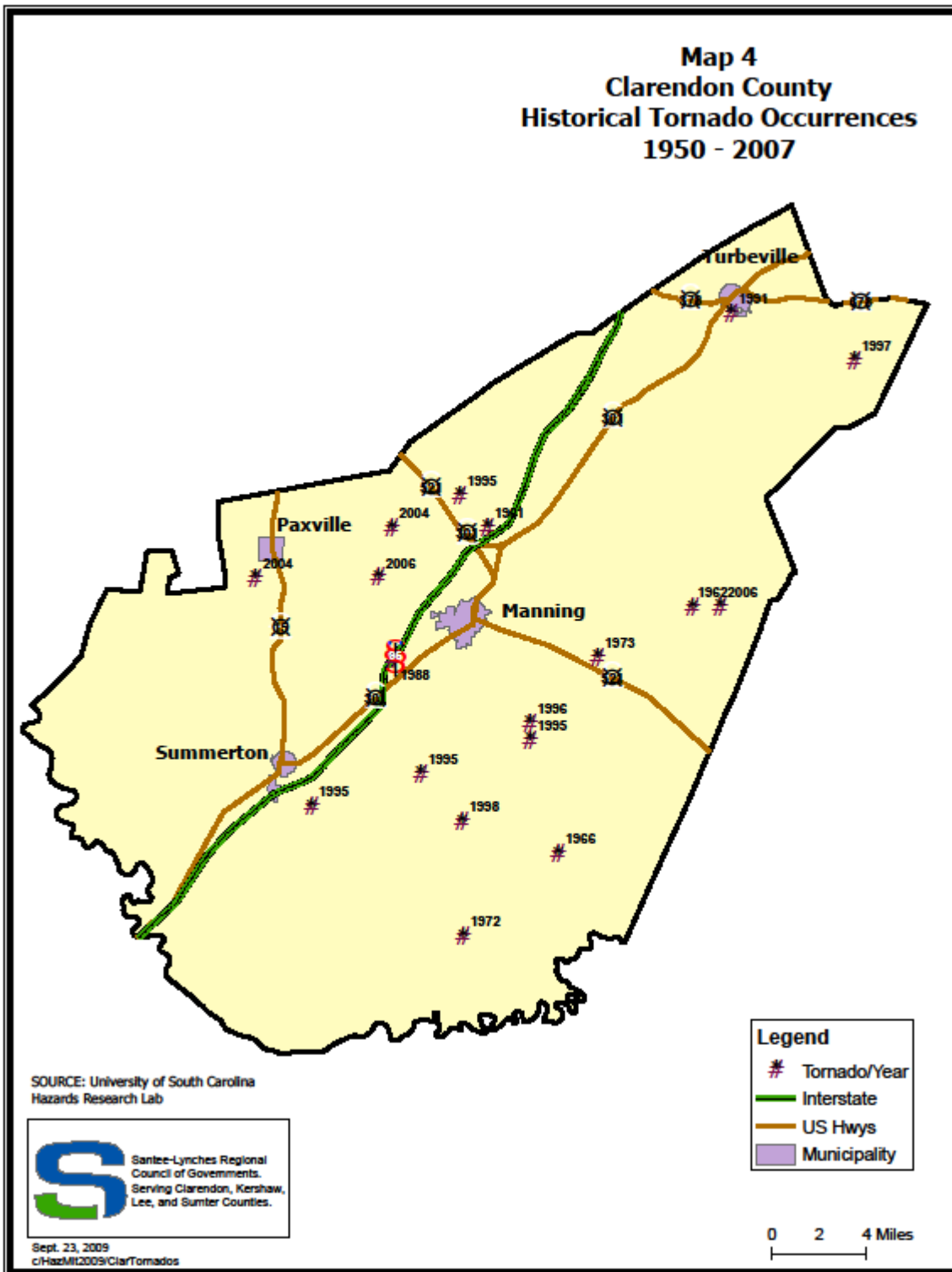
The Town of Summerton is a low risk jurisdiction and experiences an equal risk to the rest of the County outside the center of the County, which is at the greatest risk. Given the unpredictable nature of tornados all critical facilities are at risk.

Turbeville

The Town of Turbeville is located in area that would be considered at moderate risk as compared to the rest of the County. Given the unpredictable nature of tornados all critical facilities are at risk.

Paxville

The Town of Paxville would also be considered at moderate risk.



D. SEVERE WINTER STORMS**Description:**

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

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

Historical Occurrences:

Although severe winter storms are typically associated with much colder climates, it is not uncommon for South Carolina to experience significant, even disastrous, winter weather events. Presidential disasters for winter storms were declared in South Carolina in January 2000, January 2003 and February 2004.

Since 1993, there have been no injuries or deaths attributed to snow and ice events throughout the state. However, there have been an estimated \$30.5 million in property damage and an additional \$5 million in crop damage. In most instances, these impacts are more likely to be felt in the mountains and Piedmont region of the state.

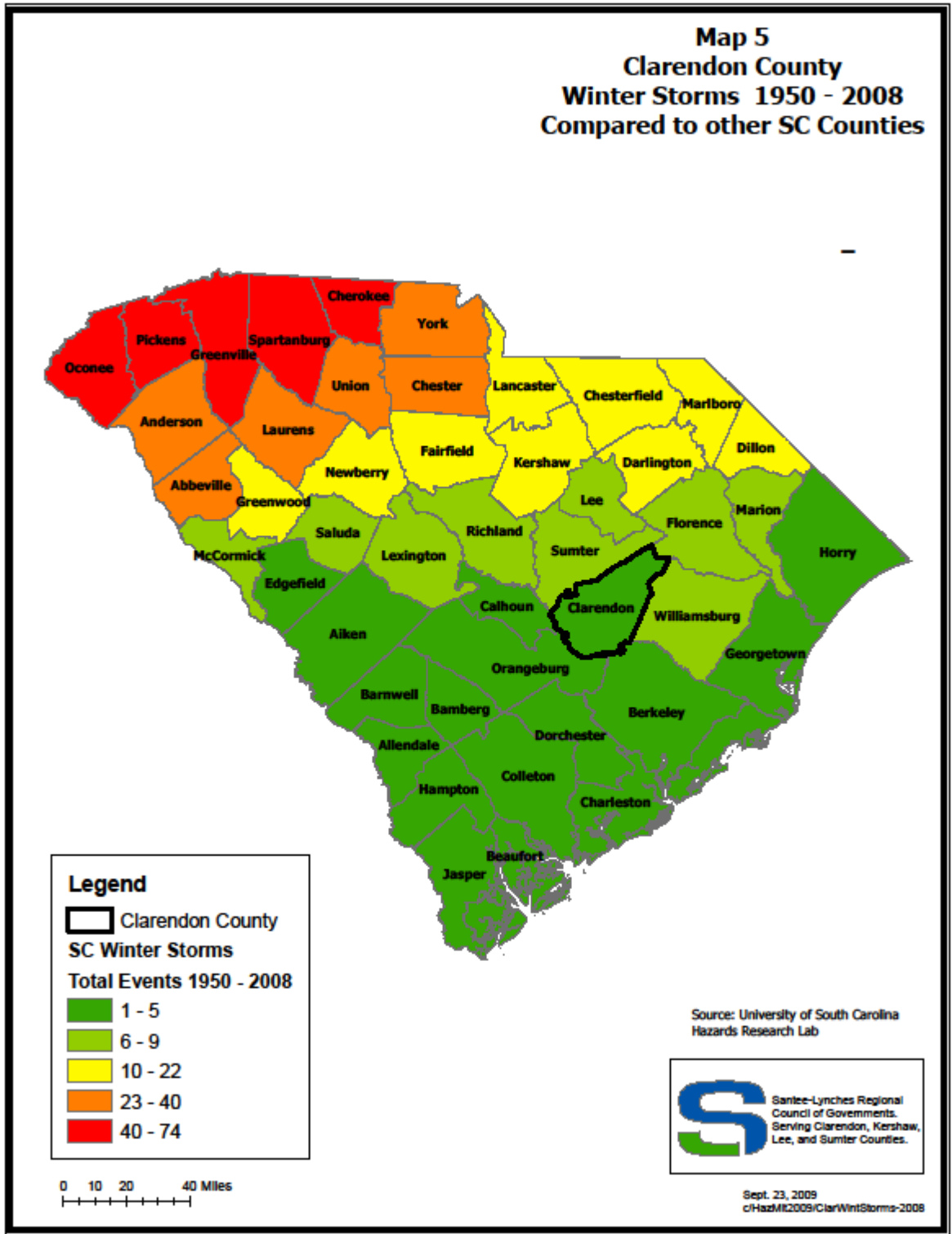
According to data acquired from the National Climatic Data Center, Clarendon County had 5 ice or snow events between 1993 and 2001. **Map 5** shows Clarendon County in relation to the rest of South Carolina. As indicated on the map, the central portion of the state, where Clarendon is located experienced very few storms during this eight-year period. However, in 2004 the County experienced a severe ice storm, which caused extensive damage and resulted in loss of power for several days.

Table A-12
Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
Winter Storm	5	15	3	33.33%

Winter Storm and Ice Storm Occurrences in Clarendon County since 2002

Winter Storm on January 23, 2003 at 6:00 am – A winter storm produced 4-7 inches of snow causing many traffic accidents with some injuries. A winter storm rapidly developed over the South Carolina central and northern midlands. This storm system produced 2-4 inches of snow in the central midlands and 4-7 inches of snow in the northern midlands. There were numerous traffic accidents some with minor injuries and no deaths. Some power outages occurred leaving about 10,000 homes without power for several hours.



Ice Storm on January 25, 2004 at 5:30 pm – An ice storm began over the North Midlands of South Carolina on Sunday night and gradually spread south into the Central Midlands and CSRA on Monday. The storm continued into Tuesday, but was mainly freezing drizzle during that time. Ice accumulations of $\frac{1}{2}$ to $\frac{3}{4}$ of an inch occurred which brought numerous trees and powerlines down. The heaviest ice accumulations occurred in Lancaster, Chesterfield, Newberry, Saluda, McCormick, Orangeburg, and Clarendon Counties. Over 250,000 homes, businesses, and schools were without power for several days. Sleet also fell in Lancaster and Chesterfield Counties and accumulated up to 2 inches. Six people were injured in traffic related accidents and there were no deaths. Damage estimates from State Emergency Management were \$28.5 million.

Ice Storm on December 26, 2004 at 4:25 am – An ice storm in the midlands produced $\frac{1}{4}$ to $\frac{3}{4}$ inch of ice taking down trees and powerlines. Some areas also reported sleet that accumulated up to an inch. Several power outages were reported, some that lasted almost a week. Numerous traffic accidents occurred.

Ice Storm on January 29, 2005 at 12:20 pm – An ice storm started late Friday night and continued off and on through Saturday night. Most areas received a quarter of an inch of ice on trees and other structures. Some areas received a quarter to a half inch of ice. These areas had some power outages which were of short duration. Overpasses and bridges iced up but ground temperatures on roadways kept the rain from freezing on them. There were many accidents from people losing control when driving over the bridges and overpasses.

Multi-jurisdictional Occurrences:

Clarendon

Given that severe winter storms tend to cover fairly large areas, the overall risk to the county is fairly equal, but the various jurisdictions have assets that are vulnerable to this type of hazard.

Manning

The City of Manning has an electric power substation that would be susceptible to winter storms.

Summerton

The Town of Summerton has an electric power substation that would be susceptible to winter storms.

Turbeville

The Town of Turbeville does not have any assets that are at significant risk due to winter storms.

Paxville

The Town of Paxville does not have any assets that are at significant risk due to winter storms.

E. DAM FAILURE

Description:

Dams are water storage, control, or diversion barriers that impound water upstream in reservoirs. Dam failure is a collapse or breach in the structure. While most dams have storage volumes small enough that failures have little or no repercussions, dams with large storage amounts can cause significant flooding downstream.

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

- Prolonged periods of rainfall and flooding, which cause most failures
- Inadequate spillway capacity, resulting in excess overtopping flows.
- Internal erosion caused by embankment or foundation leakage or piping.
- Improper maintenance, including failure to remove trees, **repair** internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational components.
- Improper design, including the use of improper construction materials and construction practices.
- Negligent operation, including the failure to remove or open gates or valves during high flow periods.
- Failure of upstream dams in the same drainage basin.
- Landslides into reservoirs, which cause surges that result in overtopping.
- High winds, which can cause significant wave action and result in substantial erosion.
- Earthquakes, which typically cause longitudinal cracks at the tops of the embankments, leading to structural failure.

Dam Classification:

The South Carolina Department of Health and Environmental Control, Dam Safety Programs has classified dams that would pose a safety hazard to human life and property into two classifications. A Class I dam is one that would cause a loss of human life. A Class II dam is one that would cause significant property damage.

There were thirty-two (32) Class I and Class II dams in the Santee-Lynches Region. Kershaw County had the most Class I and Class II dams – 4 and 10 respectively. Sumter County has the second highest number of dams with 11 Class II dams. The number of Class I and II dams by County is indicated below. A list of dams with the name and location by Class is shown in Appendix H.

Table A-13
Dam Classes by County

County	Class I	Class II	Total
Clarendon County	0	3	3
Kershaw County	4	10	14
Lee County	0	4	4
Sumter County	0	11	11
SL Region	4	28	32

Historical Occurrences:

South Carolina has a large number of dams, ranging from large structures for power generation, recreation and water supply to smaller dams for industrial, agricultural or fishing purposes. More than 200 of these dams have been rated high hazard due to potential loss of life and property should failure occur. The overall potential for dam failure based on historical records is low. Flood conditions which occurred in the month of October 1990, however, resulted in the failure of 17 dams and the overtopping of an additional 31 dams. Four people were drowned as a result of the Kendall Dam failure in Camden, SC. None of the major dams in the state was threatened by the October 1990 floods.

There is no record of dam failure in Clarendon County prior to 2003. However, during 2003 several dams failed and caused major flood damage to the Chickwood Mobile Home Park and

other establishments in the Manning area.

**Table A-14
Future Probabilities**

	Events	Years	Recurrence Interval	% Change/Year
Dam Failure	1	20	20	5

Dam Failure Occurrences in Clarendon County since 2002

There were no dam failure events reported.

Multi-jurisdictional Occurrences:

Clarendon

Clarendon County has a number of dams within the vicinity of the various watersheds in the County. The area most at risk for dam failure is the center of the County, because of the Pocotaligo River. In addition, there are several dams around Lake Marion, the Black River, and Puddin Swamp.

Manning

The City of Manning is at the most risk due to dam failure. Given the City's geographic location, any of its assets are at risk.

Summerton

The Town of Summerton is not at significant risk because the closest dams are located south and west, near Lake Marion.

Turbeville

The Town of Turbeville is not at significant risk because the closest dams are located southwest, near Pudding Swamp.

Paxville

Paxville is not at significant risk.

**Table A-15
Clarendon County**

Multi-jurisdiction Analysis of Dam Failures*

Jurisdictions	History	Vulnerability	Maximum Threat	Probability	Total Score	Jurisdiction Rating
City of Manning	2	25	100	35	162	1
Town of Summerton	2	5	50	35	92	3
Town of Turbeville	2	5	50	7	64	4
Town of Paxville	2	5	10	7	24	5
Unincorporated	2	25	50	35	112	2

*See Appendix G for an explanation of the scoring system used for this table.

Those jurisdictions with the highest numerical scores should and will be receiving priority attention for planning and/or mitigation purposes.

F. SEVERE THUNDERSTORMS, WIND EVENTS, HAIL, & LIGHTNING

Description:

Severe thunderstorms are defined by the National Weather Service as storms that have wind speeds of 58 miles per hour or higher, produce hail at least three quarters of an inch in diameter, or produced 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. Each year, lightning is responsible for an average of 93 deaths (more than tornadoes), 300 injuries, and several hundred million dollars in damage to property and forests.

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

Historical Occurrences:

Severe thunderstorms are fairly common in South Carolina, but only a small percentage of these actually cause damages.

According to the USC Hazards Lab and the National Climatic Data Center, there were a total of 197 significant wind events in Clarendon County during the period of 1955 to 2009. **These events caused** \$243,000 in damages, 1 death, and no injuries (these events do not include tornadoes which are discussed in C).

In addition, there were 144 hail events recorded for Clarendon County during the same period that resulted in no deaths, injuries, or crop damage. However, Clarendon did experience \$1,000 in property damage. There were 6 lightning events recorded between 1993 and 2009 for Clarendon County that resulted in 2 deaths and \$1,060,000 in property damage. **Map 6** (Wind Storm Frequency), **Map 7** (Hail Frequency), and **Map 8** (Lightning Storm Frequency) show how these hazards affect Clarendon in relation to the rest of South Carolina. In all three cases, Clarendon County is in the median range of frequency of occurrence; however, these storms are random in nature and do not follow geographic patterns.

Table A-16
Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
Thunderstorm w/ High Winds	123	46	0.37	267.39%
Hail	97	46	0.47	210.87%
Lightning (Causing casualty or property damage)	6	15	2.50	40.00%

Hail Occurrences in Clarendon County since 2002

There were 47 hail events reported between December 1, 2002 and May 31, 2009.

There were 45 high wind events reported between December 1, 2002 and May 31, 2009.

Multi-jurisdictional Occurrences:

Clarendon

Severe weather events are not geographically specific, and can occur anywhere in the County affecting any of the County's assets.

Manning

Severe weather events are not geographically specific, and can occur anywhere in the City affecting any of the City's assets. However, Manning does have an electrical power substation that is especially susceptible to lightning.

