ANNEX E
LEAKE COUNTY

This annex includes jurisdiction-specific information for Leake County and its participating municipalities. It consists of the following five subsections:

- E.1 Leake County Community Profile
- E.2 Leake County Risk Assessment
- E.3 Leake County Vulnerability Assessment
- E.4 Leake County Capability Assessment
- E.5 Leake County Mitigation Strategy

E.1 LEAKE COUNTY COMMUNITY PROFILE

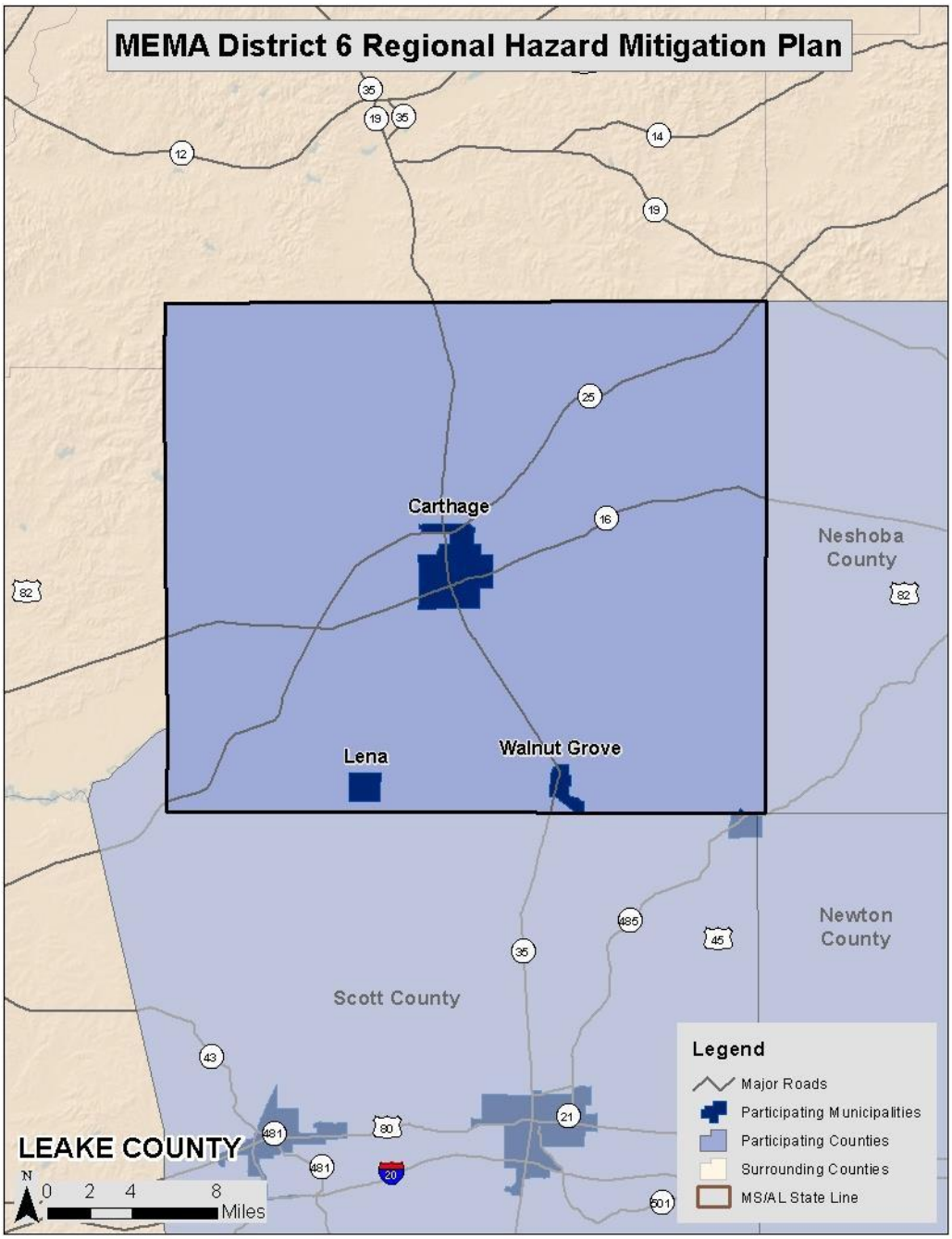
E.1.1 Geography and the Environment

Leake County is located in eastern Mississippi. It comprises two towns and one city, City of Carthage, Town of Lena, and Town of Walnut Grove, as well as many small unincorporated communities. An orientation map is provided as **Figure E.1**.

The county provides commercial and industrial opportunities along with a large recreational based economy while still keeping a strong historic and rural presence throughout. The total area of the county is 585 square miles, 2 square miles of which is water area.

Summer temperatures in the county range from highs of about 90 degrees Fahrenheit (˚F) to lows in the upper 60s. Winter temperatures range from highs in the mid-50s to lows around 30˚F. Average annual rainfall is approximately 56 inches, with the wettest months being November, December, and May.

Figure E.1: LEAKE COUNTY ORIENTATION MAP



E.1.2 Population and Demographics

According to the 2019 American Community Survey, Leake County has a population of 22,792 people. The county overall has seen a slight increase in population between 2010 and 2019. Population density is 36 people per square mile. Population counts from the US Census Bureau for 2000, 2010, and 2019 for the county and participating jurisdictions are presented in **Table E.1**.

Table E.1: POPULATION COUNTS FOR LEAKE COUNTY

Jurisdiction	2000 Census Population	2010 Census Population	2019 ACS Estimates	% Change 2000-2019
Leake County	**20,940**	**23,805**	**22,792**	**8.84%**
Carthage	4,637	5,075	4,830	4.16%
Lena	167	148	151	-9.58%
Walnut Grove	488	1,911	901	84.63%

Source: United States Census Bureau

Based on the 2019 Census, the median age of residents of Leake County is 36.9 years. The racial characteristics of the county are presented in **Table E.2**. Whites make up the majority of the population in the county, accounting for almost 51.2 percent of the population.

Table E.2: DEMOGRAPHICS OF LEAKE COUNTY

Jurisdiction	White, Percent (2019)	Black or African American, Percent (2019)	American Indian or Alaska Native, Percent (2019)	Asian, Percent (2019)	Native Hawaiian or Other Pacific Islander, Percent (2019)	Other Race, Percent (2010)	Two or More Races, percent (2019)	Persons of Hispanic Origin, Percent (2019)*
Leake County	**51.2%**	**41.9%**	**5.7%**	**0.5%**	**0.0%**	**0.2%**	**0.5%**	**4.6%**
Carthage	49.8%	46.8%	1.5%	1.6%	0.0%	0.4%	0.0%	15.5%
Lena	94.0%	6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walnut Grove	24.2%	75.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau

E.1.3 Housing

According to the 2019 American Community Survey, there are 9,567 housing units in Leake County, the majority of which are single family homes or mobile homes. Housing information for the county and three municipalities is presented in **Table E.3**.

Table E.3: HOUSING CHARACTERISTICS OF LEAKE COUNTY

Jurisdiction	Housing Units (2010)	Housing Units (2019)	Median Home Value (2019)
Leake County	**9,415**	**9,567**	**$83,300**
Carthage	1,799	1,628	$123,300
Lena	91	79	$72,500
Walnut Grove	258	280	$66,700

Source: United States Census Bureau – American Community Survey

E.1.4 Infrastructure

TRANSPORTATION

In Leake County, State Highway 25 provides access to the north and south. State Highway 35, which crosses north and south, travels through the north western portion of the county, along with State Highway 16 that travels east and west. The Natchez Trace Parkway is a National Parkway that is highly regarded for its scenic views, hiking trails, picnic areas, camp sites, and exhibits which travels through Leake County.

The Carthage-Leake County Airport provides limited local service within Leake County. The closest major airport used by residents located in nearby counties includes Jackson-Evers International Airport, which offers international and domestic flights to a number of locations around the world.

UTILITIES

Electrical power in Leake County is provided by the Central Electric Power Association, an electric cooperative that is part of the Tennessee Valley Authority. The Mississippi Power Company a Southern Company division and Energy Mississippi also provide electrical service within the county.

Water and sewer service is provided to residents by the City of Carthage, Town of Walnut Grove, Lena Water Works and other Rural Waster Associations.

COMMUNITY FACILITIES

There are a number of buildings and community facilities located throughout Leake County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 10 fire stations, 3 police stations, and 8s public schools located within the county.

There is one hospital located in Leake County. Baptist Medical Center is a 25-bed critical access hospital offering inpatient, outpatient, and diagnostic services.

Recreational opportunities in Leake County include outdoor recreation such as golf, hunting, fishing, boating, and hiking. There are multiple outdoor recreational areas including Carthage Coliseum, Low Head Dam Park, Ross Barnett Reservoir, Coal Bluff Park, Golden Memorial State Park, and Natchez Trace Parkway. Various sporting events are held at Trustmark Park amphitheater for residents and visitors.

E.1.5 Land Use

Many areas of Leake County are undeveloped or sparsely developed. There are several small incorporated municipalities located throughout the county, with a few larger hubs interspersed. These areas are where the county's population is generally concentrated. The incorporated areas are also where many of the businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of rural residential development, agricultural uses, and recreational areas, although there are some notable exceptions in the larger municipalities. Local land use and associated regulations are further discussed in *Section 7: Capability Assessment.*

East Central Planning and Development District assists with Leake County with planning and development to promote economic growth and job opportunities.

E.1.6 Employment and Industry

According to U.S. Census Bureau's American Community Survey (ACS), in 2019, Leake County had an average annual employment of 9,304 workers and according to Mississippi Department of Employment Security as of May 2021 an unemployment rate of 6.0 percent. In 2019, the Manufacturing industry employed 20.4 percent of the workforce followed by educational services, and health care and social assistance (19.3%) and Retail Trade (11.8%). The median household income in Leake County was $37,096 compared to $45,081 in the state of Mississippi.

E.2 LEAKE COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Leake County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

E.2.1 Flood

LOCATION AND SPATIAL EXTENT

There are areas in Leake County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 580 square miles that make up Leake County, there are 125.5 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 0.0 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 21.6 percent of the total land area in Leake County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure E.2** illustrates the location and extent of currently mapped special flood hazard areas for Leake County based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.[1]

[1] DFIRM panels last updated 2011.

Figure E.2: SPECIAL FLOOD HAZARD AREAS IN LEAKE COUNTY

Source: Federal Emergency Management Agency

Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 15.8 percent of the total land area in the MEMA District 6 Region.

Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the region was near Lena in Leake County in 1979. Water reached a discharge of 122,000 cubic feet per second and the stream gage height was recorded at 32.2 feet. Additional peak discharge readings and gage heights are in the table below.

County	Location/Jurisdiction	Date	Peak Discharge (cfs)	Gage Height (ft)
Clarke County	Chickasawhay River at Enterprise	02/23/1961	61,700	37.94
	Chickasawhay River near Quitman	April 1900	66,000	50.91
	Souinlovie Creek near Pachuta	April 1900	27,000	59.00
	Chickasawhay River at Shubuta	April 1900	90,000	47.90
Jasper County	Tallahala Creek at Waldrup	02/06/2004	18,900	23.17
Kemper County	Hamilton Branch near DeKalb	04/13/1974	662	7.58
	Flat Scooba Creek Tributary near Scooba	04/12/1979	427	8.87
Lauderdale County	Okatibbee Creek near Meridian	02/22/1961	27,000	26.14
Leake County	Pearl River near Carthage	04/14/1979	102,000	28.74
	Pearl River near Lena	04/17/1979	122,000	32.20
	Tuscolameta Creek at Walnut Grove	04/08/2003	45,800	32.08
	Town Creek near Verona	03/21/1955	70,000	29.40
Neshoba County	Pearl River at Burnside (unincorporated area)	04/13/1979	76,600	23.60
Newton County	Potterchitto Creek at Newton	04/07/2003	8,520	18.64
Scott County	Strong River near Morton	12/24/1974	5,600	22.00
Smith County	Oakohay Creek at Mize	04/13/1974	28,900	17.26
	Leaf River near Raleigh	04/13/1974	17,000	28.17
	Leaf River near Taylorsville	04/14/1974	37,600	57.44

HISTORICAL OCCURRENCES

Floods were at least partially responsible for nine disaster declarations in Leake County in 1974, 1979, 1983, twice in 2001, 2003, 2014, 2019, and 2020. Information from the National Centers for Environmental Information was used to ascertain additional historical flood events. A complete listing of historical disaster declarations can be found in Section 4: Hazard Identification. The National Centers for Environmental Information reported a total of 28 events in Leake County since 2001. A summary of these

events is presented in **Table E.4**. These events accounted for almost $10.9 million in property damage in the county.

Table E.4: SUMMARY OF FLOOD OCCURRENCES IN LEAKE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Carthage	1	0/0	$25,000
Lena	1	0/0	$40,000
Walnut Grove	6	0/0	$83,000
Unincorporated Area	20	0/0	$10,832,000
LEAKE COUNTY TOTAL	**28**	**0/0**	**$10,980,000**

Source: National Centers for Environmental Information

HISTORICAL SUMMARY OF INSURED FLOOD LOSSES

Current NFIP and Repetitive Loss Properties data was not made available during this plan update, as such, the most current information is provided below. According to FEMA flood insurance policy records as of June 2015, there have been 28 flood losses reported in Leake County through the National Flood Insurance Program (NFIP) since 1978, totaling over $278,000 in claims payments. A summary of these figures for the county is provided in **Table E.5**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Leake County were either uninsured, denied claims payment, or not reported.