Summerton

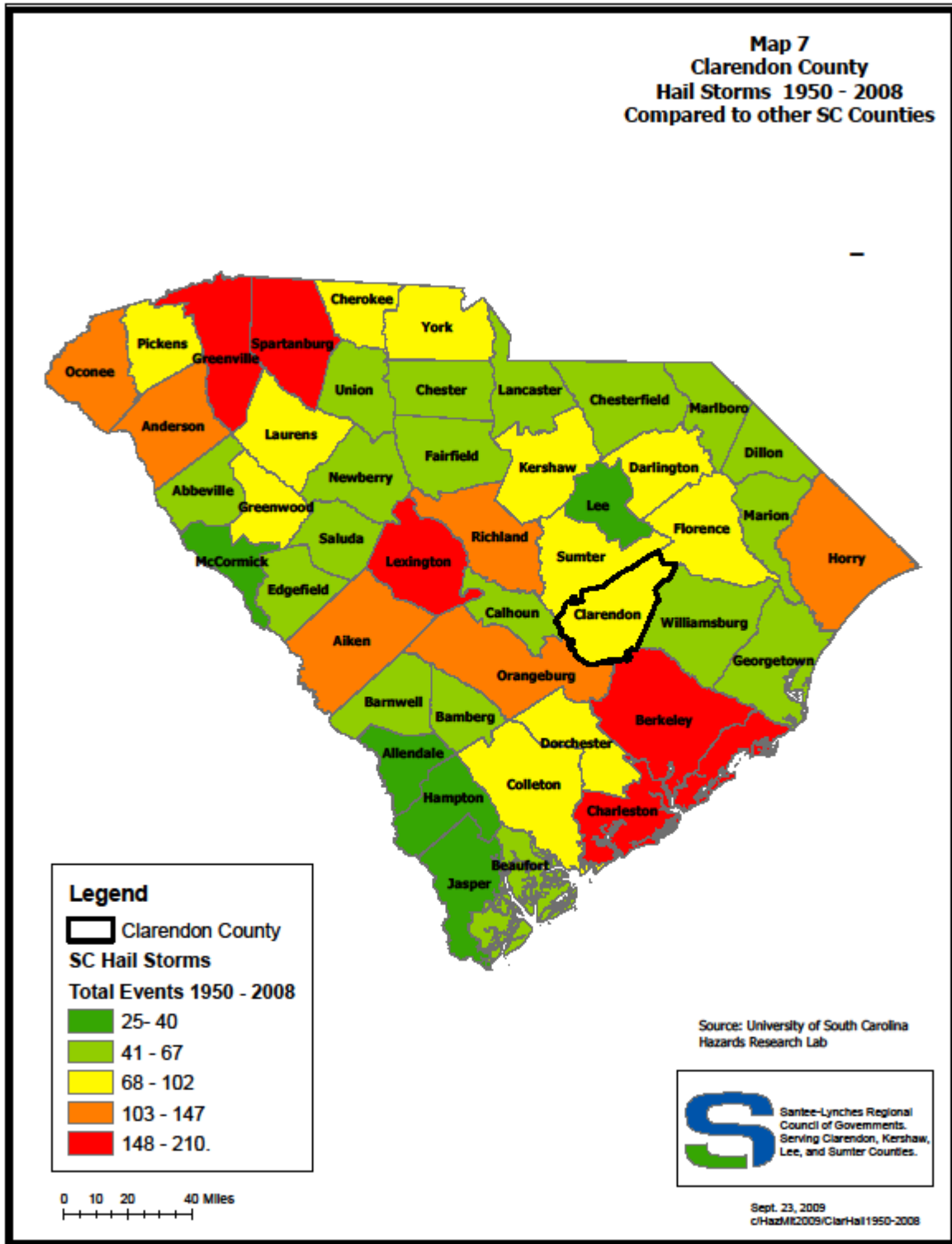
Severe weather events are not geographically specific, and can occur anywhere in the town affecting any of the town's assets. However, Summerton does have an electrical power substation that is especially susceptible to lightning.

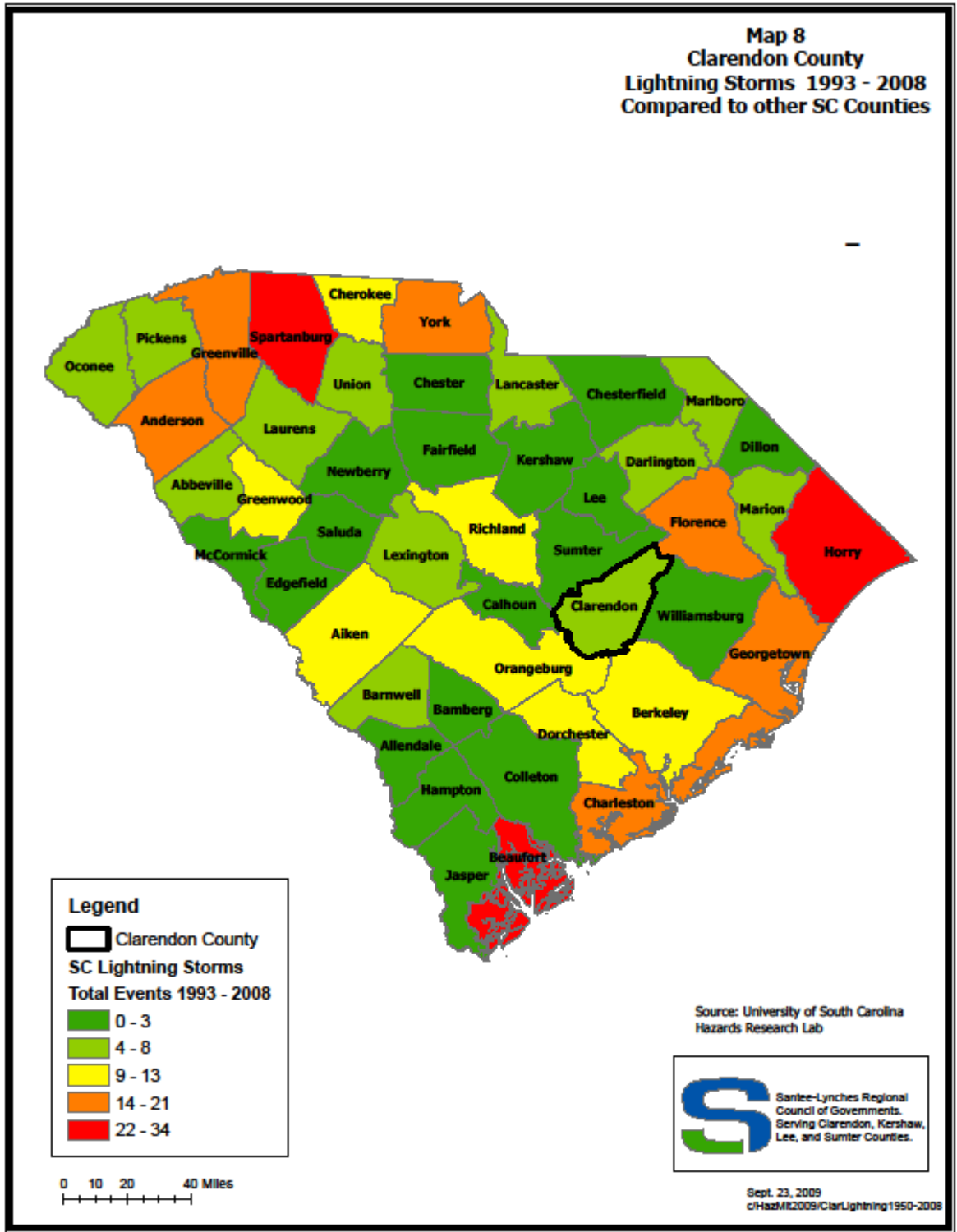
Turbeville

Severe weather events are not geographically specific, and can occur anywhere in the Town affecting any of the Town's assets.

Paxville

Severe weather events are not geographically specific, and can occur anywhere in the Town affecting any of the Town's assets.





G. WILDFIRES

Description:

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

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

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

There are four major types of wildfires. **Ground fires** burn in natural litter, duff, roots or sometimes highly organic soils. Once started they are very difficult to control, and may even rekindle after being extinguished. **Surface fires** burn in grasses and low shrubs up to 4' tall or in the lower branches of trees. They have the potential to spread rapidly, and the ease of their control depends upon the fuel involved. **Crown fires** burn in the tops of trees, and the ease of their control depends greatly upon wind conditions. **Spotting fires** occur when burning embers are thrown ahead of the main fire, and can be produced by crown fires as well as wind and topographic conditions. Once spotting begins, the fire will be very difficult to control.

Wildfires become significant threats to life and property along what is known as the "wildland/urban interface." The wildland/urban interface is defined as the area where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Since 1985, approximately 9,000 homes have been lost to urban/wildland interface fires across the United States.

There is no wildfire mapping or location data available for Clarendon County or its municipalities from the NCDC, USC Hazards Lab or local sources. The areas within the county that are at a greater risk of wildfires are those areas that have a higher density of vegetation and forests. The land cover map (see map 24) shows forested and scrub/shrub areas, largely within the unincorporated county at risk from this hazard. Smaller county jurisdictions (Summerton, Paxville, and Turbeville) with close proximity to high risk rural areas face a higher risk than the more urbanized jurisdiction of Manning. Though the outskirts of urban areas are at risk due to the proximity of forested and vegetated areas, the risk in the urban core is comparatively low. Land cover maps showing areas at risk are included in the Appendix.

Historical Occurrences:

All of South Carolina is susceptible to wildfire. According to the USC Hazards Lab, between 1988 and 2000, South Carolina has recorded a total of 64,479 wildfires that resulted in the damage of 359,277 acres. That's an average number of 5,373 fires per year. Although wildfires are possible throughout the year, normal fire season peaks for South Carolina are in the spring and late fall months.

From 1988-2008, Clarendon County had 3,519 wildfire events resulting in 17,525 acres of land burned by wildfire, for an average of 1,460 acres per year. Map 9 offers a comparison of

Clarendon to other counties in South Carolina. Like other counties in the southeastern part of the state, Clarendon has experienced a large number of wildfires that can be attributed to a number of factors, ranging from climate to land use.

TABLE A-17

**Twenty Year Summary of Wildfires in Clarendon County,
By Number of Fires, Acres Consumed**

Number of Fires	Acres Consumed
3,519	17,525

Table A-18

Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
Wildfires	3,519	20	0.01	16757.1

Wild Fire Occurrences in Clarendon County since 2002

There are no wild fire events reported between December 1, 2002 and May 31, 2009.

Multi-jurisdictional Occurrences:

Clarendon

Wildfires are not geographically specific, and can occur anywhere in the County affecting any of the County's assets. The unincorporated county is more vulnerable to wildfires than the municipalities, simply because of the fact that there **are** more forested areas in the unincorporated county.

Manning

Wildfires are not geographically specific, and can occur anywhere in the City that is forested or overgrown and can affect any of the City's adjoining or contiguous assets. The urban areas are less vulnerable to wildfires, simply because there is less vegetation.

Summerton

Wildfires are not geographically specific, and can occur anywhere in the Town affecting the town's assets. The urban areas are less vulnerable to wildfires, simply because of the fact that there is less vegetation.

Turbeville

Wildfires are not geographically specific, and can occur anywhere in the Town that is forested or overgrown can affect any of the town's contiguous assets. The urban areas are more vulnerable to wildfires, simply because there is less vegetation.

Paxville

Wildfires are not geographically specific, and can occur anywhere in the Town affecting any of the Town's assets. The urban areas are less vulnerable to wildfires, simply because of the fact that there is less vegetation.

Table A-19
Clarendon County
Multi-jurisdiction Analysis of Wildfires*

Jurisdictions	History	Vulnerability	Maximum Threat	Probability	Total Score	Jurisdiction Rating
Manning	2	25	10	7	44	3
Summerton	10	50	50	35	145	2
Turbeville	10	50	50	35	145	2
Paxville	10	50	50	35	145	2
Unincorporated	20	50	100	70	240	1

*NCDC data for individual occurrences was not available; therefore, data was utilized from a county wide scale utilizing a land cover GIS Shapefile (see map 24). As such, scores for wildfires were determined from analysis of this information.

*See Appendix G for an explanation of the scoring system used for this table.

Those jurisdictions with the highest numerical scores should and will be receiving priority attention for planning and/or mitigation purposes.

H. EARTHQUAKES

Description:

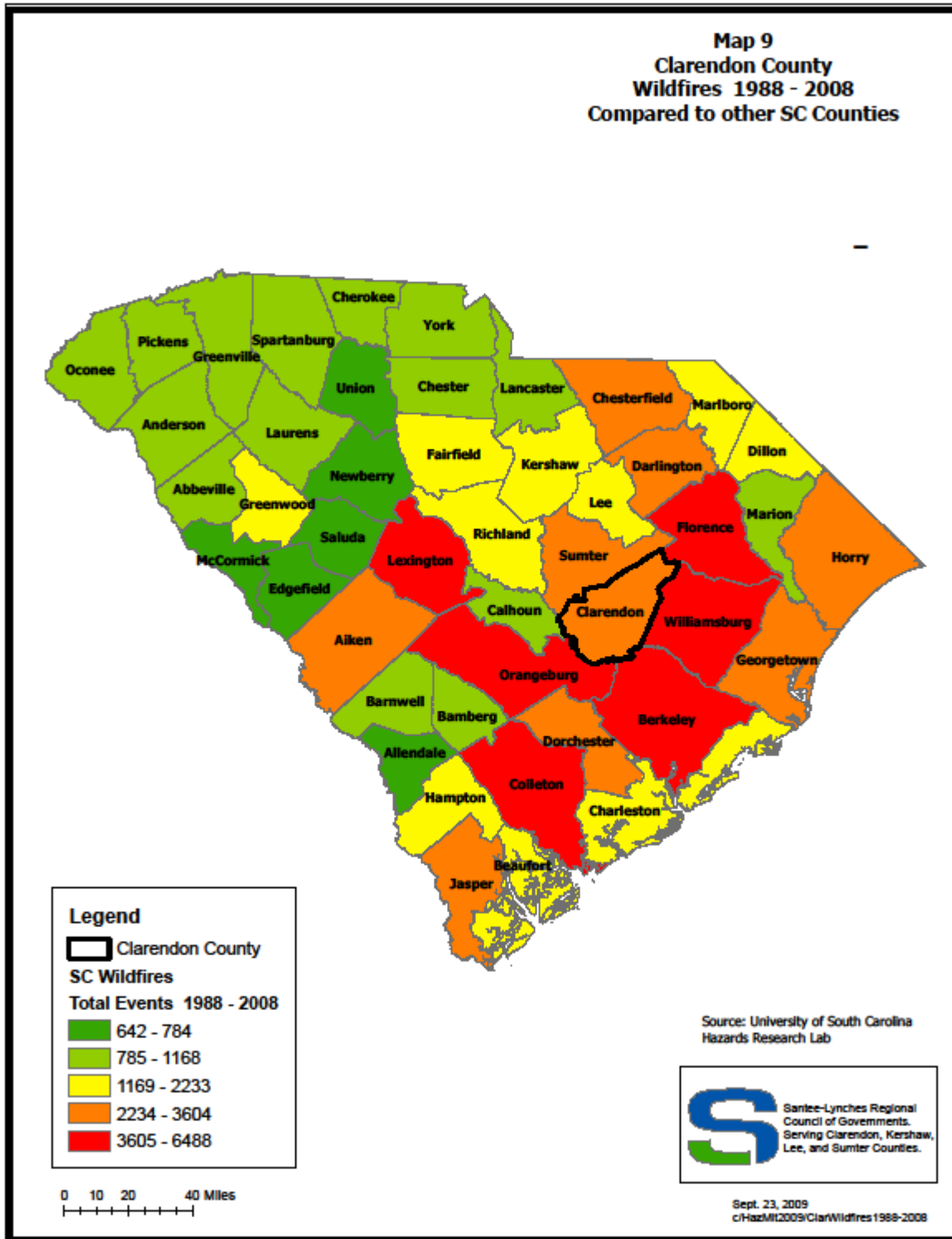
An earthquake is the motion or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square kilometers; cause damage to property measured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

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

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the earth's ten tectonic plates. These plate borders generally follow the outlines of the continents, with the North American plate following the continental border with the Pacific Ocean in the west, **and** the mid-Atlantic trench in the east. As earthquakes occurring in the mid-ocean trench usually pose little threat to humans, the greatest earthquake threat in North America is along the Pacific coast.

The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a

Map 9
Clarendon County
Wildfires 1988 - 2008
Compared to other SC Counties



rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, which generates an earthquake.

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

A detailed description of the Modified Mercalli Scale of Earthquake Intensity and its correspondence to the Richter Scale is given in **Table A-20**.

TABLE A-20
Modified Mercalli Intensity Scale for Earthquakes

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

Historical Occurrences:

Earthquakes are relatively infrequent but not uncommon in South Carolina. From 1698 to 2001, 20 earthquakes occurred in South Carolina with a Richter Scale magnitude equal to or greater than 4. The most property damage in South Carolina ever attributed to an earthquake was caused by the August 31, 1886 Charleston, South Carolina shock. The quake left about 65

people dead in Charleston.

Clarendon County has very little history with earthquakes. There has been 1 historical epicenter recorded within Clarendon County between 1698 and 2009. It occurred on January 29, 1994, and it had a magnitude of 2.9. **Map 10** shows the location of this earthquake.

Figure A-3 shows the peak acceleration (%g) with 10% Probability of Exceedance in 50 years for the central and east coast of the United States (U.S. Geological Survey, National Seismic Hazard Mapping Project, 1996). Clarendon County is located in an area with less than 10%g (peak acceleration), which means it faces low seismic risk.

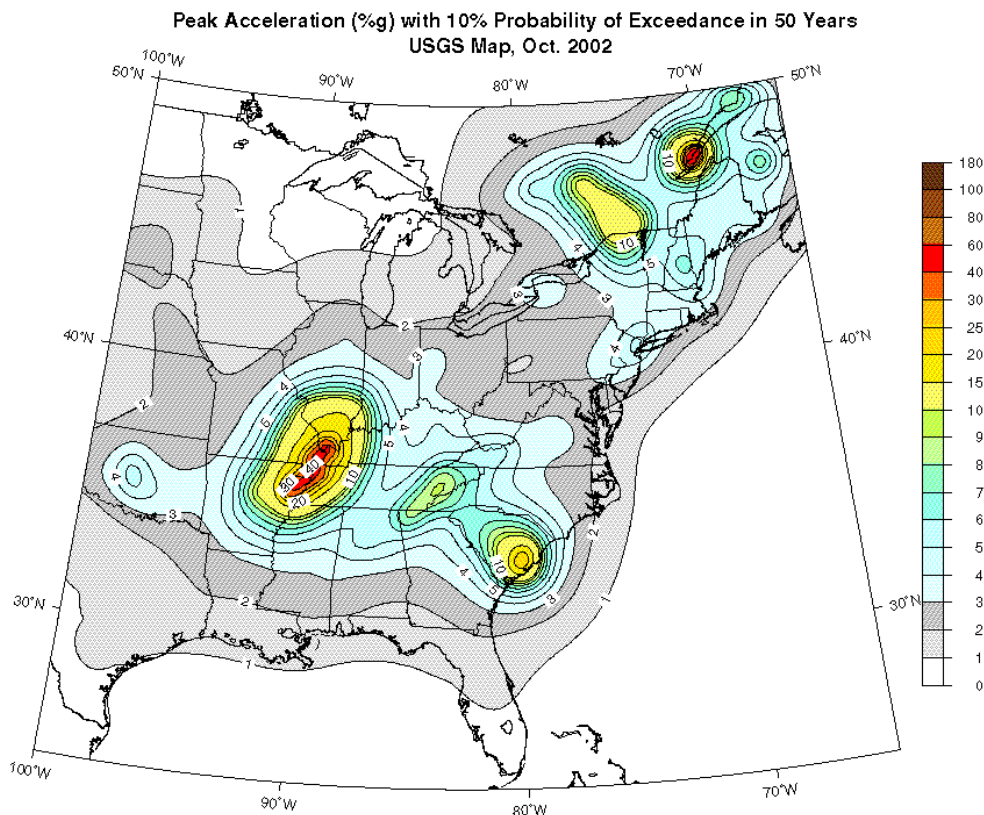


FIGURE A-3
Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
 Source: United States Geological Survey

Table A-21
Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
Earthquake	1	307	307	0.33%

Earthquake Occurrences in Clarendon County since 2002

There are no earthquake events reported between December 1, 2002 and May 31, 2009.