Table E.5: SUMMARY OF INSURED FLOOD LOSSES IN LEAKE COUNTY

Location	Flood Losses	Claims Payments
Carthage	18	$186,046
Lena*	--	--
Walnut Grove	0	$0
Unincorporated Area	10	$92,350
LEAKE COUNTY TOTAL	**28**	**$278,396**

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

REPETITIVE LOSS PROPERTIES

According to the Mississippi Emergency Management Agency, there are four non-mitigated repetitive loss properties located in Leake County, which accounted for eight losses and almost $57,000 in claims payments under the NFIP. The average claim amount for these properties is $7,100. All four properties are single family. Without mitigation, these properties will likely continue to experience flood losses. **Table E.6** presents detailed information on repetitive loss properties and NFIP claims and policies for Leake County.

Table E.6: REPETITIVE LOSS PROPERTIES IN LEAKE COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment

Carthage	3	3 single family	6	$40,000	$6,028	$46,028	$7,671
Lena*	--	--	--	--	--	--	--
Walnut Grove	0	--	0	$0	$0	$0	$0
Unincorporated Area	1	1 single family	2	$9,931	$840	$10,772	$5,386
LEAKE COUNTY TOTAL	**4**		**8**	**$49,932**	**$6,868**	**$56,800**	**$7,100**

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

PROBABILITY OF FUTURE OCCURRENCES

Flood events will remain a threat in Leake County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdictions and unincorporated areas have risk to flooding, though not all areas will experience flood. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county. For example, the Town of Lena has less floodplain and thus a lower risk of flood than the other municipalities. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

E.2.2 Erosion

LOCATION AND SPATIAL EXTENT

Erosion in Leake County is typically caused by flash flooding events. Unlike coastal areas, areas of concern for erosion in Leake County are primarily rivers and streams. Generally, vegetation helps to prevent erosion in the area, and it is not an extreme threat to the county. No areas of concern were reported by the hazard mitigation council.

HISTORICAL OCCURRENCES

Several sources were vetted to identify areas of erosion in Leake County. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. No historical erosion occurrences were found in these sources.

PROBABILITY OF FUTURE OCCURRENCES

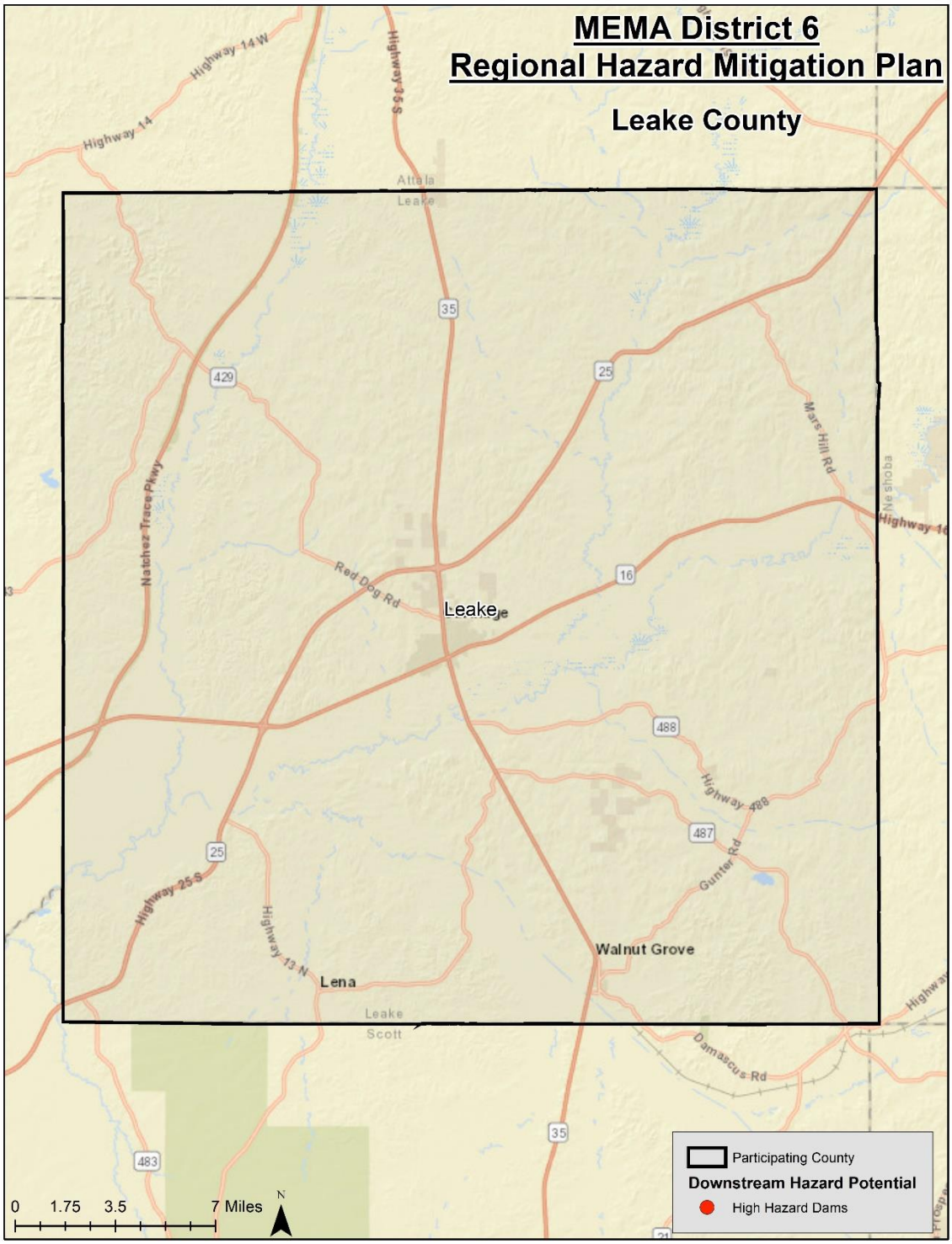
Erosion remains a natural, dynamic, and continuous process for Leake County, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent annually).

E.2.3 Dam and Levee Failure

LOCATION AND SPATIAL EXTENT

According to the U.S. Army Corps of Engineers' National Inventory of Dams, there are no high hazard dams in Leake County (**Table E.7**). **Figure E.3** shows the location of other nearby high hazard dams.

Figure E.3: LEAKE COUNTY HIGH HAZARD DAM LOCATIONS



Source: U.S. Army Corps of Engineers – National Inventory of Dams

Table E.7: LEAKE COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential
Leake County	
NONE	*N/A*

Source: U.S. Army Corps of Engineers – National Inventory of Dams

HISTORICAL OCCURRENCES

According to the Mississippi State Hazard Mitigation Plan, there has been one dam failure reported in Leake County. This incident occurred in May 1983 when the State Highway 35 structure was overtopped. Although no damage was reported with this event, several breach scenarios in the county could be catastrophic.

PROBABILITY OF FUTURE OCCURRENCES

Given the current dam inventory and historic data, a dam breach is possible (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

E.2.4 Winter Storm and Freeze

LOCATION AND SPATIAL EXTENT

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Leake County is not accustomed to severe winter weather conditions and rarely receives severe winter weather, even during the winter months. Events tend to be mild in nature; however, even relatively small accumulations of snow, ice, or other wintery precipitation can lead to losses and damage due to the fact that these events are not commonplace. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

The extent of winter storms can be measured by the amount of snowfall received (in inches). Official long term snow records are not kept for any areas in the MEMA District 6 Region. However, the greatest snowfall reported in Meridian (north of the region) was 14.0 inches in 1963. In February 2021, the region experienced winter weather with heavy snow up to three inches. Transportation was greatly impacted.

HISTORICAL OCCURRENCES

Winter weather has resulted in one disaster declaration in Leake County in 1999. According to the National Centers for Environmental Information, there have been a total of 14 recorded winter storm events in Leake County since 1996 (**Table E.9**). These events resulted in almost $1.645 million in damages. Detailed information on the recorded winter storm events can be found in **Table E.10**.

TABLE E.9: SUMMARY OF WINTER STORM EVENTS IN LEAKE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage

Leake County	14	0/0	$1,645,000

Source: National Centers for Environmental Information

TABLE E.10: HISTORICAL WINTER STORM IMPACTS IN LEAKE COUNTY

Location	Date	Type	Deaths / Injuries	Property Damage*
Carthage				
None Reported	--	--	--	--
Lena				
None Reported	--	--	--	--
Walnut Grove				
None Reported	--	--	--	--
Unincorporated Area				
LEAKE (ZONE)	2/1/1996	Ice Storm	0/0	$152,096
LEAKE (ZONE)	12/14/1997	Heavy Snow	0/0	$0
LEAKE (ZONE)	12/22/1998	Ice Storm	0/0	$183,005
LEAKE (ZONE)	1/27/2000	Ice Storm	0/0	$41,575
LEAKE (ZONE)	2/20/2006	Ice Storm	0/0	$142,046
LEAKE (ZONE)	12/11/2008	Heavy Snow	0/0	$0
LEAKE (ZONE)	2/11/2010	Heavy Snow	0/0	$383,036
LEAKE (ZONE)	1/9/2011	Ice Storm	0/0	$21,218
LEAKE (ZONE)	2/3/2011	Ice Storm	0/0	$424,360
LEAKE (ZONE)	2/9/2011	Heavy Snow	0/0	$318,270
LEAKE (ZONE)	1/16/2013	Heavy Snow	0/0	$0
LEAKE (ZONE)	12/08/2017	Heavy Snow	0/0	$0
LEAKE (ZONE)	1/10/2021	Heavy Snow	0/0	$0
LEAKE (ZONE)	2/17/2021	Winter Storm	0/0	$200,000

Source: National Centers for Environmental Information

There have been several severe winter weather events in Leake County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

December 1998
Central Mississippi was hit by a crippling ice storm. Up to 2 inches of ice accumulated on power lines and much of the region experienced long power outages, nearly seven days in some cases. The ice caused numerous power outages and brought down many trees and power lines. Christmas travel was severely hampered for several days with motorists stranded at airports, bus stations, and truck stops. Travel did not return to normal until after Christmas in some locations.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

PROBABILITY OF FUTURE OCCURRENCES

Winter storm events will continue to occur in Leake County. According to historical information, the annual probability is likely (between 10 and 100 percent).

FIRE-RELATED HAZARDS

E.2.5 Drought / Heat Wave

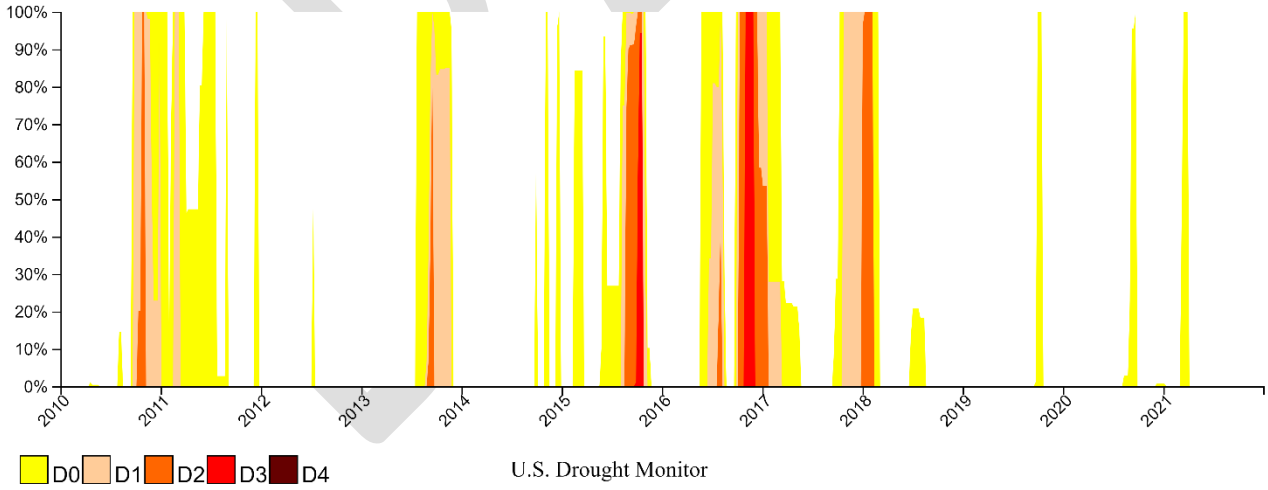
Drought
Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that Leake County would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

Heat Wave
Heat waves typically impact a large area and cannot be confined to any geographic or political boundaries.

HISTORICAL OCCURRENCES

Drought
According to the U.S. Drought Monitor, Leake County had drought levels (including abnormally dry) in each of the last 10 years (2010-2020). **Table E.11** shows the most severe drought classification for each year, according to U.S. Drought Monitor classifications. It should be noted that the U.S. Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

Figure E.4: HISTORICAL DROUGHT OCCURRENCES IN LEAKE COUNTY



Source: United States Drought Monitor

Some additional anecdotal information was provided from the National Centers for Environmental Information on droughts in Leake County.

Summer 2006 – During a four-and-a-half-month period, from June to the middle of October, abnormally dry conditions prevailed across most of Jackson, MS County Warning Area (CWA). The drought had a significant impact on the agricultural industry. Non-irrigated crops were destroyed and all other sustainable crops produced a below normal yield. Catfish ponds were drawn down to severe levels and required water to be pumped back into the fish ponds. The cattle industry suffered due to low watering ponds and lack of sufficient grasslands for grazing and hay production. Water supply problems were encountered by those cities who obtained water from local rivers for drinking purposes due to the low river flows. Fire threat was significant causing the issuance of burn bans across the CWA.