Multi-jurisdictional Occurrences:Clarendon

Given that there has only been one earthquake in Clarendon County, the area where it occurred is the only that can be considered at risk. The assets in this area include some dams for the Black River and the Sardinia Fire Station.

Manning

According to the historical data, Manning is at a minimum level of risk, so its assets are not particularly threatened.

Summerton

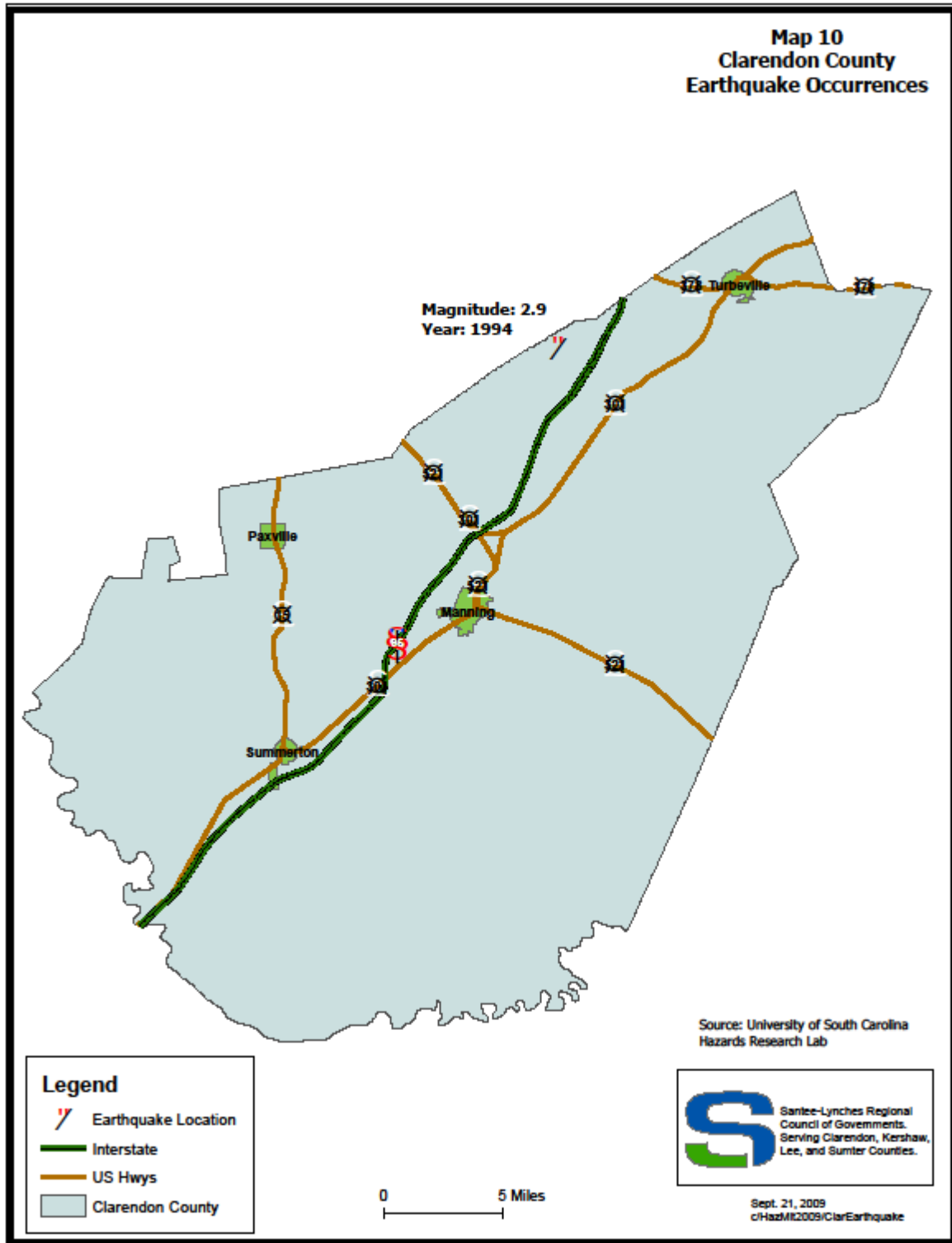
According to the historical data, Summerton is at a minimum level of risk, so its assets are not particularly threatened.

Turbeville

According to the historical data, Turbeville is at a minimum level of risk, so its assets are not particularly threatened.

Paxville

According to the historical data, Paxville is at a minimum level of risk, so its assets are not particularly threatened.



I. Droughts

Description:

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

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

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

Source: The National Drought Mitigation Center

Meteorological Drought

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

Agricultural Drought

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

Hydrological Drought

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

ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts are out of phase with impacts in other economic sectors. For example, a precipitation deficiency may result in a rapid depletion of soil moisture that is almost immediately discernible to agriculturalists, but the impact of this deficiency on reservoir levels may not affect hydroelectric power production or recreational uses for many months. Also, water in hydrologic storage systems (e.g., reservoirs, rivers) is often used for multiple and competing purposes (e.g., flood control, irrigation, recreation, navigation, hydropower, wildlife habitat), further complicating the sequence and quantification of impacts. Competition for water in these storage systems escalates during drought and conflicts between water users increase significantly.

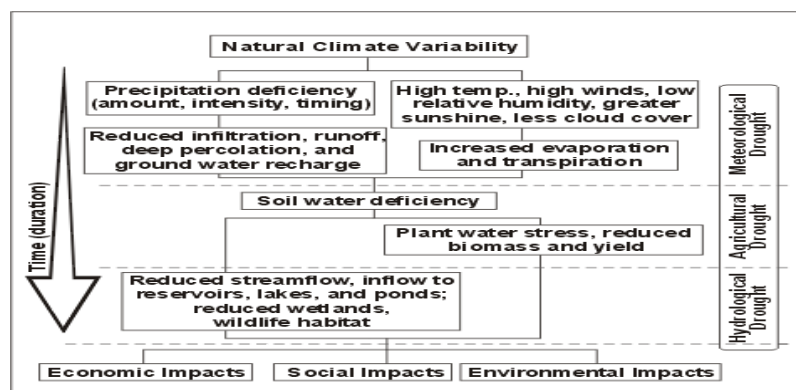
Hydrological Drought and Land Use

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

Socioeconomic Drought

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

Figure A-4 shows how climatic factors interact with one another and contribute to drought conditions, which can impact social, environmental, and social conditions.



Source: *The National Drought Mitigation Center*

The most commonly used indicator of drought and drought severity is the **Palmer Drought Severity Index (PDSI)**, which is published jointly by the National Oceanic and Atmospheric Administration (NOAA) and the US Department of Agriculture (USDA). The PDSI measures the difference between water supply (in terms of precipitation and stored soil moisture) and demand (the amount of water required to recharge soil and keep rivers, lakes, and reservoirs at normal levels). The result is a scale from +4 to -4, at 1.0 and 0.5 intervals. See **Table A-22** for a detailed description of the PDSI.

Table A-22
Palmer Drought Severity Index (PDSI)

Scale	Description
Above 4.0	extremely wet
3.0 to 3.99	very wet
2.0 to 2.99	moderately wet
1.0 to 1.99	slightly wet
0.5 to 0.99	incipient wet spell
0.49 to -0.49	near normal conditions
-0.5 to -0.99	incipient dry spell
-1.0 to -1.99	mild drought
-2.0 to -2.99	moderate drought
-3.0 to -3.99	severe drought
-4.0 or less	extreme drought

Measuring Severity of Drought

Keetch-Byram Drought Index (KBDI). A soil/duff drought index that ranges from 0 (no drought) to 800 (extreme drought) and is based on 8 inches of available moisture in the upper soil layers that can be used by vegetation for evapotranspiration. The index indicates deficit inches of available water in the soil. A KBDI reading of 450 means there is a deficit of 4.5 inches of ground water available to the vegetation. Factors in the index are maximum daily temperature, daily precipitation, antecedent precipitation, and annual precipitation.

TABLE A-23
Keetch-Byrum Drought Index (KBDI)

Index	Description
0-150	The fuels and ground are quite moist. Drying is generally limited to the fine surface fuels and the organic layers retain sufficient moisture to resist burning. Most of the heavy fuels (100 and 1000 hour) are too wet to ignite. Typical of spring dormant season following winter precipitation.
150-300	Scattered patches of surface litter remain in damp areas following a fire, and the organic layer remains basically undisturbed. Both pine and hardwood stumps may ignite, but seldom burn below ground. Snags a major threat for potential fire escape. Spotting usually minimal. Large acreages (500+) ignited can create intense conditions. Fire behavior is predictable. Typical of late spring, early growing season.
300-500	Fire consumes most surface litter along with a significant loss in organic soil material. Site preparation burns expose mineral soil, producing areas causing erosion problems. 100 and 1000 hour fuels contribute to fire intensity. Stumps and snags ignite. Spotting occurs. Escaped fire is difficult to control. Fire behavior is still predictable. Increased mop-up and patrol activities are required. This is typical in the late spring, early growing season at a K/B level below 400 KBDI. Above 400 KBDI, typical of late summer, early fall.

500-700	All surface litter and most of the organic layer are consumed by fire leaving excessive site damage. 1000 hour fuels contribute readily to fire intensity. Spotting is difficult to control. Above 600 KBDI, fire suppression is a major problem. Expect fire escape the next day. Summer site preparations should be canceled when the KBDI surpasses 550. Near 700, understory vegetation wilts and is consumed by fire. Fire behavior is predictable, but often unpredicted. Extensive mop-up to fire suppression. The levels above 600 are associated with severe drought
700 Plus	Expect the same as the previous levels, only worse! Extreme fire behavior. Delay burning until the K/B index falls below 500

Source: South Carolina Drought Response Unit of the Department of Natural Resources

Historical Occurrences:

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

Droughts are sometimes alleviated by a tropical cyclone. During 1954 Hurricane Hazel ended an extreme drought in eastern South Carolina, although drought conditions continued in western sections. In 1990, the remnants of Hurricane Klaus and Tropical Storm Marco ended an extreme drought.

Precipitation occurs during periods of drought; however, it is highly localized, inconsequential, and generally evaporates within 24-hours after falling. Periods of insufficient rainfall for crop growth occur during some summers. There is approximately a one in four probability of a drought somewhere in South Carolina at any time (Guttman and Plantico, 1987). Field crops such as corn, cotton, and soybeans are greatly stressed when drought conditions extend over several weeks during the growing season because only 9% of all farms in the state have irrigated acres, as compared to 26% nationwide. However, the state has a similar proportion of irrigated acres when compared to Alabama, North Carolina, and Virginia. Only Florida and Georgia have higher percentages of irrigated land in the Southeast United States (U.S. Department of Commerce, 1993).

Severe Droughts have been documented at intervals of roughly every thirty years, with some exceptions, since the early 19th Century. Documented severe droughts have occurred statewide in 1818, 1845, 1890, 1925, 1933, 1954, 1977, 1983, 1986, 1988, 1990, and 1993. According to the National Climatic Data Center, Clarendon experienced one significant drought for 62 days from **1950 to 2008**. **Map 11** shows how many droughts occurred in South Carolina Counties during this **fifty-nine** year period. Located in the central part of the state, which experienced the fewest number of droughts, Clarendon did not endure the same **frequency** of droughts experienced by the Upstate and Low Country areas of South Carolina.

Table A-24
Hazard Probability

	Events	Years	Recurrence Interval	% Chance/Year
Drought	1	59	59	1.69

Drought Occurrences in Clarendon County since 2002

There were no drought events reported between December 1, 2002 and May 31, 2009.

Multi-jurisdictional Occurrences:Clarendon

Drought, by its definition, primarily affects agriculture, and, if severe enough, water supplies. As such, the County's critical facilities are not at risk due to drought.

Manning

Drought, by its definition, primarily affects agriculture, and, if severe enough, water supplies. As such, the City's critical facilities are not at risk due to drought.

Summerton

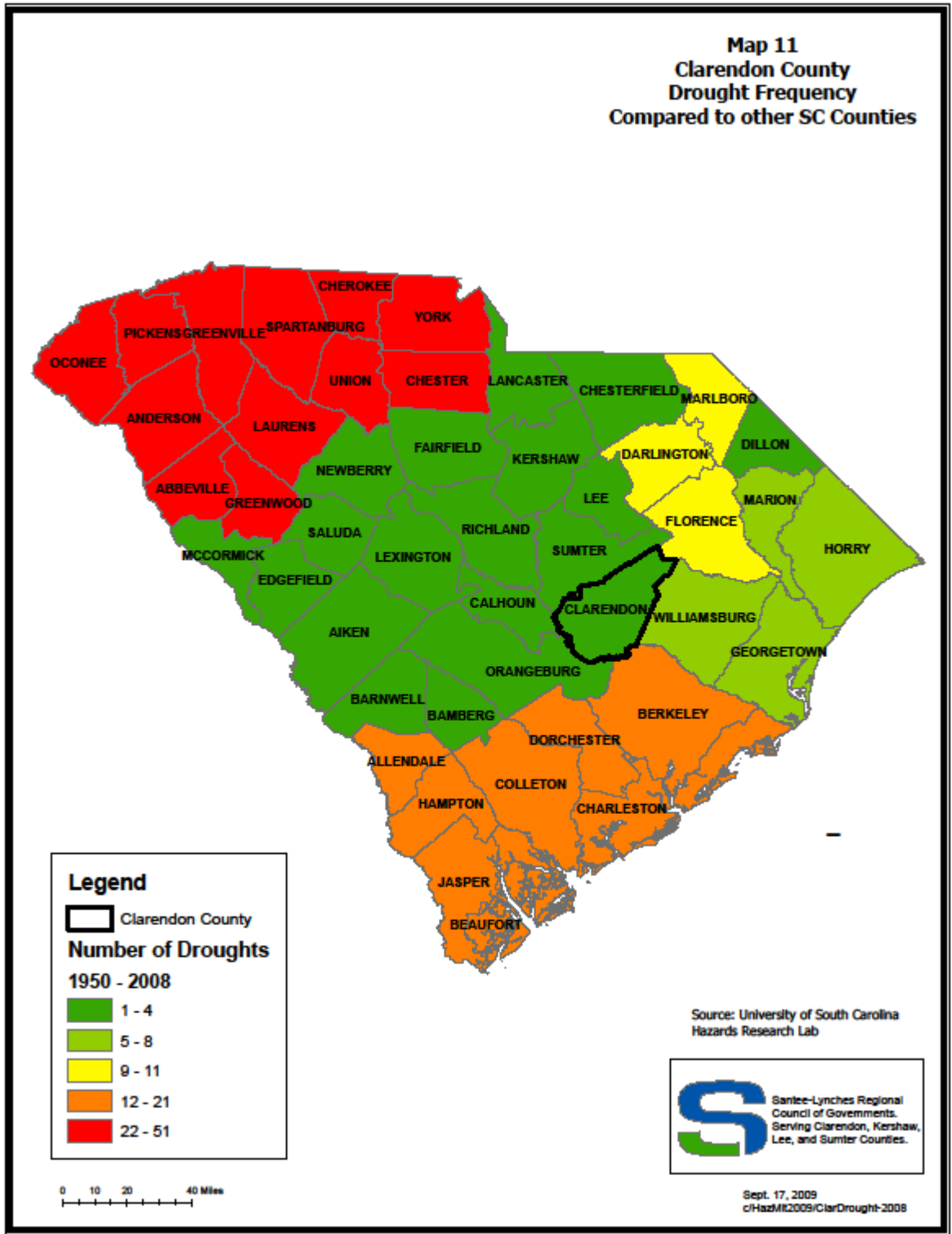
Drought, by its definition, primarily affects agriculture, and, if severe enough, water supplies. As such, the Town's critical facilities are not at risk due to drought.

Turbeville

Drought, by its definition, primarily affects agriculture, and, if severe enough, water supplies. As such, the Town's critical facilities are not at risk due to drought.

Paxville

Drought, by its definition, primarily affects agriculture, and, if severe enough, water supplies. As such, the Town's critical facilities are not at risk due to drought.



2-A HAZARD PROFILE RISK INDEX

A Social Vulnerability Index

In order to determine the **Social Vulnerability** of Clarendon County, the University of South Carolina Hazards Research Lab included the following statistics from the 2000 Census on the Block Group Level:

- **Under 18 Population**
- **Over 65 Population**
- **Female Population**
- **Nonwhite Population**
- **Total Population**
- **Number of Houses**
- **Number Rental Units**
- **Number of Mobile Homes**

Once these statistics were determined from the Census tables, ratios were calculated by dividing the demographic data found in a block group by the county total. For example, the **Under 18 Population** for a block group would be divided by the total **Under 18 Population** for the County. Once the ratios were determined for these categories for each block group, the University stipulated that a **Vulnerability Score** should be calculated to determine how the vulnerable populations compare at the block group level. This was done by dividing the ratio for a block group by the highest ratio in the county. From this calculation, a vulnerability score was determined for each population segment for each block group. In addition to the demographic data collected for the ratios, the following information was also collected for vulnerability score:

- **Value_Dif (the difference between the mean house value for the block group and the average mean house value for the county)**
- **Value_Abs (the absolute difference in the between the value_dif for the block group and maximum value_dif for the entire county)**
- **Value Vulnerability (the standardized vulnerability score based on house value)**

Once these **Vulnerability Scores** were determined, they were added together and the sum of these numbers were placed in a database field titled, **Social Vulnerability**. By adding these various factors, the block groups most vulnerable to hazards due to population density, at risk groups, and property values could be displayed on a map.

Map 12 shows the **Social Vulnerability** score on a thematically shaded map of 2000 Census Block Groups within Clarendon County. The legend on the right indicates the range of the scores for the county.

The map displays the most vulnerable areas of the county are around Lake Marion and the County's primary population center, the City of Manning. The area around Lake Marion is the fastest growing residential section of Clarendon County with a large number of retirees; therefore, it scored in the highest range because of the over 65 population, housing values, and total populations. The areas around Manning are the most populous in the County, while the block group around Paxville has large concentrations of nonwhite population.