Summer 2007 – By the middle of April, drought conditions were being experienced across a large portion of Eastern and some of Central Mississippi. During the month of May, the drought worsened and expanded. In June, the drought peaked across the region. Although drought conditions continued throughout July and August, conditions were less severe than earlier in the summer. As a result of these conditions, area farmers and crop yields were affected.

October 2010 – Very dry conditions continued across central Mississippi during most of October. Crops were put under stress under the warm and dry conditions. The likely impact was less crop yields for harvest time.

Heat Wave

The National Centers for Environmental Information was used to determine historical heat wave occurrences in the county.

July 2005 – A five-day heat wave occurred across the region. Heat index values reached near 110 degrees each day. Each day had high temperatures ranging from 95 to 99 degrees. This was the warmest stretch of weather the area experienced since July 2001.

August 2005 –A heat wave covering the south began in mid-August and lasted about 10 days. High temperatures were consistently over 95 degrees and surpassed 100 degrees or more on some days. It was the first time since August 2000 that 100 degree temperatures reached the area.

July 2006 – A short heat wave impacted most of the area temperatures in the 90s to around 100 for five straight days.

August 2007 – A heat wave gripped most of the area with the warmest temperatures since 2000. It lasted from August 5th to the 16th.

August 2010 – The combination of high humidity and above normal temperatures produced heat index readings ranged between 105 and 109 degrees during the afternoon hours in the middle part of August.

PROBABILITY OF FUTURE OCCURRENCES

Drought

Based on historical occurrence information, it is assumed that Leake County has a probability level of likely (between 10 and 100 percent annual probability) for future drought events. However, the extent (or

magnitude) of drought and the amount of geographic area covered by drought, varies with each year.

Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

Heat Wave
Based on historical occurrence information, it is assumed that all of Leake County has a probability level of likely (between 10 and 100 percent annual probability) for future heat wave events.

E.2.6 Wildfire

LOCATION AND SPATIAL EXTENT

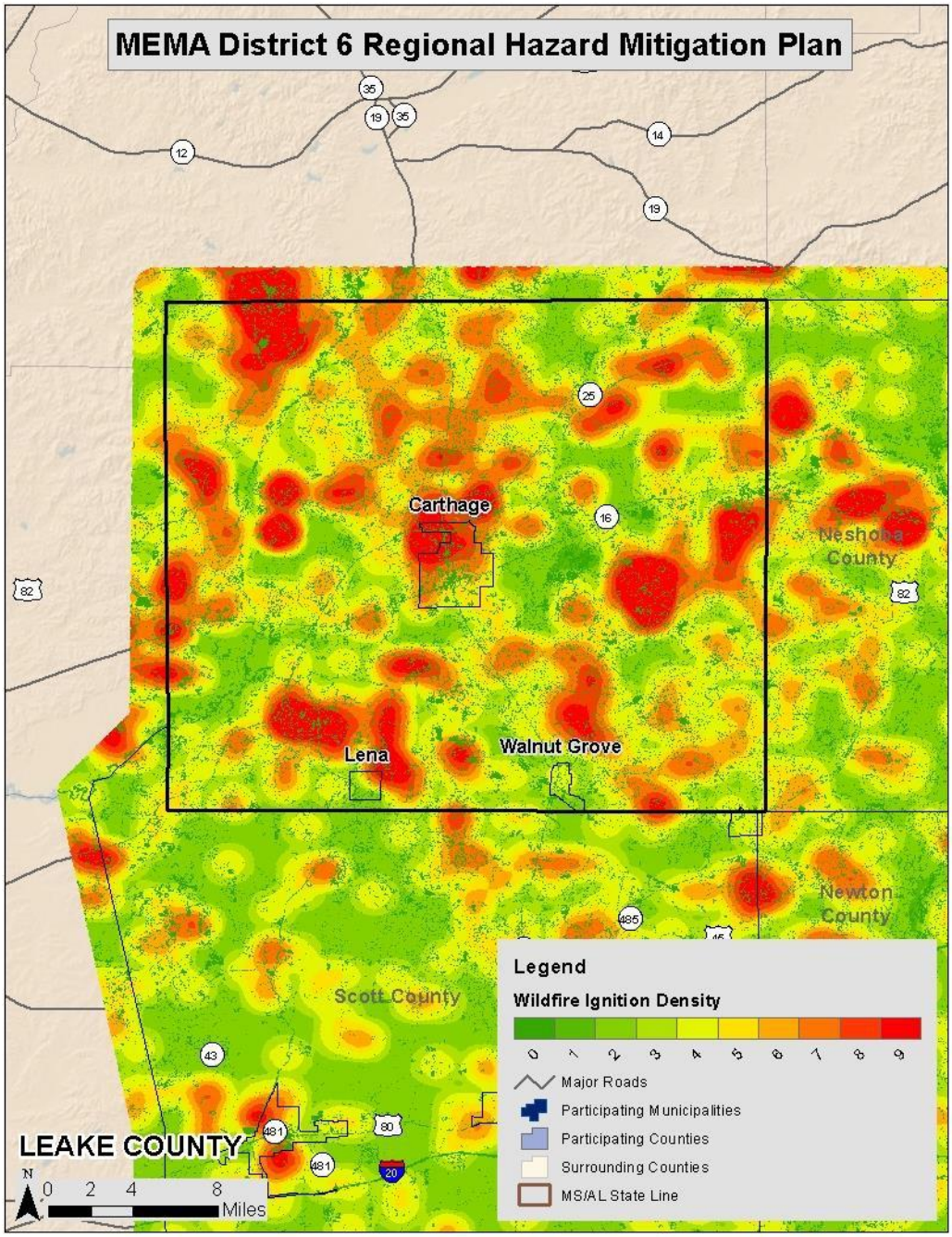
The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Wildfire Ignition Density data shown in the figure below give an indication of historic location.

HISTORICAL OCCURRENCES

Figure E.5 shows the Wildfire Ignition Density in Leake County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. This is measured in the number of fires per year per 1,000 acres.[2]

[2] Southern Wildfire Risk Assessment, 2014.

Figure E.5: WILDFIRE IGNITION DENSITY IN LEAKE COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the Mississippi Forestry Commission from 2015 to 2019, Leake County experiences an average of 41 wildfires annually which burn an average of 426.8 acres per year. The data indicates that most of these fires are small, averaging 10.4 acres per fire. **Table E.8** provides a summary of wildfire occurrences in Leake County and **Table E.9** lists the number of reported wildfire occurrences in the county between the years 2010 and 2019. Jurisdiction specific information is not available due to Mississippi Forestry Commission providing only county level data.

Table E.8: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2015-2019)

	Leake County
Average Number of Fires per year	41
Average Number of Acres Burned per year	426.8
Average Number of Acres Burned per fire	10.4

*These values reflect averages over a 5-year period.
Source: Mississippi Forestry Commission

Table E.9: HISTORICAL WILDFIRE OCCURRENCES IN LEAKE COUNTY

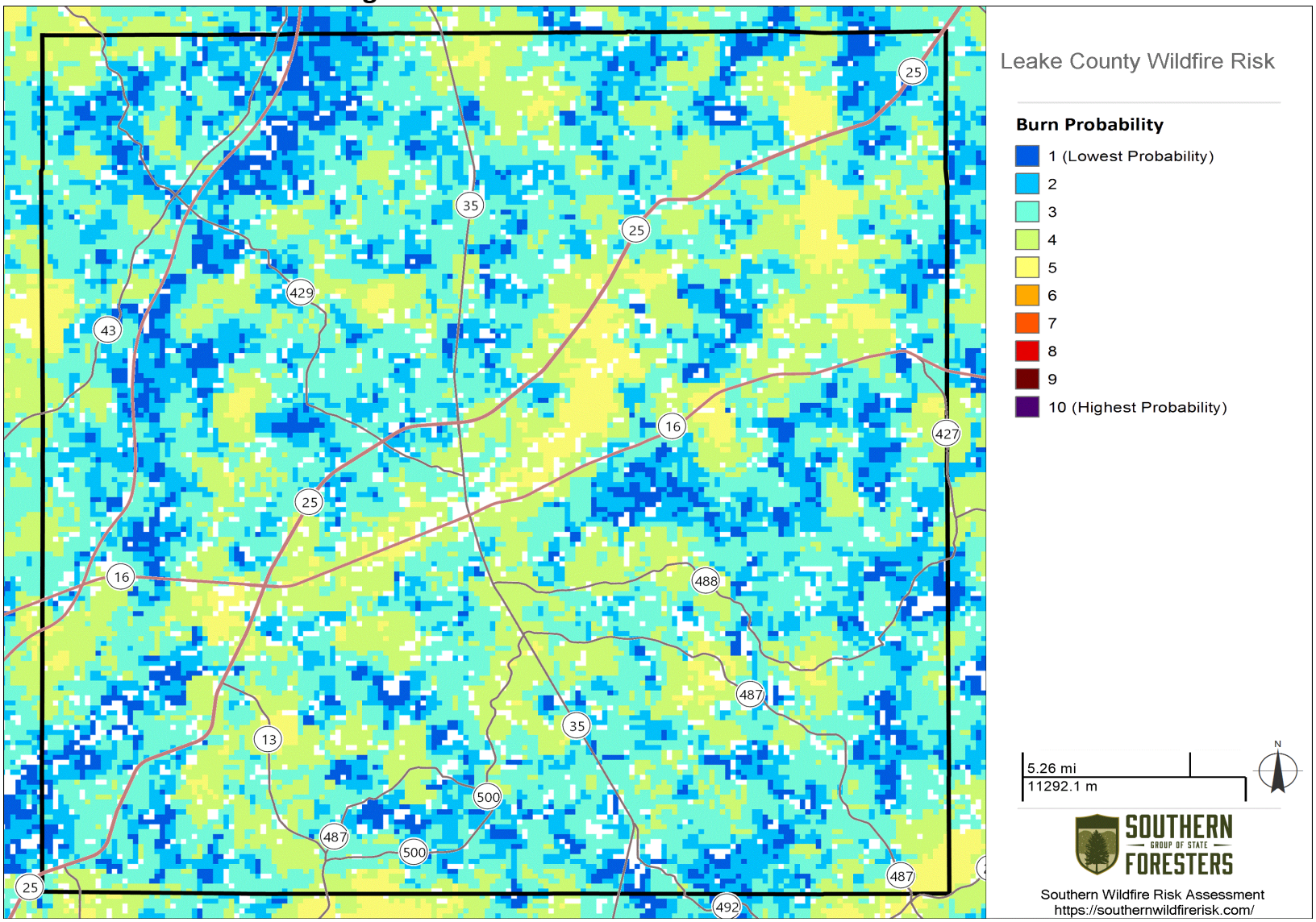
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Leake County										
Number of Fires	43	65	41	60	50	71	54	37	19	26
Number of Acres Burned	242	1,245	683	501	469	449	790	566	96	233

Source: Mississippi Forestry Commission

PROBABILITY OF FUTURE OCCURRENCES

Wildfire events will be an ongoing occurrence in Leake County. **Figure E.6** shows that there is some probability a wildfire will occur throughout the county. However, the likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due to local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Leake County for future wildfire events is highly likely (100 percent annual probability).