2-B Natural Hazards Index

The procedures defined by the University of South Carolina Hazards Research Lab for conducting a risk assessment involved compiling data for the natural hazards listed in Section 1

of this Appendix. Certain data sets were only available at the county level, meaning that individual occurrences of these hazards were not referenced. These events included: Winter Storms, Wildfires, Severe Winds, Lightning, and Hail.

Once the hazards were identified, a **Frequency Ratio** was calculated using the following formula:

Frequency = # of events / # of years in record

These **Frequency Ratios** were added together to form a base number on which an overall hazard scoring system could be based. Since this information was not available below the county level, the hazard score was uniform throughout the county for these factors. However, the risk assessment did include data sets that would facilitate the differentiations of various portions of the county from one another according to the historical instances of the following hazards: Flood Prone Areas, Hurricanes, Tornadoes, and Earthquakes.

Flood Prone Areas

Map 2 displays the Flood Prone Areas in the County. In the case of Clarendon County, this data was developed by the Santee-Lynches Regional Council of Governments to correspond and match with the Q3 (FEMA) data that was available in neighboring Sumter County. It was digitized utilizing existing hydro datasets obtained from the South Carolina Department of Natural Resources and topographic data from the USGS. In the overall hazard scoring, the areas most likely to flood were weighted equally to the maximum (grid) value of earthquakes and tornadoes. This number was chosen in order for those areas affected by flood to:

- Become visually distinct from the base county-wide frequency ratio
- Not be submerged by scores obtained by the procedures stipulated by the University of South Carolina Hazards Research Lab concerning Hurricanes, Tornadoes, and Earthquakes

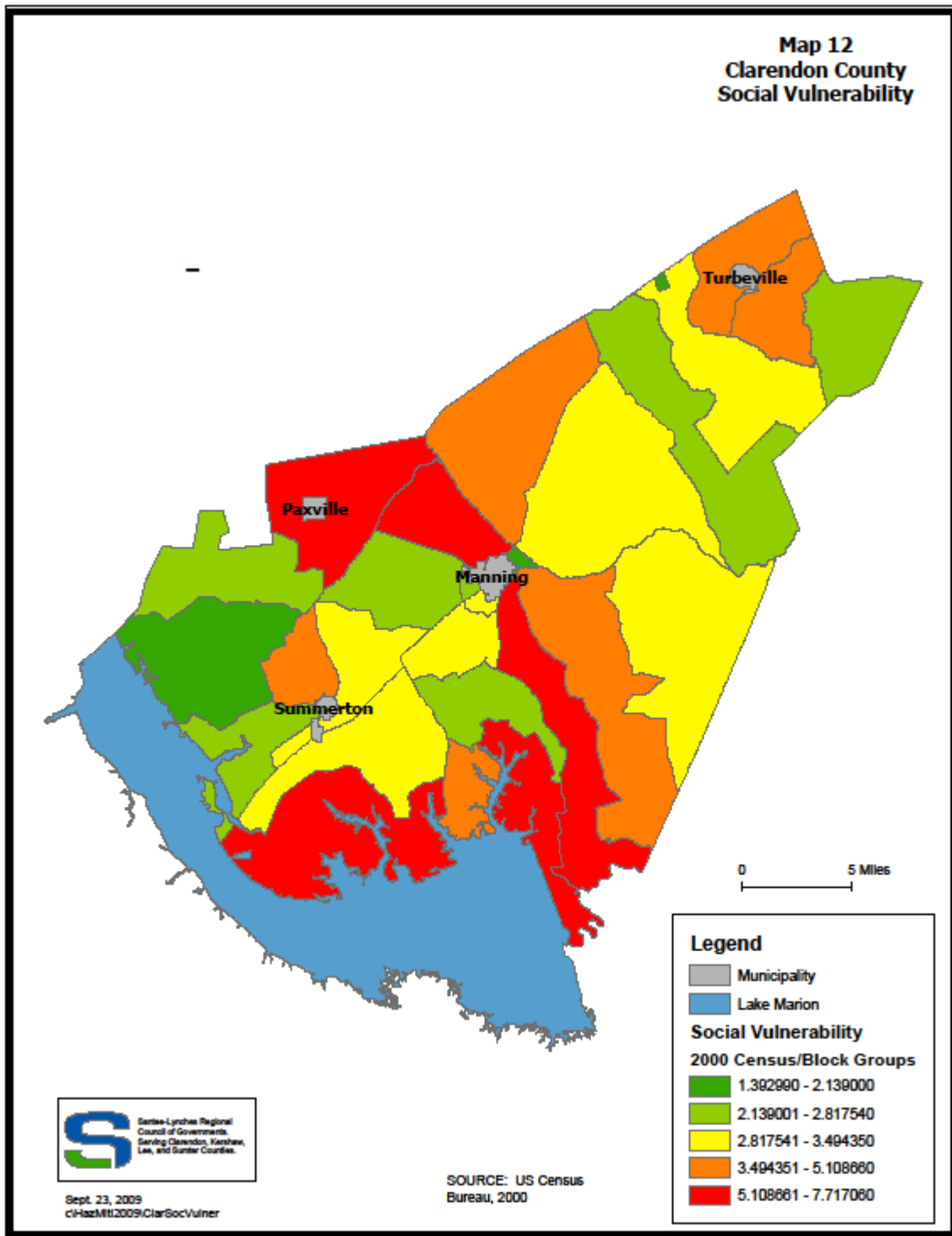
Hurricanes

The University of South Carolina Hazards Research Lab provided Hurricane track data that geographically referenced the linear direction by which an eye of a Hurricane passed (see **Map 3**). From this information it was stipulated by the University that those tracks that passed within a 100 miles of the county be selected with the GIS software. Once these tracks were selected, a buffer was created that contained an attribute table that was coded according to the following values:

- Category 1 – 74 to 95 mph
- Category 2 – 96 to 110 mph
- Category 3 – 111 to 130 mph
- Category 4 – 131 to 155 mph
- Category 5 – 155 + mph
- Tropical Storms and Depressions accounted for all events with wind speeds less than 74 mph

Once these items were coded according to wind speed, a buffer distance needed to be established in order to show the area of impact for each storm. The buffer distance was determined to utilize the following values:

- Tropical Depression/Storm – 5 mile buffer on either side of the track
- Category 1 – 10 mile buffer
- Category 2 – 20 mile buffer



- Category 3 – 30 mile buffer
- Category 4 – 40 mile buffer
- Category 5 – 50 mile buffer

Once these buffers were established, they were clipped according to the county's boundaries (the area of the buffer that fell outside of the county was removed). Then, each category of hurricane (and tropical storm) was assigned a frequency ratio, using the same formula applied to the county wide hazard data.

Tornadoes

The University of South Carolina Hazards Research Lab provided point locations for the tornado hazards that occurred in the state. Once these points were brought into GIS, those points that occurred in Clarendon County were selected. Once these points were selected the tornado density was calculated utilizing a GIS Extension, called Spatial Analyst. Essentially, Spatial Analyst allows a user to create a grid (raster image) by the density or occurrence of points. In this example, it provides a gravity map (see **Map 14**) of tornadoes to add to the risk assessment. Once the density was established, the frequency ratio was applied to the density score of the gravity map.

Earthquakes

The procedure for earthquakes was identical to the methodology the University stipulated for tornadoes; and, as a result, a similar frequency ratio was produced. **Map 15** displays the Earthquake density that was used to help calculate the overall risk assessment.

Hazards Profile Index

Once all of the hazards identified by the University of South Carolina Hazards Research Lab were gathered and their corresponding frequency ratios calculated, a **Composite Hazards Map** was created to show the geographic relation to the combined threat that these hazards presented to the County. In order to combine these layers of information in a geographic format, yet retain all of the data, a series of "unions" (this operation is performed on two layers at a time) were performed on each layer representing a natural hazard. For the sake of definition, a union combines two GIS layers together into one feature, and the data contained in each layer (attributes) are retained in a combined database (attribute table). The most important aspect of this combining process is that as two polygon features are brought together and intersect one another, areas of overlap *will have attributes of both features*. This is the key concept to this methodology, because as the frequency ratios are added, the sum total will yield an overall composite frequency score.

Map 15 is the sum result of this process for Clarendon County. As the map shows, the overall risk is a combination of the geographically specific hazards, and the map should be seen as a comparison between the different areas within the County. In the case of Clarendon County, the areas at the most risk due to historical occurrences of natural hazards are the following:

- The area around the City of Manning, due to flood prone areas and tornado density
- The northern part of the county, due to both tornado and earthquake density

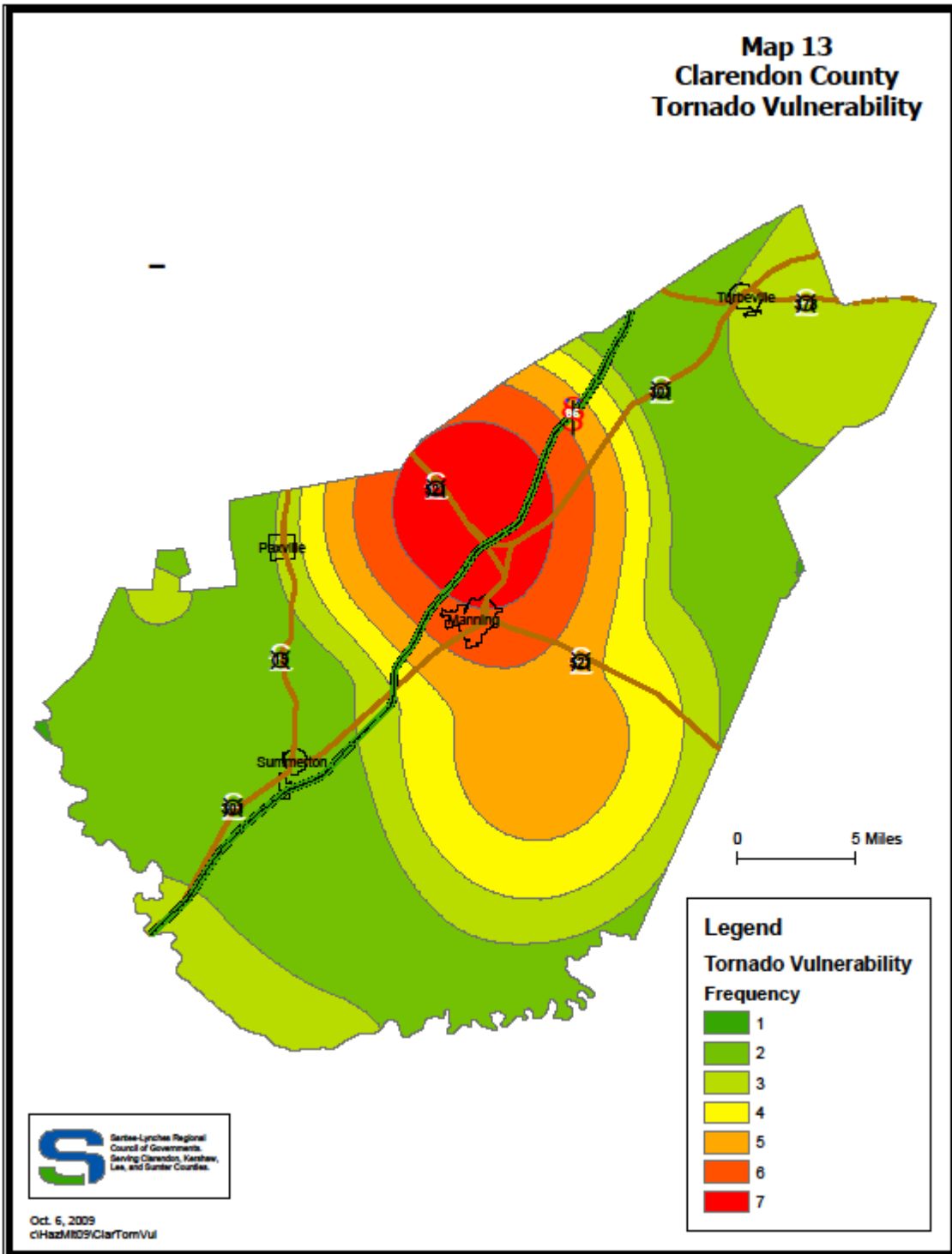
3. CONCLUSIONS ON HAZARD RISK

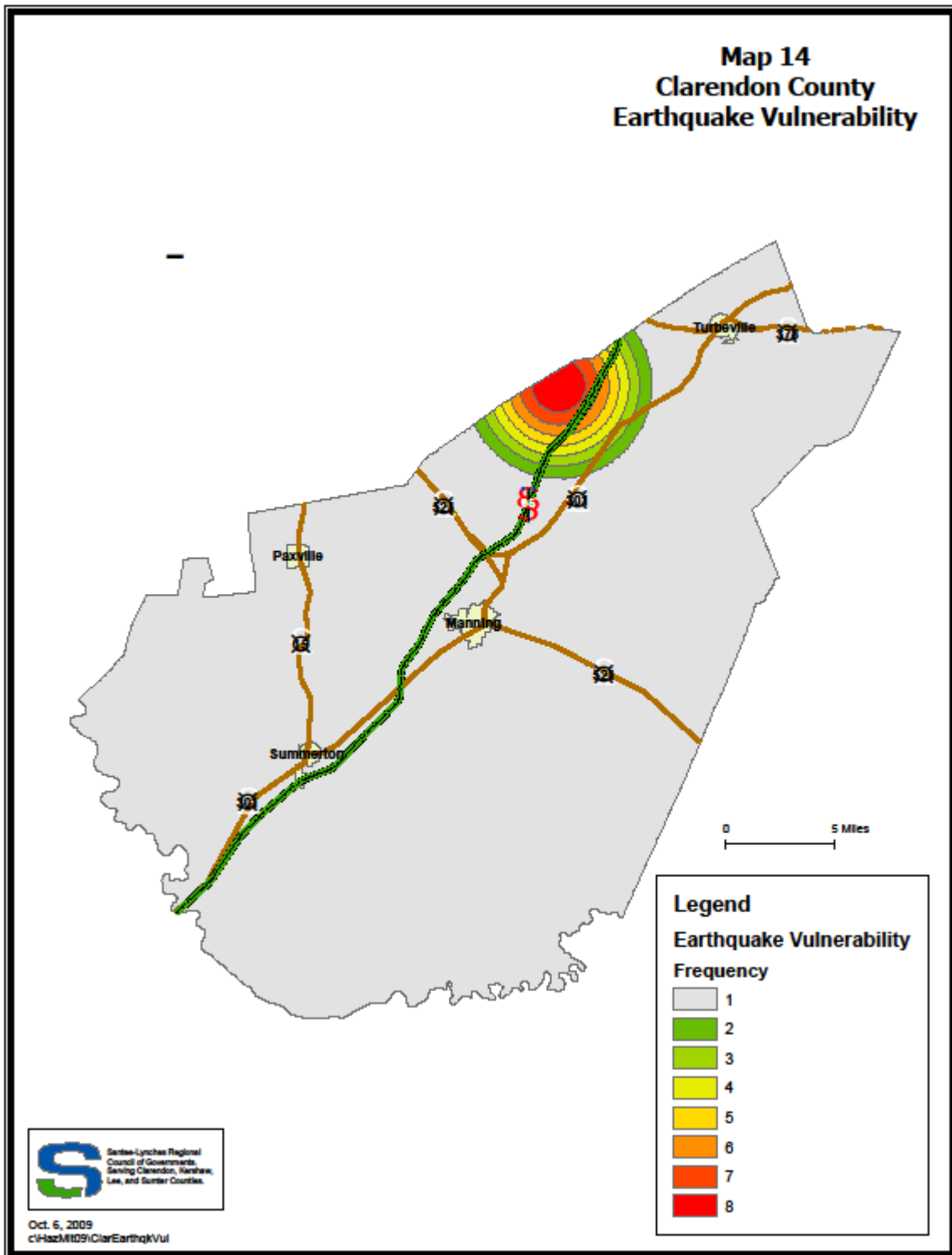
The final step in the University of South Carolina's procedures for risk assessment involved using the same GIS "union" procedure when combining the various hazards in order to obtain an overall composite frequency score (the sum of the frequency scores for all of the hazards

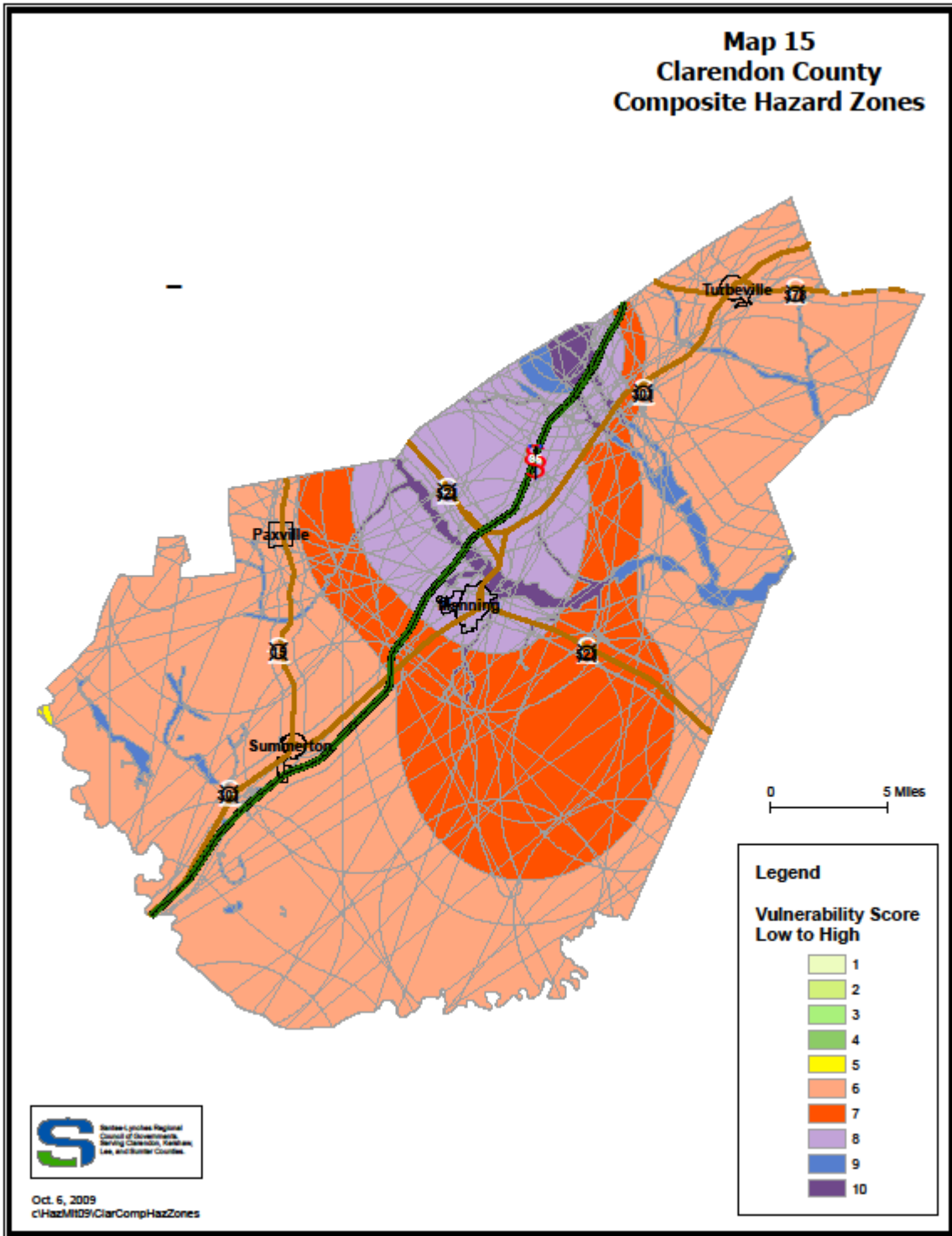
listed in this Appendix). In this case, the GIS products created from the descriptions of the **Social Vulnerability Index** (section 2-A) and the **Natural Hazards Index** (section 2-B) are combined to form a **Combined Hazard Risk Assessment**.