Figure E.6: BURN PROBABILITY IN LEAKE COUNTY



Source: Southern Wildfire Risk Assessment

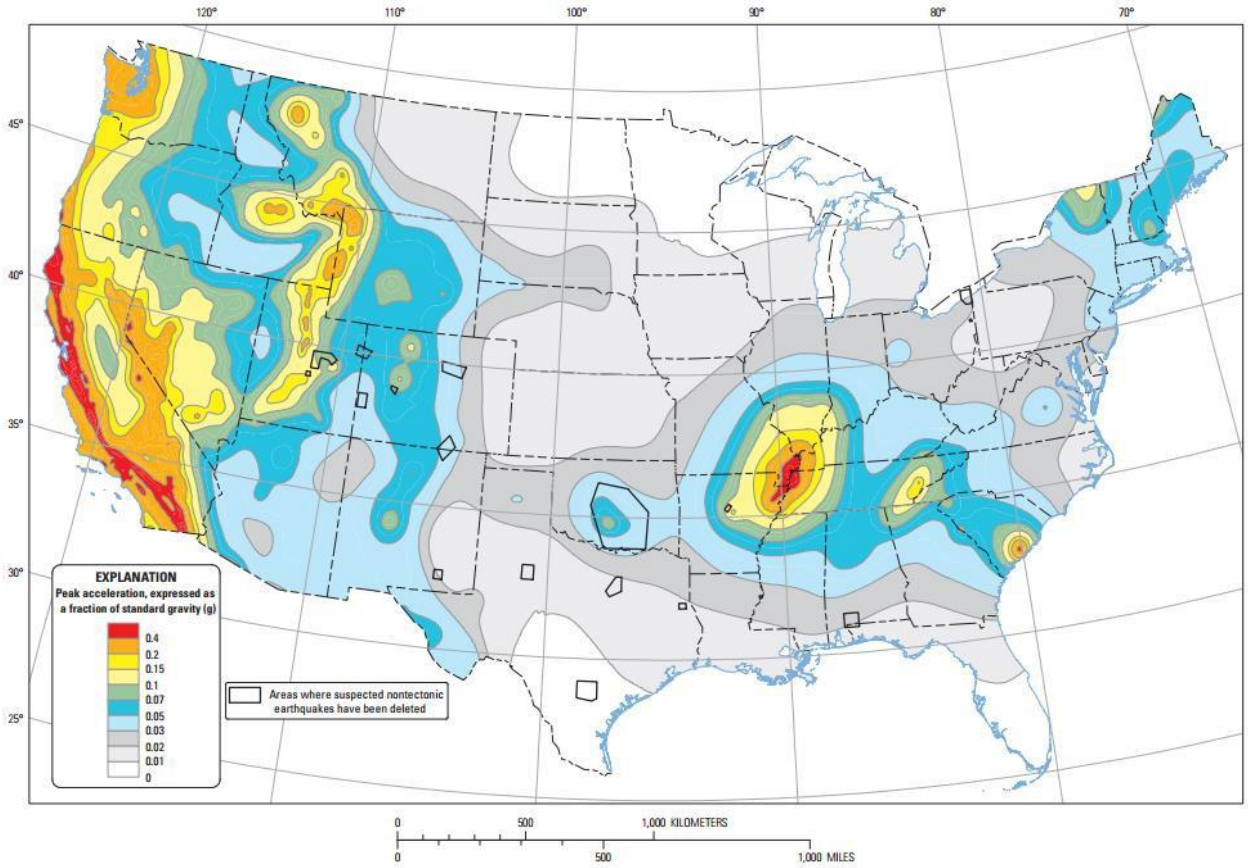
GEOLOGIC HAZARDS

E.2.7 Earthquake

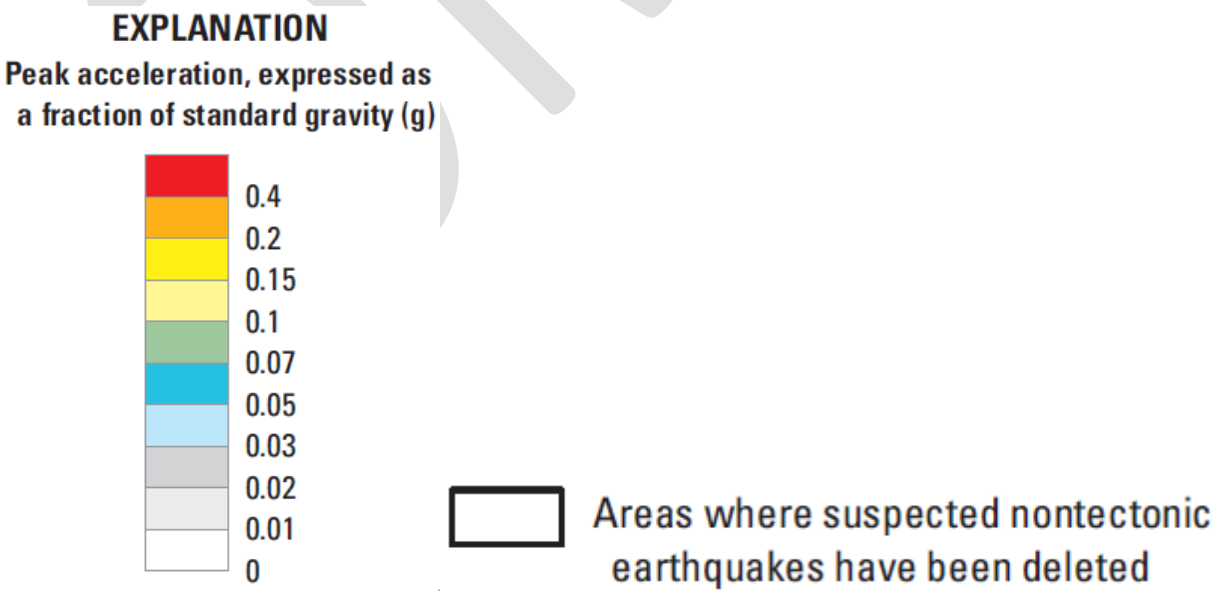
LOCATION AND SPATIAL EXTENT

Figure E.7 shows the intensity level associated with Leake County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Leake County lies within an approximate zone of level "3" to "5" ground acceleration. This indicates that the county exists within an area of moderate seismic risk.

Figure E.7: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Ten-percent probability of exceedance in 50 years map of peak ground acceleration



Source: United States Geological Survey, 2014

HISTORICAL OCCURRENCES

At least one earthquake is known to have affected Leake County since 1976. This measured a V on the Modified Mercalli Intensity (MMI) scale. **Table E.10** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table E.11** presents a detailed occurrence of each event including the date, distance for the epicenter, magnitude and Modified Mercalli Intensity (if known).[3]

No earthquakes have occurred in the planning area since the last plan update. This was also confirmed during planning meetings with participants.

Table E.10: SUMMARY OF SEISMIC ACTIVITY IN LEAKE COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Carthage	1	V	< 4.8
Lena	0	--	--
Walnut Grove	0	--	--
Unincorporated Area	0	--	--
LEAKE COUNTY TOTAL	**1**	**V (slightly strong)**	**< 4.8**

Source: National Geophysical Data Center

Table E.11: SIGNIFICANT SEISMIC EVENTS IN LEAKE COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Carthage				
Carthage	3/25/1976	461.0 km	4.9	V
Lena				
None Reported	--	--	--	--
Walnut Grove				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Source: National Geophysical Data Center

PROBABILITY OF FUTURE OCCURRENCES

The probability of significant, damaging earthquake events affecting Leake County is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated to be between 1 and 10 percent (possible).

[3] Due to reporting mechanisms, not all earthquake events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