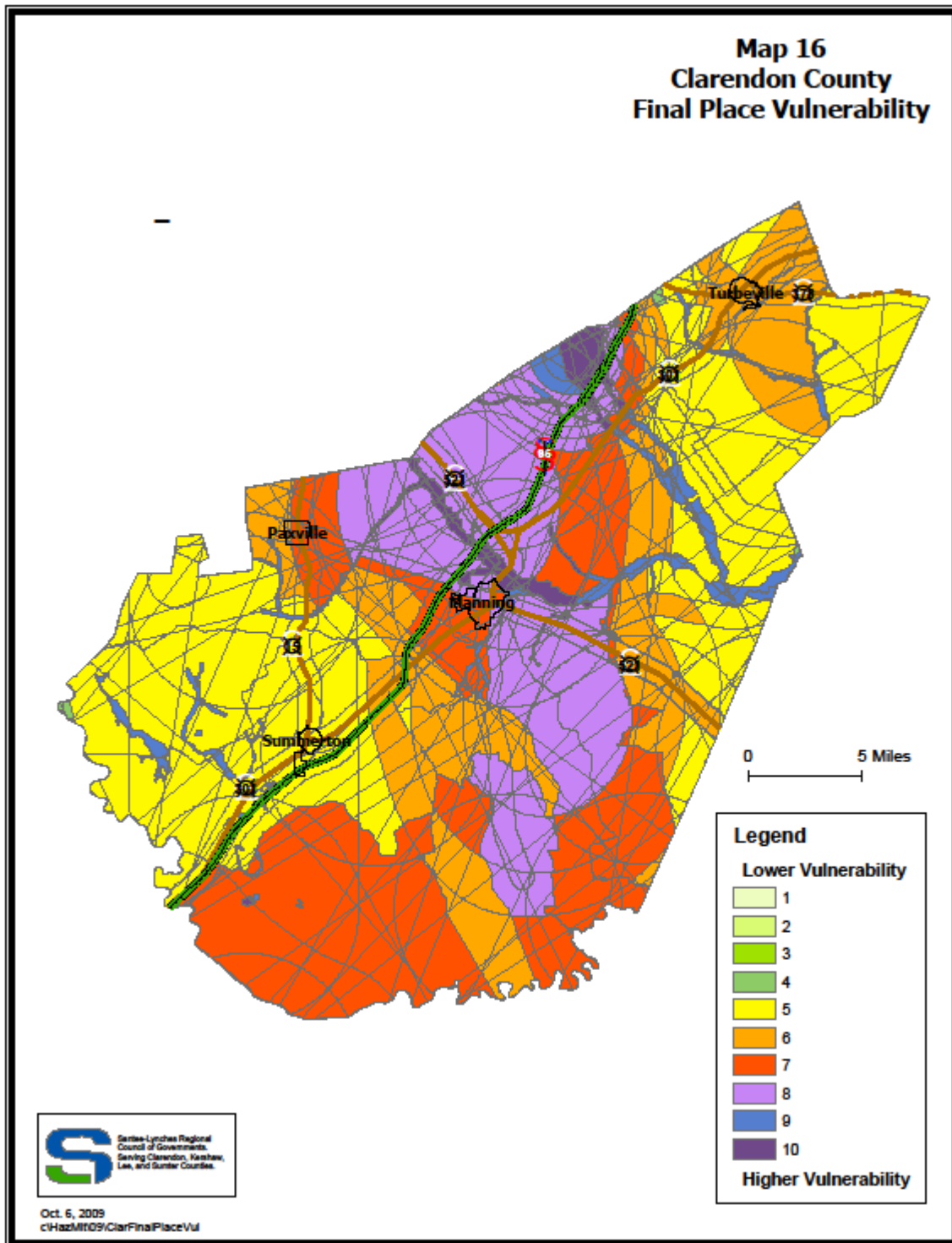
Map 16 illustrates this union between social vulnerability and areas historically affected by hazards. In essence, this map merges this information, so that areas with both vulnerable populations and high incidences of natural hazards. In the case of Clarendon, the social data impacts the final map in the following ways:

- The area around Lake Marion, because of the residential density and the over 65 population, is at an elevated risk.
- Because of low population density and a lack of households, the most rural and remote parts of the county is at a decreased risk.









SECTION 8-2 CRITICAL FACILITY VULNERABILITY

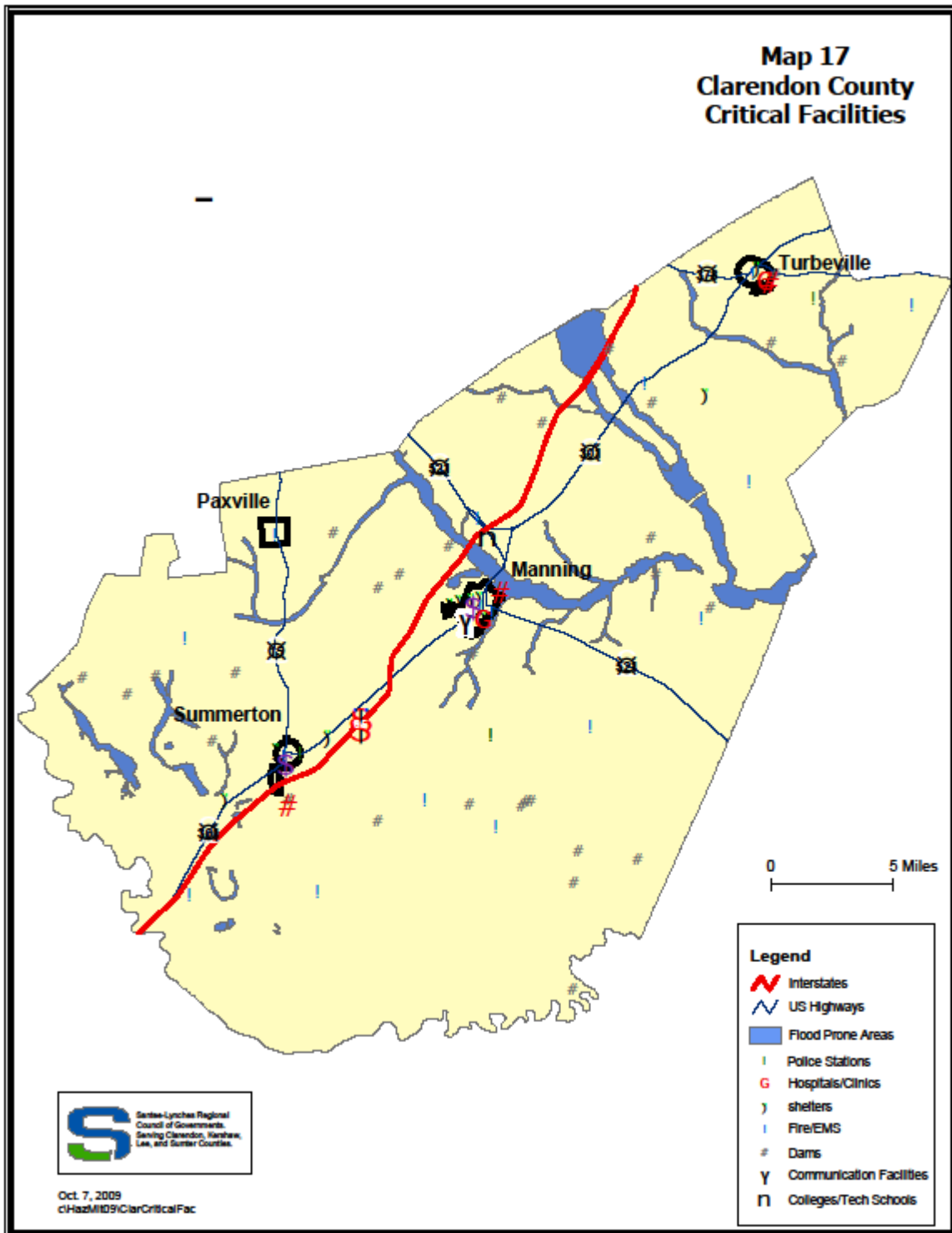
This part of the Natural Hazard Mitigation Plan addresses the assets within the County and the critical facilities located within their boundaries. The University of South Carolina Hazards Lab compiled the initial critical facilities data with the criteria that these critical facilities are vital to the safety and well fare of the community. Thus, they are seen as essential for community survivability, along with the continuation of government and must remain operational or return to operation within 72 hours following a disaster. Also included were facilities that served at-risk or special needs populations, which would need to be addressed in the event of a disaster. The critical facilities include the following:

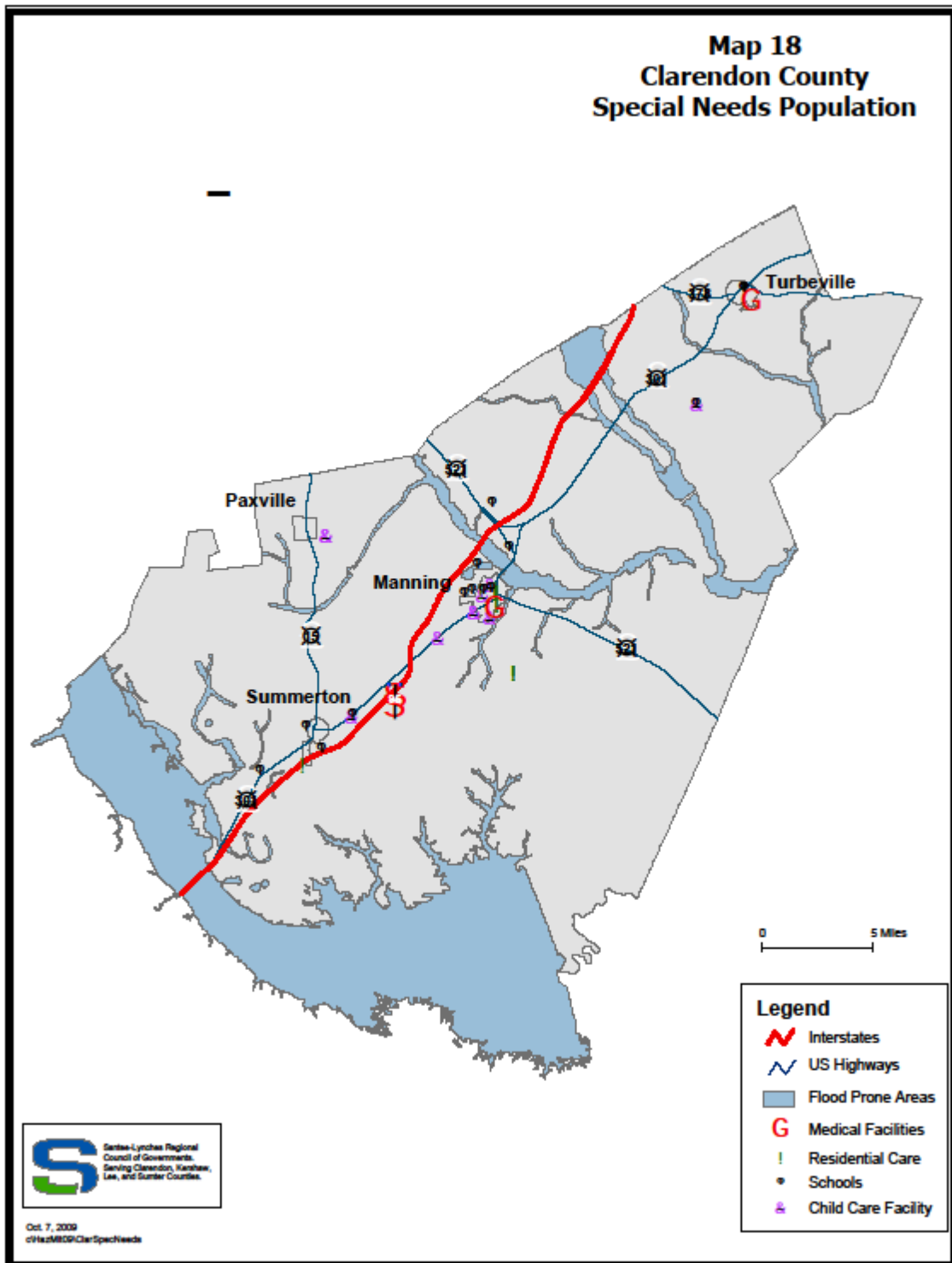
- Police Stations
- Hospitals/Medical Clinics
- Emergency Shelters
- Fire Stations
- Dams
- Communication Facilities
- Schools
- Residential Care Facilities
- Daycare Centers
- Transportation Infrastructure
- Electric, Water, and Wastewater Utilities

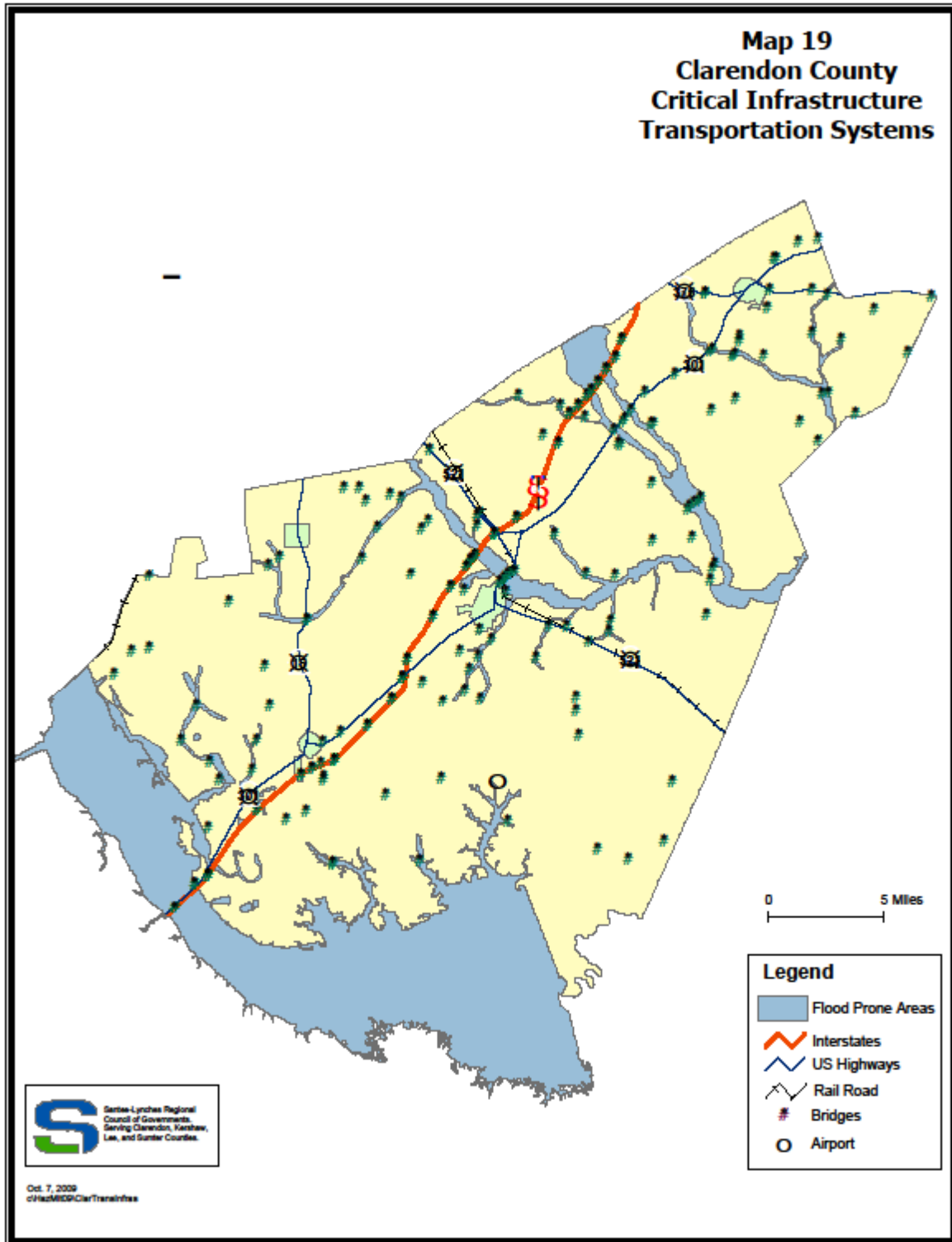
Once SLRCOG received the critical facility data from the University it was reviewed by SLRCOG staff to ensure accuracy, and SLRCOG added data from their own GIS database in order for the information to be complete. Furthermore, the information was presented in a public meeting for general input and comments. A complete list of these critical facilities is included with this section of the plan.

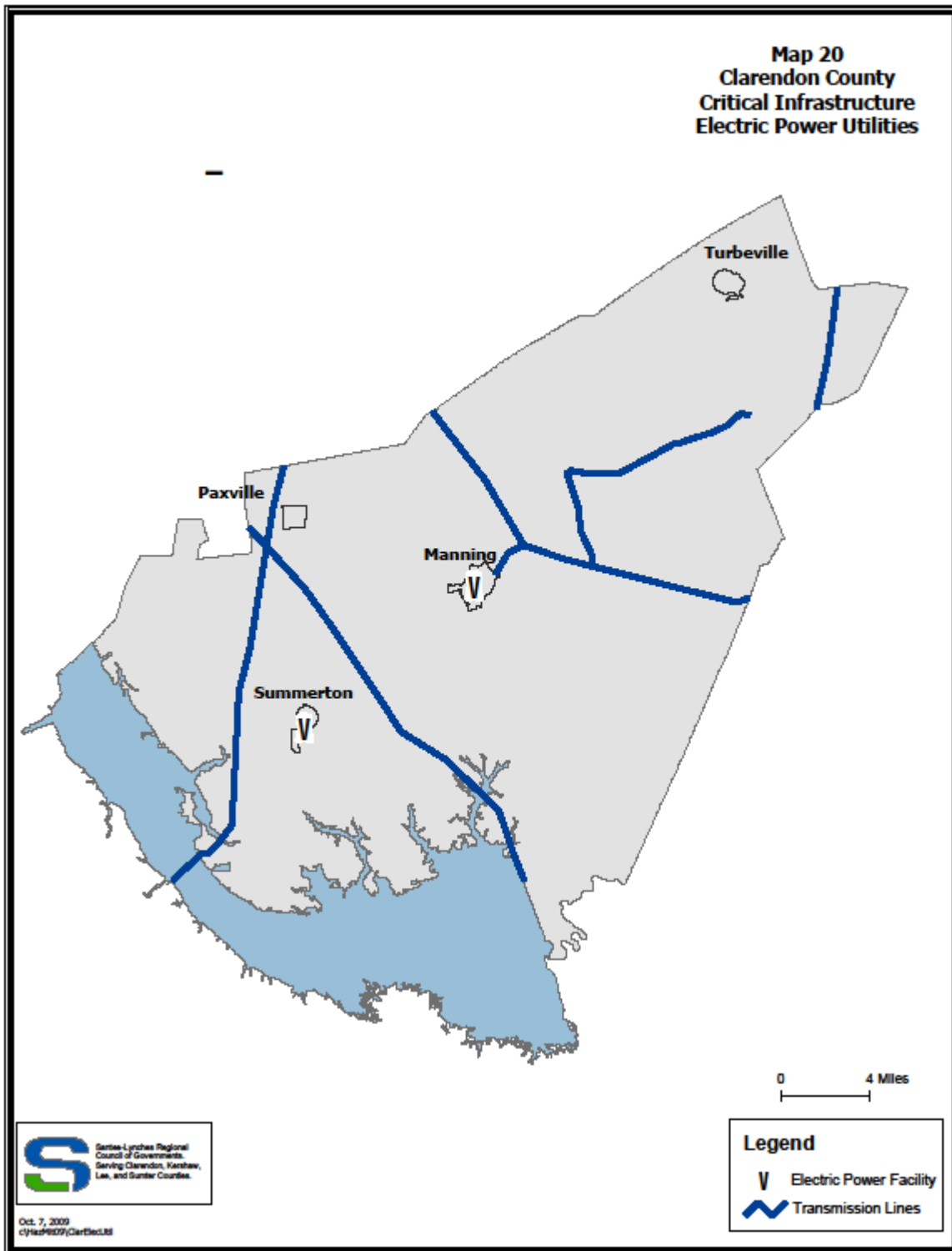
Along with critical facilities list, a series of maps were created to display the geographic location of these facilities within the County. These maps are included at the end of this section.

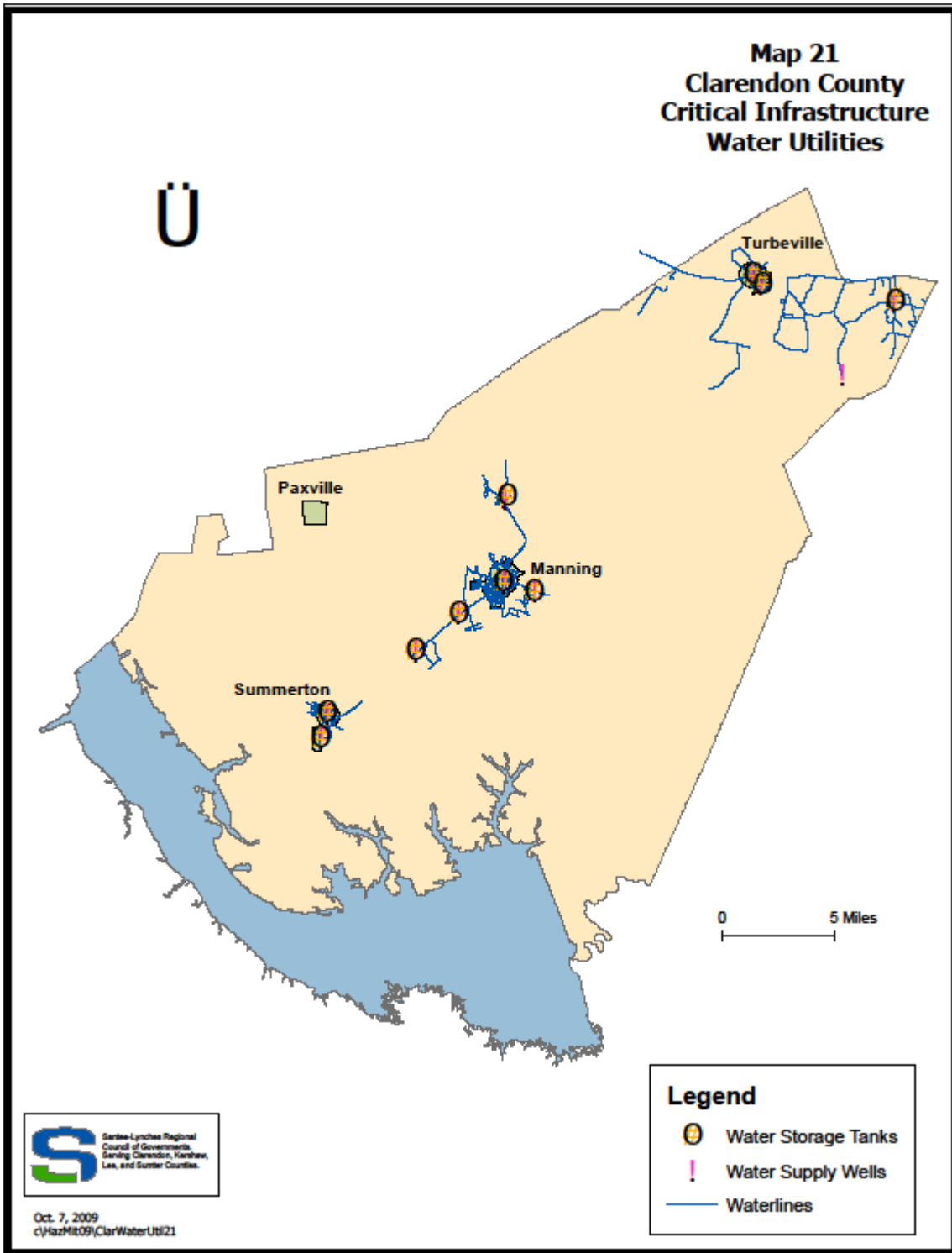
- Map #17 (Critical Facilities) shows the geographic location of those structures whose proper function are considered to be essential.
- Map #18 (Special Needs Population) maps out the various structures that serve at-risk population and need special consideration in terms of emergency response.
- Map #19 (Critical Infrastructure: Transportation Systems) includes County assets essential for evacuation and community access to critical facilities.
- Map #20 (Critical Infrastructure: Electric Power Utilities) shows the County's electric power distribution system.
- Map #21 (Critical Infrastructure: Water Utilities) provides locations for the County's water lines and water storage facilities.
- Map #22 (Critical Infrastructure: Wastewater Utilities) provides locations for the County's sewer lines, and wastewater treatment plants.

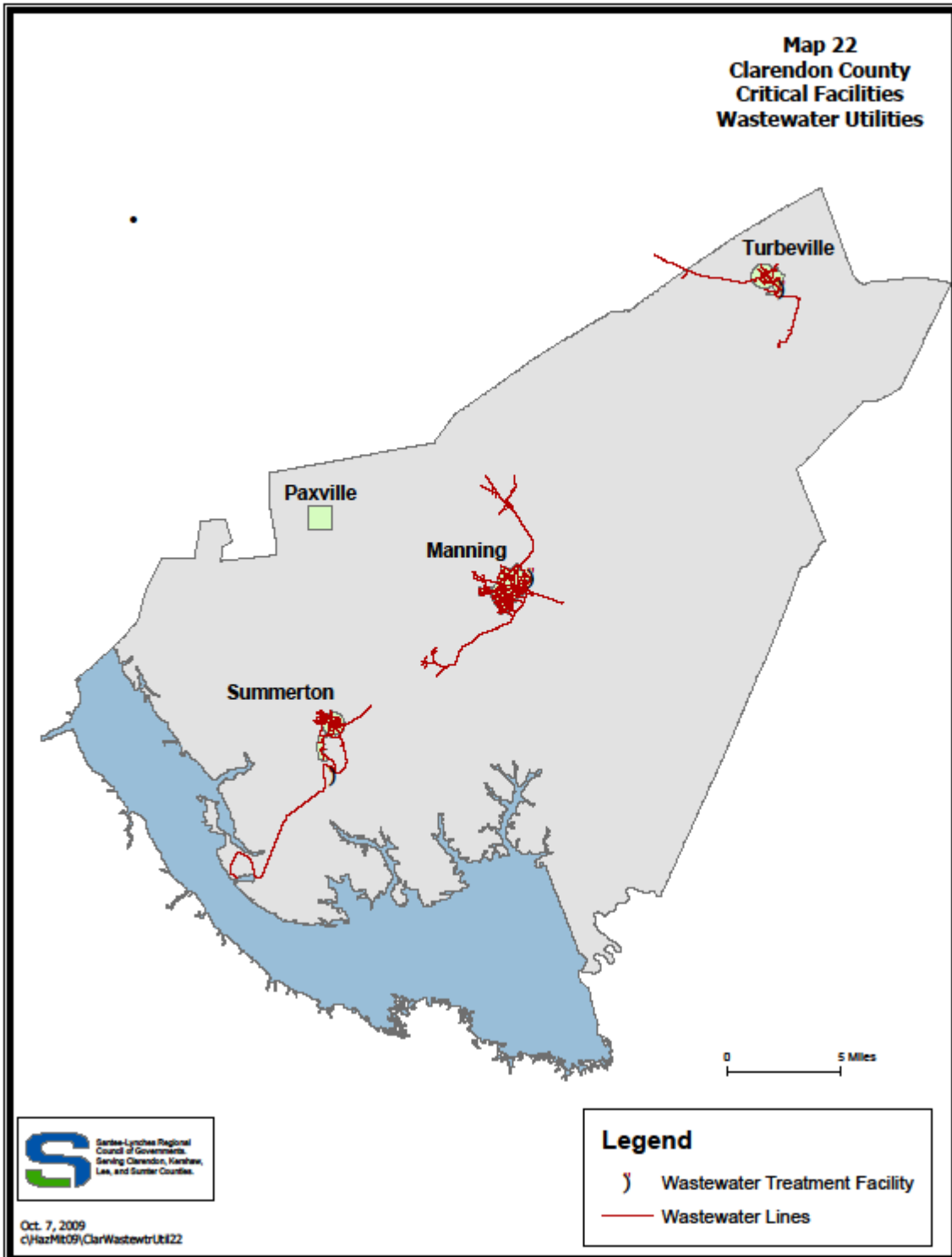












SECTION 8-3 MITIGATION CAPABILITY ASSESSMENT

The capability assessment describes the legal authority vested in local governments to pursue measures to mitigate the impacts of natural hazards. This capability assessment focuses on the evaluation of Clarendon County's existing programs and policies to determine what vehicles are already in place to support mitigation activities. These policies and programs were identified based on a review of existing plans and ordinances for the county and each of the municipalities.

Clarendon County

Clarendon County Comprehensive Plan, Adopted December 28, 1999

Developed a policy stating "the county will continue to implement the Flood Damage Prevention Ordinance and maintain membership in the Flood Insurance Program" (Chapter III, page 5).

Identified that the E-911 system will soon be implemented. E-911 will improve the response time of the EMS and Fire Department.

Established a policy that the county will identify sensitive environmental areas, including but not limited to wetlands, floodplains, and Carolina Bays. Develop regulations for their protection.

The Land Use Element includes a future land use map and identifies flood prone areas where development should be avoided.

Clarendon County Flood Damage Prevention Ordinance, adopted March 18, 1991

Require all subdivision plats and requests for building permits to be reviewed prior to any approval or acceptance.

Unified Development Code (Combined Subdivision Regulations and Zoning Ordinance) adopted December 1999.

Established definitions for Floodway, Flood Hazard, and FIRM established detail requirements for allowing various land uses in zoning districts.

Stormwater Ordinance

The Soil and Water Conservation District has been designated by Council with the responsibility of implementing the state Stormwater requirements in Clarendon County.

Emergency Operation Plan, approved May 2004

Established an Emergency Operation Group to Plan, coordinate and manage all disaster relief operations for the County.

International Building Code, 2000 Edition

Chapter 16 Structural Design has specific requirements for building design and construction to minimize the impact of natural hazards (snow load, wind loads, flood loads, and earthquake loads).

Appendix G of the Building Code has specific requirements for Flood Resistant Construction.

City of Manning

City of Manning Comprehensive Plan, adopted April 1996, updated October 2002

Flood Hazard areas are discussed and identified in a map. This map shows that the 100 Year Flood Plain is basically on the perimeter of the city and is the result of flooding from Bell Branch, Pocotaligo Swamp, and Ox Swamp (see pages 14-16).

The Fire protection capabilities of the town are discussed on page 31. Here the fire fighting equipment, training of manpower, ISO rating, and mutual aid agreement with the county to combat fires in and near the City of Manning are discussed.

The Long Range Land Development Map (Map 13 on page 62), show the projected land development pattern to be away from the flood prone areas.

The recommendation of the Plan is that the city adopts Subdivision Regulations to control the development of undeveloped land or properties and road construction.

The Comprehensive Planning and Zoning Ordinance should be re-evaluated every five years and updated every 10 years. In 2007, the Comprehensive Plan should be updated to incorporate provisions for Hazard Mitigation and other items identified during this study.

City of Manning Zoning Ordinance, adopted October 1996, revised October 2002

The Zoning Ordinance provides provisions for review of all permits for construction or renovation of structures in the city whether it is residential, commercial, or industrial. The locations of these structures are governed by the Zoning Ordinance.

The Flood Plain Protective Areas Regulations, Section 720, specifies that new construction and substantial improvement to existing structures be elevated and that tie-downs be utilized on new mobile home structures placed in floodplain areas.

International Building Code, 2003 Edition

The City of Manning does not employ a Building Official, however, under an intergovernmental agreement, the city contracts with Clarendon County for enforcement of the International Building Codes within the city limits.

Chapter 16, Structural Design, has specific requirements for building design and construction to minimize the impact of natural hazards (snow loads, wind loads, flood loads and earthquake loads).

Administrative Staff/Enforcement Staff

The City of Manning has a full time City Administrator, Public Works Director, Police Chief and Fire Chief to provide the implementation of mitigation measures and emergency response activities. The city has an active Planning Commission and Zoning Board of Appeals.

Subdivision Regulations

The City of Manning has not adopted Subdivision Regulations. Over the years, the city has discussed contracting with Clarendon County for enforcement of the County Subdivision Regulations within the City Limits.

Storm Drainage Ordinance

The City of Manning has not adopted Storm Drainage Ordinances. The city should adopt these regulations and contracts with Clarendon County for enforcement.

Town of Summerton**Town of Summerton Comprehensive Plan, adopted 1989, updated April 1999**

The plan discusses the climate of the Summerton area, but does not address the temperature extremes or natural hazards occurring in the area.

The flooding conditions **are** discussed, with a map showing the flood prone areas, on page 7.

Growth trends of the town are given along with employment, infrastructure, and traffic patterns.

Under Land Use Problems and Concerns Section, the lack of maintenance of drainage ditches was listed as a concern. This lack of maintenance of ditches causes urban flooding to occur.

Under Residential Objectives, on page 35, it is the policy of the town to discourage high density residential development in areas having conservation values, economic deposit, excessive slopes or flood plain conditions; or hazardous area.??

The Long Range Land Development Plan, Map 10, encourages the continuation of the town's current development patterns – residential to remain residential with the commercial areas in the downtown area and on the main corridors to continue.

Town of Summerton Zoning Ordinance, adopted 1989, updated April 1999

The Summerton Zoning Ordinance provides for the process, structure and authority to review all building permits for conformance with the Town's Zoning Ordinance requirements, to regulate the location and placement of buildings and structures.

The Flood Plain Protective Areas Regulations, Section 609 of the ordinance discusses that all new construction and substantial improvement to existing structures must meet the ordinance requirements, e.g., the elevation and tie-down of new structures placed in floodplain areas.

International Building Code, 2003 Edition

The Town of Summerton does not employ a Building Official, however under an intergovernmental agreement, the town contracts with Clarendon County for enforcement of the International Building Codes within the town Limits.

Chapter 16, Structural Design, has specific requirements for building design and construction to minimize the impact of natural hazards (e.g., snow loads, wind loads, flood loads and earthquake loads).

Administrative and Enforcement Staff

The town recently employed a full time Town Administrator to assist in the administration and affairs of the Town. The Public Works Director also serves as the Fire Chief and Zoning Administrator.

Town of Turbeville**Town of Turbeville Comprehensive Plan, adopted August 1994**

The Comprehensive Plan does not address natural hazards or mitigation measures.

The plan discusses the population growth trends and population composition.

The Land development trends **are** discussed on page 9.

Town of Turbeville Zoning Ordinance, adopted August 1994

The Zoning Ordinance provides a mechanism for restricting the location and placement of structures.

There are no designated Flood Plain areas within the Town of Turbeville. However, in the Zoning Ordinance, Section 923 (page 9-6), Flood Plains and Flood Ways, the town provides guidelines to regulate development in the floodplain in case any of the land adjacent to the town limits that are designated potentially flood prone should become part of the town through annexation.

Other Codes and Ordinances

The Town of Turbeville does not have building codes of subdivision regulations.

Administrative and Enforcement Staff

The Town of Turbeville has a full time Administrator and a full time Police Chief to provide the implementation of mitigation measures and emergency response activities.

Town of Paxville

The Town of Paxville **has** only employee is a part time Town Clerk/Treasurer. The Town does not provide any services nor has the town adopted any development ordinances or regulations (e.g., Comprehensive Plan, Zoning Ordinance, building codes, etc.). Through intergovernmental agreements, police protection is provided by the County Sheriff Department and fire protection is provided by the Clarendon County Fire Department. **Building codes by county???**

Summary of Capability Assessment – Clarendon County

The assessment of each local government's policies, programs, and ordinances in Clarendon County along with their technical/administrative and fiscal abilities indicate that Paxville and **Turbeville??** do not have the capability to implement a comprehensive range of mitigation initiatives.

It is noted that Clarendon County, the City of Manning, and the Town of Summerton have the necessary ordinances, policies, and fiscal resources in place along with the administrative staff to implement mitigation strategies, goals, objectives, and an action plan.

Recommendations:

It is the recommendation of the Hazard Mitigation Steering Committee that formal and informal Intergovernmental Agreements and Memorandums of Understanding between the Town

Councils of Paxville and Turbeville be worked out to permit Clarendon County to implement emergency response activities (preparedness, response, and mitigation) within their town limits.

The county will continue to utilize and make available to the Towns of Paxville and Turbeville the Clarendon County's Building and Planning Department for the enforcement of building and construction codes, the Sheriff's Department for law enforcement by supplementing and complementing local police efforts; and the county's Emergency Operation Center will be utilized for emergency response and mitigation activities. The County's Public Education and Awareness Program will be countywide in its scope and focus. In addition, any application for federal funds from FEMA, HUD, and other programs will be applied for and utilized on a countywide basis and on behalf of the Towns of Paxville and Turbeville.

The mitigation efforts or measures that Clarendon County will pursue include the following: prevention, property protection, public education and awareness, natural resources protection, **and** emergency services and structural projects as outlined in the Clarendon County Action Plan in Section 8-5

Section 8-4

Mitigation Strategy - Goals, Objectives, and Action Plan

This section puts forth a summation of the ideas and concepts, brought about by mitigation planning, through a list of goals and corresponding objectives for Clarendon County and its municipalities. Each goal is listed and then accompanied by courses of action, which are bulleted items that follow. Finally, the section provides a table listing specific actions for the stated goals, along with priority of the project, and the responsible party and timeframe for implementation.

Goals are general guidelines that explain the desired outcomes of the natural disaster mitigation planning process. As such, they are to be considered broad policy statements representing long-term results and also to address problems and situations identified through vulnerability and capability assessments.

Objectives, on the other hand, describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals, and the steps that they describe are usually measurable with defined completion times.

Finally, actions provide more detailed descriptions of specific work tasks to help a county or municipality achieve the goals and objectives. These, in turn, can be further elaborated as specific projects envisioned by a local government that addresses specific needs or desired outcomes.

Priority of Projects

Based on the recommendations of the Hazard Mitigation Steering Committee, the following implementation schedule has been developed. Projects have been listed with the ranking assigned by the Steering Committee (H=High, M=Medium, L=Low). Feasibility to implement the project is based on the results of the capability assessment.

- High priority project with high feasibility
- High priority projects with medium feasibility
- Medium priority projects with high feasibility
- Medium priority projects with medium feasibility
- Medium priority projects with low feasibility
- Low priority projects

The Hazard Mitigation Steering Committee ranked projects based on a cost-benefit review that showed which projects were most needed, which of these projects was the most likely to be accomplished, and which would most effectively address mitigation needs. In addition to reviewing potential monetary costs, the team considered the social impact of each potential project, the technical capabilities of the local government to carry through the project, impact on the environment, ability of the local government to maintain the project, and any political or legal effects of the decision. This cost-benefit review was the basis for each of the project feasibility rankings.

Funding

A list of the potential funding sources, please refer to Appendix B.

Responsible Party

Effective implementation of the actions is vital to the success of the Hazard Mitigation Plan. The following tables for the counties and incorporated city's and town's lay out the implementation strategy, i.e. and who is the responsible party for implementation of the strategy. The Hazard Mitigation Steering Committee has worked out this implementation strategy for each implementation action. The abbreviation or name of the following implementation agencies will be used in the action tables:

COG	Council of Governments
CC	County Council and City Council
DHEC	Department of Health and Environmental Control
FEMA	Federal Emergency Management Agency
DPA	County Disaster Preparedness Agency
EMD	Emergency Management Director
ARC	American Red Cross
DSS	SC Department of Social Services
PW	Public Works Department
UD	Utilities Department
PUP	Private Utility Provider
CiA	City Administrator
CoA	County Administrator
SBC	State Building Codes
SCDNR	South Carolina Department of Natural Resources
SCEMD	South Carolina Emergency Management Division

Timeframe

The recommended timeframe for the implementation of the specific action item is as follows:

On-going – Daily/Monthly
 Immediate – within one (1) year or less

Short-Term

1-2 years ---2010 - 2012
 2-4 years ---2012 – 2014

Long-Term

6-8 Years---2016-2018
 8-10 Years---2018-2020

Mitigation Actions and Goals for Turbeville and Paxville

The assessment of each local government's policies, programs, and ordinances in Clarendon County along with their technical/administrative and fiscal abilities indicate that Paxville and Turbeville do not have the capability to implement a comprehensive range of mitigation initiatives. Clarendon County has historically assisted these jurisdictions in the implementation of programs, policies and activities outside the scope of jurisdictional capabilities. Given these limitations Turbeville and Paxville requested that Clarendon County assist them in the implementation of mitigation activities. Action items for those jurisdictions are included with the action items for Clarendon County. Action items for Turbeville and Paxville are indicated by T or P in the Clarendon County action item listing. Clarendon County Goals #2 and #10 apply to Paxville and Turbeville.

4.1 Clarendon County Mitigation Strategy

Goal #1 Ensure the protection of critical facilities in the county.

Objectives

- Identify needed repairs and improvements to critical facility structures and equipment.
- Identify critical facilities that are at risk of being damaged or incapacitated due to a natural disaster.

Goal #2 Increase public education and awareness of natural hazards.

Objectives

- Provide public education to increase awareness of hazards and publicize the effectiveness of mitigation by incorporating/developing web sites, pamphlets, radio, television, and print media.
- All interested individuals will be encouraged to participate in hazard mitigation planning and training activities.
- Educate the public about emergency shelters and evacuation procedures.

Goal #3 Ensure that the availability and operation of the county's infrastructure will not be significantly disrupted by a natural disaster.

Objectives

- Water, sewer, roads, power, and natural gas infrastructure must be assessed for their vulnerability, and be inspected for their ability to maintain functionality during the occurrence of a natural disaster.

Goal #4 Reduce the potential impact of natural disasters on new and existing development

Objectives

- Through comprehensive plans, building codes, or zoning ordinances and similar local government initiatives should address natural hazard mitigation and strengthen present policies to further protect the county and incorporated municipalities.
- Address identified data limitations regarding lack of detailed information about development build-out potential in high hazard areas.

Goal #5 Ensure that emergency shelters have adequate capacity and resources.

Objectives

- Ensure the availability of back up power through generators.
- Ensure that adequate and sufficient medical supplies and equipment are present.
- Utilize Census Block Group population counts to ensure that shelters are adequate in size to serve surrounding population.

Goal #6 Reduce the impact of wildfires on homes, buildings, critical facilities, and infrastructure.*Objectives*

- Address identified data limitations regarding lack of detailed information about vegetation types and individual structures located within the more rural areas of the County.
- Develop a comprehensive approach to reducing the possibility of damage and loss of function due to the exposure of critical facilities and infrastructure to wildfire.

Goal #7 Reduce the impact of severe winds on houses, buildings, critical facilities, and infrastructure.*Objectives*

- Pursue community oriented grants for structures

Goal #8 Reduce the impact of floods on homes, buildings, critical facilities, and infrastructure.*Objectives*

- Develop a comprehensive approach, through long-range planning, ICC Code revisions and zoning enforcement, to reduce the possibility of damage to structures.
- Protect existing structures and assets that are most vulnerable to the effects of flooding.
- Promote the continuing purchase of flood insurance by property owners in flood hazard areas.
- Address identified data limitations regarding lack of detailed information about individual structures located in the 100 year floodplain; flood probabilities other than the 100 year flood plain; and first floor elevations for priority areas.

Goal #9 Ensure the protection and function of Communications.*Objectives*

- Communication lines should be frequently inspected in order to determine vulnerability to natural hazards.
- Inadequate communication systems supporting emergency service operations will be retrofitted or relocated to withstand the impact of natural disasters.

Goal #10 Facilitate the preparedness of Emergency Response*Objectives*

- Enhance response capacity of the County fire, sheriff, and emergency services personnel to at-risk populations.
- Obtain funding for new equipment and training in order to enhance response times and performance.

*Accompanying Actions for Goals***Goal #1: Ensure the protection of critical facilities in the county.**

Priority	Name	Action	Responsible Party	Timeframe
High	Facility Evaluation	Prepare facility audits by evaluating all critical facilities exposure to damage from natural hazards and power losses from downed power lines. Include a review of insurance coverage and identify where more information can be found on the property protection measures recommended by the audit.	Building Grounds Supervisor	1 Year
High	Repair Facilities	Make repairs found listed in the audits in order for the facility to remain operational in case a natural disaster occurs. Items to consider include replacing roofs, installing storm windows and hurricane shutters, improved electrical systems, and ensuring the structures meet the required building codes.	Building Grounds Supervisor	3 Years
High	Backup Power for Critical Facilities	All critical facilities should have a proper backup power supply in order to make sure that if power lines are downed, they can remain functional. Therefore, it is essential that critical facilities should be equipped with backup generators.	Building Grounds Supervisor	Ongoing

Goal #2: Increase public education and awareness of natural hazards.

Priority	Name	Action	Responsible Party	Timeframe
High	Public Education and Awareness information (P, T)	Prepare background information, articles and other explanations of hazard mitigation topics and provide them to County, municipal, and private offices for use in presentations, newsletter articles, websites, brochures, and other outreach projects.	Emergency Management	3 Years
High	Public Education and Awareness (P, T)	Prepare and disseminate outreach projects based on any prepared material concerning hazard mitigation. These projects should be publicized by the utilization of newsletters, news releases, directed mailings, handouts, websites, radio, and television.	Emergency Management	3 Years

Goal #3: Ensure that the county's infrastructure will not be significantly disrupted by a natural disaster.

Priority	Name	Action	Responsible Party	Timeframe
High	Inspection of Lines	Utility lines and structures need to be inspected for their ability to withstand a natural hazard.	Provider	Ongoing
Low	Models and Database	The County and municipalities should develop geographically accurate models and databases of their infrastructure systems.	Emergency Management	5 Years

Goal #4: Reduce the impact of natural disasters on new and existing developments.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Update Plans, Codes, and Ordinances	When comprehensive plans, land use plans, zoning, and subdivision ordinances are up for revision, they should include natural disaster mitigation provisions.	Planning & Zoning	Ongoing
Medium	Flood Control Projects	Implement flood control projects for areas such as farm drainage, bridge improvements, and repairing dams that are prone to failure.	Planning & Zoning	Ongoing

Goal # 5: Ensure that emergency shelters have adequate capacity and resources.

Priority	Name	Action	Responsible Party	Timeframe
Low	Shelter Audit	Perform an audit of shelters to determine which of these structures are better-suited and equipped to serve at-risk populations. In addition, the audit should also determine what equipment is needed to meet these tasks.	American Red Cross	1 Year
Medium	Backup Power	Make sure shelters have an adequate back up power supply by furnishing them with generators.	County Administrator	Ongoing

Goal # 6: Reduce the impact of wildfires on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
Low	Inventory Vulnerable Area to Wildfires	Inventory existing data concerning land cover, land use, and future land use and develop GIS databases to determine areas that are vulnerable to wildfire.	Fire Department	10 Years
Low	Evaluate Areas Susceptible to Wildfires	Utilize GIS analysis to identify structures (homes and other buildings) that are in areas susceptible to wildfire.	Fire Department	10 Years

Goal # 7: Reduce the impact of severe wind on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
High	Safe Rooms	Require new critical facilities to include tornado "safe rooms".	Building & Grounds Supervisor	Ongoing
Medium	Vegetation Management	Inspect and manage vegetation that could damage critical facilities if felled by wind.	Building & Grounds Supervisor	1 Year

Goal # 8: Reduce the impact of floods on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Drainage Ditch Maintenance	Implement a formal and regular drainage ditch and canal system maintenance program for storm water management.	Public Works	5 Years
Low	Update Flood Maps	Encourage FEMA to update flood maps.	Planning & Zoning	Ongoing

Goal # 9: Ensure the protection and function of Communications

Priority	Name	Action	Responsible Party	Timeframe
High	Inspection of Lines	An inspection of communication lines in order to determine what needs to be replaced, and to ensure that they are clear from tree limbs and other obstructions.	Provider	Ongoing
High	Creation of Mobile Dispatch Unit	Create a mobile dispatch unit to ensure that communications are not lost as a result of a natural disaster.	County EM Director	5 Years
High	Retrofit and Relocate Communication System	Utility and communication systems supporting emergency services operations will be retrofitted or relocated to withstand the impact of a natural disaster.	Provider	Ongoing

Goal #10: Facilitate the preparedness of Emergency Response

Priority	Name	Action	Responsible Party	Timeframe
Medium	Emergency Response Preparation Evaluation (P, T)	Conduct a review of emergency response plans and programs to identify where additional activities are needed to respond to natural hazards.	Emergency Management	1 Year
Medium	Emergency Response Preparation Equipment	Purchase any necessary equipment that is critical for the response to natural disasters and to ensure that personnel have adequate and up-to date training and the use of specific equipment.	Emergency Management	Ongoing

4.2 City of Manning Mitigation Strategy

Goal #1 Ensure the protection of critical facilities in the city.

Objectives

- Identify needed repairs and improvements to critical facility structures and equipment.
- Identify critical facilities that are at risk of being damaged or incapacitated due to a natural disaster.

Goal #2 Increase public education and awareness of natural hazards.

Objectives

- Provide public education to increase awareness of hazards and publicize the effectiveness of mitigation by incorporating/developing web sites, pamphlets, radio, television, and print media.
- All interested individuals will be encouraged to participate in hazard mitigation planning and training activities.
- Educate the public about emergency shelters and evacuation procedures.

Goal #3 Ensure that the availability and operation of the city's infrastructure will not be significantly disrupted by a natural disaster.

Objectives

- Water, sewer, roads, power, and natural gas infrastructure must be assessed for their vulnerability, and be inspected for their ability to maintain functionality during the occurrence of a natural disaster.
- Retrofit the police/fire departments to make them operational without electricity.

Goal #4 Reduce the potential impact of natural disasters on new and existing development.

Objectives

- Through comprehensive plans, building codes, or zoning ordinances and similar local government initiatives should address natural hazard mitigation and strengthen present policies to further protect the city.
- Address identified data limitations regarding lack of detailed information about development build-out potential in high hazard areas.

Goal #5 Reduce the impact of wildfires on homes, buildings, critical facilities, and infrastructure.

Objectives

- Address identified data limitations regarding lack of detailed information about vegetation types and individual structures located within the more forested or overgrown areas of the City.
- Develop a comprehensive approach to reducing the possibility of damage and loss of function due to the exposure of critical facilities and infrastructure to wildfire.

Goal #6 Reduce the impact of severe winds on houses, buildings, critical facilities, and infrastructure.

Objectives

- Pursue community oriented grants for structures

Goal #7 Reduce the impact of floods on homes, buildings, critical facilities, and infrastructure.*Objectives*

- Develop a comprehensive approach, through long-range planning, ICC Code revisions and zoning enforcement, to reducing the possibility of damage to structures.
- Protect existing structures and assets that are most vulnerable to the effects of flooding.
- Promote the continuing purchase of flood insurance by property owners in flood hazard areas.
- Address identified data limitations regarding lack of detailed information about individual structures located in the 100 year floodplain; flood probabilities other than the 100 year flood plain; and first floor elevations for priority areas.
- Identify drainage problems to reduce urban flooding.

Goal #8 Ensure the protection and function of Communications.*Objectives*

- Communication lines should be frequently inspected in order to determine vulnerability to natural hazards.
- Inadequate communication systems supporting emergency service operations will be retrofitted or relocated to withstand the impact of natural disasters.

Goal #9 Facilitate the preparedness of Emergency Response.*Objectives*

- Enhance response capacity of the City fire, police, and emergency services personnel to at-risk populations.
- Obtain funding for new equipment and training in order to enhance response times and performance.
- Finalize the 911 house numbering project.

Accompanying Actions for Goals**Goal #1: Ensure the protection of critical facilities in the city.**

Priority	Name	Action	Responsible Party	Timeframe
High	Facility Evaluation	Prepare facility audits by evaluating all critical facilities exposure to damage from natural hazards and power losses from downed power lines. Include a review of insurance coverage and identify where more information can be found on the property protection measures recommended by the audit.	Public Works Fire Department Electric Company	Within a year (2006)
Medium	Repair Facilities	Make repairs found listed in the audits in order for the facility to remain operational in case a natural disaster occurs. Items to consider include replacing roofs, installing storm windows and hurricane shutters, improved electrical systems, and ensuring the structures meet the required building codes.	Administrator Departments	2007
Low	Backup Power for Critical Facilities	All critical facilities should have a proper backup power supply in order to make sure that if power lines are downed, they can remain functional. Therefore, it is essential that critical facilities should be equipped with backup generators.	Administrator Departments	2006-2010

Goal #2: Increase public education and awareness of natural hazards.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Public Education and Awareness information	Prepare background information, articles and other explanations of hazard mitigation topics and provide them to municipal and private offices for use in presentations, newsletter articles, websites, brochures, and other outreach projects.	COG	2006-2008
High	Public Education and Awareness	Prepare and disseminate outreach projects based on any prepared material concerning hazard mitigation. These projects should be publicized by the utilization of newsletters, news releases, directed mailings, handouts, websites, radio, and television.	SCEMD FEMA ARC	Ongoing

Goal #3: Ensure that the city's infrastructure will not be significantly disrupted by a natural disaster.

Priority	Name	Action	Responsible Party	Timeframe
High	Inspection of Lines	Utility lines and structures need to be inspected for their ability to withstand a natural hazard.	Provider	Ongoing
Low	Replace or Retrofit Outdated Structures	Any antiquated structures that are deemed vulnerable should be replaced or retrofitted.	SBC	2006-2008
High	Models and Databases	The City should develop geographically accurate models and databases of their infrastructure systems.	UD	2004-2006
Medium	Retrofit Critical Facilities	Retrofit the City fire/police departments to remain operational without electricity.	City Administrator	2006-2007

Goal #4: Reduce the impact of natural disasters on new and existing developments.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Update Plans, Codes, and Ordinances	When comprehensive plans, land use plans, zoning, and subdivision ordinances are up for revision, they should include natural disaster mitigation provisions.	CC	Ongoing
Low	Property Protection Measures	Incorporate retrofitting incentives by establishing a program of technical assistance and financial incentives to encourage property protection measures on private commercial property.	SBC SCEMD	1-2 Years
High	Flood Control Projects	Implement flood control projects for areas of the city by mapping and cleaning drainage ditches that prone to impede the drainage flow..	CIA PW	Immediate 2-4 Years

Goal #5: Reduce the impact of wildfires on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
High	Inventory Vulnerable Area to Wildfires	Inventory existing data concerning land cover, land use, and future land use and develop GIS databases to determine areas that are vulnerable to wildfire.	COG	1-2 Years
Medium	Evaluate Areas Susceptible to Wildfires	Utilize GIS analysis to identify structures (homes and other buildings) that are in areas susceptible to wildfire.	CIA	2-4 Years
Low	Vegetation Management	Remove and clear vegetation, especially underbrush, in forested areas that have historically been prone to wildfires.	CC	Ongoing

Goal #6: Reduce the impact of severe winds on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
Low	Safe Rooms	Require new critical facilities to include tornado "safe rooms".	ECBC	Ongoing
Medium	Vegetation Management	Inspect and manage vegetation that could damage Critical facilities if felled by wind.	Tree Board	Ongoing
High	Emergency Tree Removal	Update the City tree inventory and seek funds to replace hazardous or damaged trees.	Public Works Dept.	On-going
High	Emergency Debris Removal	Remove debris from major arterials to facilitate the movement of emergency vehicles	Public Works Dept.	On-going

Goal #7: Reduce the impact of floods on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Drainage Ditch Maintenance	Implement a formal and regular drainage ditch and canal system maintenance program for storm water management.	Public Works	2006-2007
Low	Flood Threat Recognition System	Determine the possibility of a flood threat recognition system that utilizes rain and stream gages, along with a central gage, to monitor and predict the occurrences of floods and flash floods.	SCDNR	2006-2008
Medium	Update Flood Maps	Encourage FEMA to update flood maps.	SCEMD	2004-2006
Medium	Back Flow Prevention	Install back-flow prevention valves in sewer pipes.	Public Works Dept.	On-going
High	Drainage Study – Phase I	Identify drainage ditches and direction of flow and have a corrective plan of action.	City Administrator or Public Works Dept.	2005-2006
High	Drainage Study – Phase II	Clear drainage ditches of obstructions.	Public Works	2006-2007
High	Sewer Line Inspection	Inspect sewer lines/wastewater lines to reduce the inflow and infiltration of water.	Utility Dept.	On-going

Goal #8: Ensure the protection and function of Communications.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Inspection of Lines	An inspection of communication lines in order to determine what needs to be replaced, and to ensure that they are clear from tree limbs and other obstructions.	Provider	Ongoing
High	Creation of Mobile Dispatch Unit	Create a mobile dispatch unit to ensure that communications are not lost as a result of a natural disaster.	City EM Director	Ongoing
Medium	Retrofit and Relocate Communication System	Utility and communication systems supporting emergency services operations will be retrofitted or relocated to withstand the impact of a natural disaster.	Provider	Immediate
Medium	Acquire Communication Equipment	Acquire 800 MHz radios for the City Administrator and Department Heads.	County Emergency Management Director	Immediate

Goal #9: Facilitate the preparedness of Emergency Response.

Priority	Name	Action	Responsible Party	Timeframe
Low	Emergency Response Preparation Evaluation	Conduct a review of emergency response plans and programs to identify where additional activities are needed to respond to natural hazards.	COG	Annually
Medium	Emergency Response Preparation Equipment	Purchase any necessary equipment that is critical for the response to natural disasters and to ensure that personnel have adequate and up-to date training and the use of specific equipment.	DPP	
High	Emergency Response Preparedness	Encourage property owners to clearly display street address number on their building/structure.	Fire and Police Department	2006-2007

Goal #10: Reduce the impact of severe weather storms on homes, buildings, critical facilities and infrastructures.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Vegetation Management	Inspect and manage vegetation that could damage critical facilities if felled by wind/ice/snow.	Public Works	Ongoing

4.3 Town of Paxville Mitigation Strategy**Goal #2 Increase public education and awareness of natural hazards.***Objectives*

- Provide public education to increase awareness of hazards and publicize the effectiveness of mitigation by incorporating/developing web sites, pamphlets, radio, television, and print media.
- All interested individuals will be encouraged to participate in hazard mitigation planning and training activities.
- Educate the public about emergency shelters and evacuation procedures.

Goal #10 Facilitate the preparedness of Emergency Response*Objectives*

- Enhance response capacity of the Town fire, police, and emergency services personnel to at-risk populations.
- Obtain funding for new equipment and training in order to enhance response times and performance.

Accompanying Actions for Goals**Goal #2: Increase public education and awareness of natural hazards.**

Priority	Name	Action	Responsible Party	Timeframe
High	Public Education and Awareness information	Prepare background information, articles and other explanations of hazard mitigation topics and provide them to municipal and private offices for use in presentations, newsletter articles, websites, brochures, and other outreach projects.	Emergency Management	3 years
High	Public Education and Awareness	Prepare and disseminate outreach projects based on any prepared material concerning hazard mitigation. These projects should be publicized by the utilization of newsletters, news releases, directed mailings, handouts, websites, radio, and television.	Emergency Management	3 years

Goal #10: Facilitate the preparedness of Emergency Response

Priority	Name	Action	Responsible Party	Timeframe
Medium	Emergency Response Preparation Evaluation	Conduct a review of emergency response plans and programs to identify where additional activities are needed to respond to natural hazards.	Emergency Management	1 Year

4.4 Town of Summerton Mitigation Strategy

Goal #1 Ensure the protection of critical facilities in the town.

Objectives

- Identify needed repairs and improvements to critical facility structures and equipment.
- Identify critical facilities that are at risk of being damaged or incapacitated due to a natural disaster.

Goal #2 Increase public education and awareness of natural hazards.

Objectives

- Provide public education to increase awareness of hazards and publicize the effectiveness of mitigation by incorporating/developing web sites, pamphlets, radio, television, and print media.
- All interested individuals will be encouraged to participate in hazard mitigation planning and training activities.
- Educate the public about emergency shelters and evacuation procedures.

Goal #3 Ensure that the availability and operation of the town's infrastructure will not be significantly disrupted by a natural disaster.

Objectives

- Water, roads, power, and natural gas infrastructure must be assessed for their vulnerability, and be inspected for their ability to maintain functionality during the occurrence of a natural disaster.

Goal #4 Reduce the potential impact of natural disasters on new and existing development

Objectives

- Through comprehensive plans, building codes, or zoning ordinances and similar local government initiatives should address natural hazard mitigation and strengthen present policies to further protect the town.
- Address identified data limitations regarding lack of detailed information about development build-out potential in high hazard areas.

Goal #5 Reduce the impact of wildfires on homes, buildings, critical facilities, and infrastructure.

Objectives

- Address identified data limitations regarding lack of detailed information about vegetation types and individual structures located within the more forested or overgrown areas of the Town.
- Develop a comprehensive approach to reducing the possibility of damage and loss of function due to the exposure of critical facilities and infrastructure to wildfire.

Goal #6 Reduce the impact of severe winds on houses, buildings, critical facilities, and infrastructure.

Objectives

- Pursue community oriented grants for structures

Goal #7 Reduce the impact of floods on homes, buildings, critical facilities, and infrastructure.*Objectives*

- Develop a comprehensive approach, through long-range planning, ICC Code revisions and zoning enforcement, to reducing the possibility of damage to structures.
- Protect existing structures and assets that are most vulnerable to the effects of flooding.
- Promote the continuing purchase of flood insurance by property owners in flood hazard areas.
- Address identified data limitations regarding lack of detailed information about individual structures located in the 100 year floodplain; flood probabilities other than the 100 year flood plain; and first floor elevations for priority areas.

Goal #8 Ensure the protection and function of Communications.*Objectives*

- Communication lines should be frequently inspected in order to determine vulnerability to natural hazards.
- Inadequate communication systems supporting emergency service operations will be retrofitted or relocated to withstand the impact of natural disasters.

Goal #9 Facilitate the preparedness of Emergency Response*Objectives*

- Enhance response capacity of the Town fire, police, and emergency services personnel to at-risk populations.
- Obtain funding for new equipment and training in order to enhance response times and performance.

Accompanying Actions for Goals**Goal #1: Ensure the protection of critical facilities in the town.**

Priority	Name	Action	Responsible Party	Timeframe
High	Facility Evaluation	Prepare facility audits by evaluating all critical facilities exposure to damage from natural hazards and power losses from downed power lines. Include a review of insurance coverage and identify where more information can be found on the property protection measures recommended by the audit.	Town Administrator and Town Clerk	Short Term
Medium	Repair Facilities	Make repairs found listed in the audits in order for the facility to remain operational in case a natural disaster occurs. Items to consider include replacing roofs, installing storm windows and hurricane shutters, improved electrical systems, and ensuring the structures meet the required building codes.	Town Administrator	Ongoing
High	Backup Power for Critical Facilities	All critical facilities should have a proper backup power supply in order to make sure that if power lines are downed, they can remain functional. Therefore, it is essential that critical facilities should be equipped with backup generators.	Town Administrator	Short Term

Goal #2: Increase public education and awareness of natural hazards.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Public Education and Awareness information	Prepare background information, articles and other explanations of hazard mitigation topics and provide them to municipal and private offices for use in presentations, newsletter articles, websites, brochures, and other outreach projects.	Town Administrator and County Emergency Preparedness	Ongoing
Medium	Public Education and Awareness	Prepare and disseminate outreach projects based on any prepared material concerning hazard mitigation. These projects should be publicized by the utilization of newsletters, news releases, directed mailings, handouts, websites, radio, and television.	Town Administrator and County Emergency Preparedness	Ongoing

Goal #3: Ensure that the town's infrastructure will not be significantly disrupted by a natural disaster.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Inspection of Lines	Utility lines and structures need to be inspected for their ability to withstand a natural hazard.	Provider	Ongoing
High	Replace or Retrofit Outdated Structures	Any antiquated structures that are deemed vulnerable should be replaced or retrofitted.	Town Administrator and Public Works	Ongoing
Low	Models and Database	The Town should develop geographically accurate models and databases of their infrastructure systems.	Town Administrator	Ongoing

Goal #4: Reduce the impact of natural disasters on new and existing developments.

Priority	Name	Action	Responsible Party	Timeframe
Medium	Update Plans, Codes, and Ordinances	When comprehensive plans, land use plans, zoning, and subdivision ordinances are up for revision, they should include natural disaster mitigation provisions.	Zoning Administrator	Ongoing
High	Flood Control Projects	Implement flood control projects for areas such as farm drainage, bridge improvements, and repairing dams that are prone to failure.	Zoning Administrator	Short Term

Goal #5: Reduce the impact of wildfires on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
Low	Inventory Vulnerable Area to Wildfires	Inventory existing data concerning land cover, land use, and future land use and develop GIS databases to determine areas that are vulnerable to wildfire.	Town Administrator Fire Chief SLRCOG	Long Term
Low	Evaluate Areas Susceptible to Wildfires	Utilize GIS analysis to identify structures (homes and other buildings) that are in areas susceptible to wildfire.	Town Administrator Fire Chief SLRCOG	Long Term
Low	Vegetation Management	Remove and clear vegetation, especially underbrush, in rural areas that have historically been prone to wildfires.	Town Administrator Fire Chief SLRCOG Property Owners	Ongoing

Goal #6: Reduce the impact of severe winds on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
High	Vegetation Management	Inspect and manage vegetation that could damage Critical facilities if felled by wind.	Town Administrator Public Works	Ongoing

Goal #7: Reduce the impact of floods on homes, buildings, critical facilities, and infrastructure.

Priority	Name	Action	Responsible Party	Timeframe
High	Drainage Ditch Maintenance	Implement a formal and regular drainage ditch and canal system maintenance program for storm water management.	Public Works	Ongoing
Medium	Update Flood Maps	Encourage FEMA to update flood maps.	Zoning Administration	Ongoing
Medium	Back Flow Prevention	Install back-flow prevention valves in sewer pipes.	Public Works	Ongoing (as needed)

Goal #8: Ensure the protection and function of Communications

Priority	Name	Action	Responsible Party	Timeframe
High	Inspection of Lines	An inspection of communication lines in order to determine what needs to be replaced, and to ensure that they are clear from tree limbs and other obstructions.	Provider	Ongoing
Low	Creation of Mobile Dispatch Unit	Create a mobile dispatch unit to ensure that communications are not lost as a result of a natural disaster.	County EM Director	Long Term
High	Retrofit and Relocate Communication System	Utility and communication systems supporting emergency services operations will be retrofitted or relocated to withstand the impact of a natural disaster.	Provider	Ongoing

Goal #9: Facilitate the preparedness of Emergency Response

Priority	Name	Action	Responsible Party	Timeframe
High	Emergency Response Preparation Evaluation	Conduct a review of emergency response plans and programs to identify where additional activities are needed to respond to natural hazards.	Town Administrator Public Works Police & Fire	Short Term
Medium	Emergency Response Preparation Equipment	Purchase any necessary equipment that is critical for the response to natural disasters and to ensure that personnel have adequate and up-to date training and the use of specific equipment.	Town Administrator Public Works Police & Fire	Ongoing

4.5 Town of Turbeville Mitigation Strategy**Goal #2 Increase public education and awareness of natural hazards.***Objectives*

- Provide public education to increase awareness of hazards and publicize the effectiveness of mitigation by incorporating/developing web sites, pamphlets, radio, television, and print media.
- All interested individuals will be encouraged to participate in hazard mitigation planning and training activities.
- Educate the public about emergency shelters and evacuation procedures.

Goal #10 Facilitate the preparedness of Emergency Response*Objectives*

- Enhance response capacity of the Town fire, police, and emergency services personnel to at-risk populations.
- Obtain funding for new equipment and training in order to enhance response times and performance.

Accompanying Actions for Goals**Goal #2: Increase public education and awareness of natural hazards.**

Priority	Name	Action	Responsible Party	Timeframe
High	Public Education and Awareness information	Prepare background information, articles and other explanations of hazard mitigation topics and provide them to municipal and private offices for use in presentations, newsletter articles, websites, brochures, and other outreach projects.	Emergency Management	3 years
High	Public Education and Awareness	Prepare and disseminate outreach projects based on any prepared material concerning hazard mitigation. These projects should be publicized by the utilization of newsletters, news releases, directed mailings, handouts, websites, radio, and television.	Emergency Management	3 years

Goal #10: Facilitate the preparedness of Emergency Response

Priority	Name	Action	Responsible Party	Timeframe
Medium	Emergency Response Preparation Evaluation	Conduct a review of emergency response plans and programs to identify where additional activities are needed to respond to natural hazards.	Emergency Management	3 years

Clarendon County Critical Facilities

Type	Name	Address	Owner	Lat	Long
Airport	Clarendon Regional Airport	SC 260	Clarendon County	33.59	-80.21
Emergency Facility	Fire/Police	SC 261	Clarendon County	33.61731	-80.20658
Fire Station	Alcolu Station	US 521	Clarendon County	33.74559	-80.2149
Fire Station	Davis Station	Rickenbacker Rd	Clarendon County	33.57908	-80.25355
Fire Station	Paxville Station	Conyers Rd	Clarendon County	33.73698	-80.35872
Fire Station	Headquarters	318 Keilt St	Clarendon County	33.689592	-80.2046
Fire Station	Gable Station	US 301	Clarendon County	33.8249	-80.09562
Fire Station	Union Station	Fire Tower Rd	Clarendon County	33.76608	-80.02228
Fire Station	Turbeville Station	Pope St	Clarendon County	33.88949	-80.01782
Fire Station	Forreston Station	Kingstree Hwy	Clarendon County	33.68542	-80.05698
Fire Station	North Santee Station	Dingle Pond Rd	Clarendon County	33.52445	-80.42043
Fire Station	Taw Caw Station	Liberty Hill Rd	Clarendon County	33.52575	-80.33
Fire Station	Wyboo Station	SC 260	Clarendon County	33.56335	-80.20353
Fire Station	Summerton Station	Church St	Clarendon County	33.60618	-80.35247
Fire Station	Barrineau Station	E Main St	Clarendon County	33.8698	-79.90537
Fire Station	Liberty Station	Brewer Rd	Clarendon County	33.62194	-80.13602
Fire Station	Remini Station	Elliot Rd	Clarendon County	33.67572	-80.42266
Emergency Shelter	Clarendon Memorial Hospital	10 Hospital St	Clarendon County	33.686295	-80.210467
Emergency Shelter	East Clarendon High	Pope St	Clarendon County	33.89177	-80.014569
Emergency Shelter	Manning Elementary	Hwy 261	Clarendon County	33.694566	-80.23441
Emergency Shelter	Lake Marion Nursing Home	Gibson Road	Clarendon County	N/A	N/A
Emergency Shelter	Manning High	Hwy 261	Clarendon County	33.696743	-80.229186
Emergency Shelter	Manning Middle	311 W Boyce St	Clarendon County	33.697178	-80.220044
Emergency Shelter	Manning Primary	125 N Boundary St	Clarendon County	33.698484	-80.213514
Emergency Shelter	Scott's Branch Elementary	Fourth St	Clarendon County	33.608807	-80.213514
Emergency Shelter	Scott's Branch High	301 South St	Clarendon County	33.615772	-80.322346
Emergency Shelter	St. Paul Primary	255 Liberty Hill	Clarendon County	33.57964	-80.395481
Emergency Shelter	Walker Gamble Elementary	Walker Gamble Rd	Clarendon County	33.816458	-80.052442
Fire Station	Manning Fire/Police	42 W Boyce St	City of Manning	33.69318	-80.21322

Type	Name	Address	Owner	Lat	Long
Sewer Treatment Facility	Manning Facility	Memorial St	City of Manning	33.701372	-80.199161
Emergency Facility	Summerton Police Dept	W Main St	Town of Summerton	33.60722	-80.34154
Sewer Treatment Facility	Summerton Facility	Hemmingway Rd	Town of Summerton	33.57549	-80.351161
Emergency Facility	Turbeville Police Dept	Dubose Rd	Town of Turbeville	33.8741	-79.9751
Sewer Treatment Facility	Turbeville Facility	Seloc Rd	Town of Turbeville	33.882489	-80.005627
Electric Power Facility	Manning	Huggins St	Progressive Energy	33.692812	-80.217868
Electric Power Facility	Summerton	Mood St	Progressive Energy	33.60055	-80.351308
Hospital	Clarendon County Memorial Hospital	10 Hospital St	Private	33.686295	-80.210467