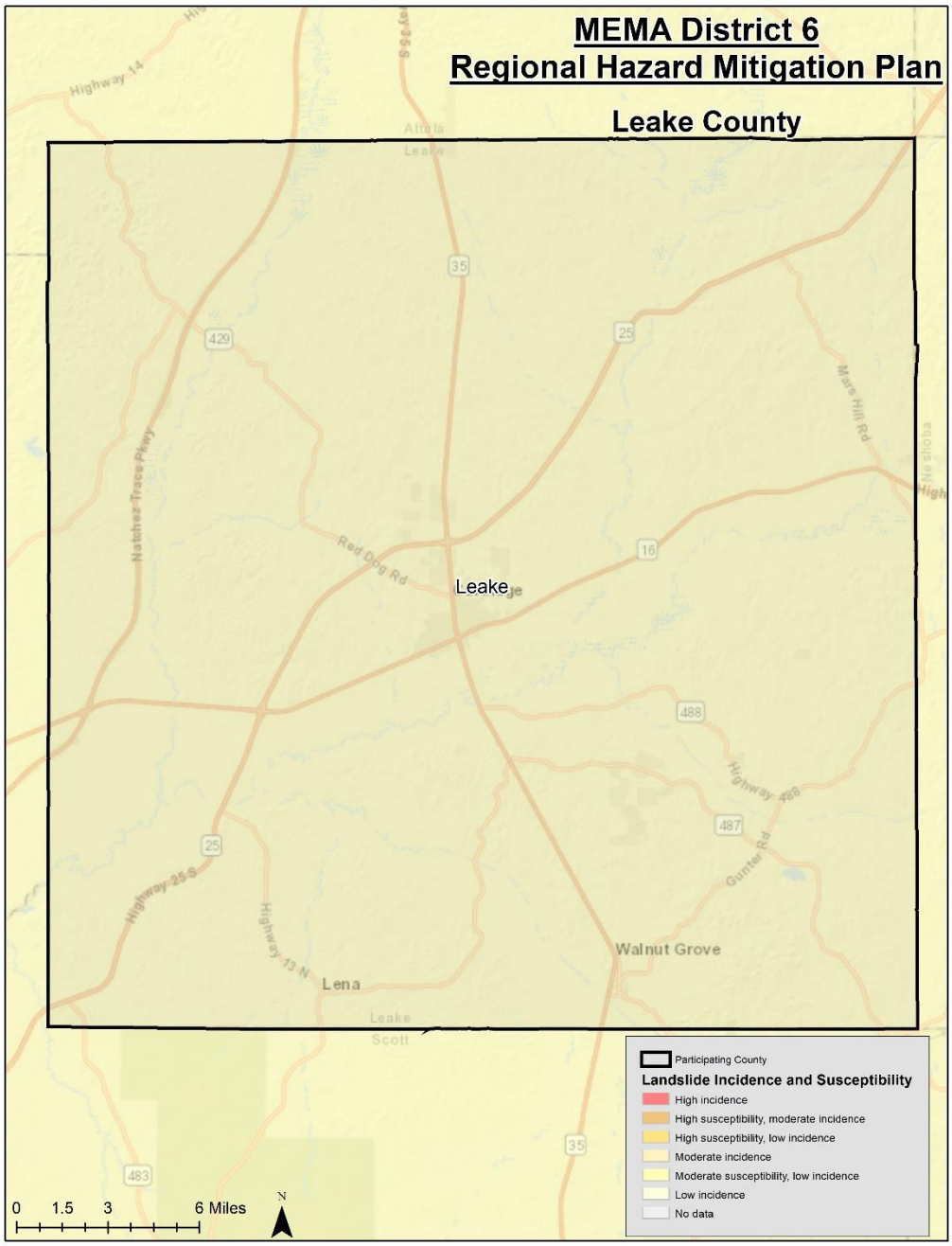
E.2.8 Landslide

LOCATION AND SPATIAL EXTENT

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes. Landslides are possible throughout Leake County, though the risk is relatively low.

According to **Figure E.8** below, the entire county falls under a low incidence area. This indicates that less than 1.5 percent of the area is involved in landsliding.

Figure E.8: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF LEAKE COUNTY



Source: United States Geological Survey

HISTORICAL OCCURRENCES

There is no extensive history of landslides in Leake County. Landslide events typically occur in isolated areas. Reviews of the USGS Landslide Inventory show no historical occurrences of landslides.

PROBABILITY OF FUTURE OCCURRENCES

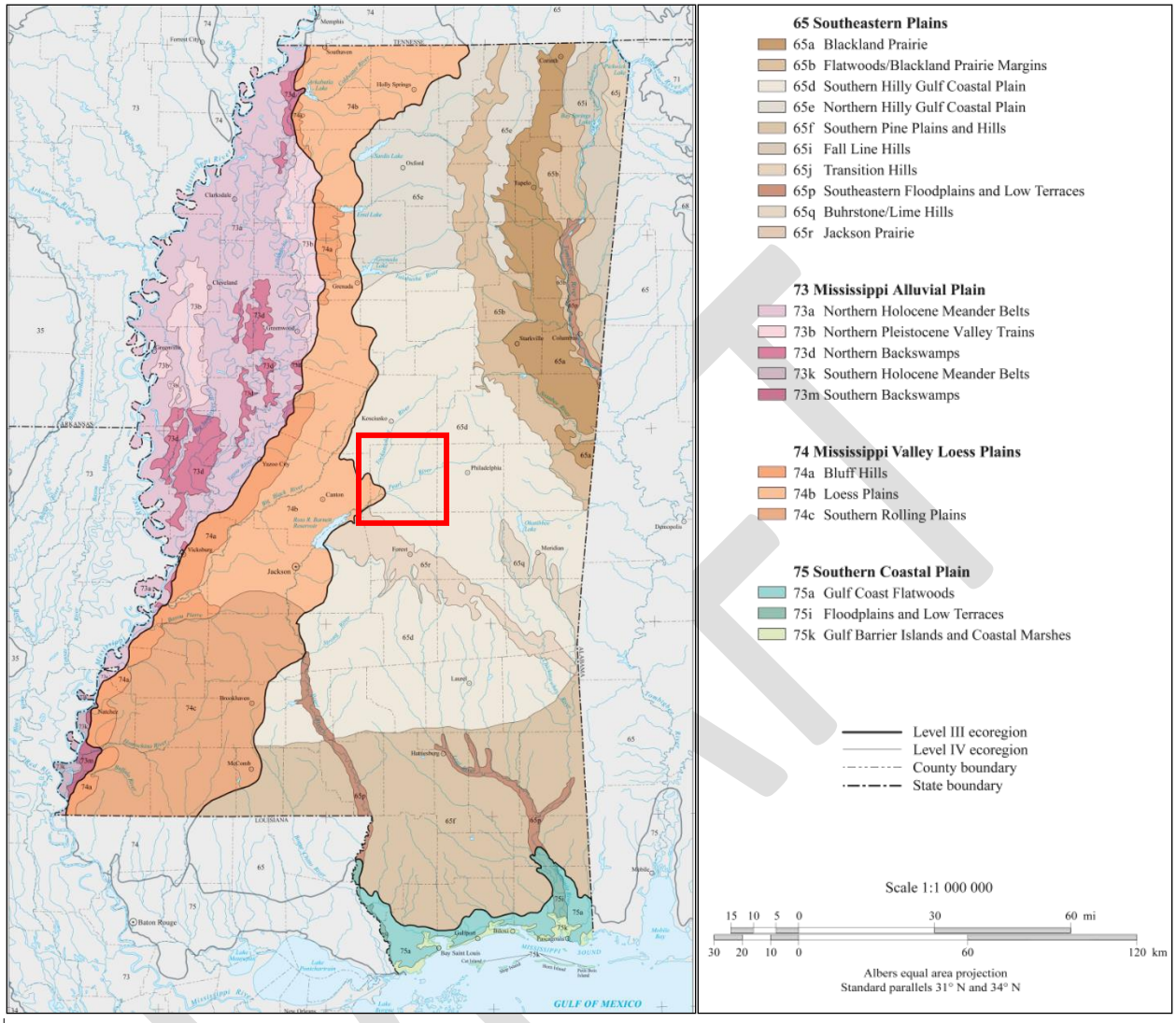
Based on historical information and the USGS susceptibility index, the probability of future landslide events is unlikely (less than 1 percent probability). The USGS data indicates that all areas in Leake County have a low incidence rate and low susceptibly to landsliding activity. However, local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Leake County have greater risk than others given factors such as steepness on slope and modification of slopes.

E.2.9 Land Subsidence

LOCATION AND SPATIAL EXTENT

Much of Leake County is located in an area where the soil is substantially clay, causing a shrink and swell effect depending on the current conditions. Indeed, much of the area underlain by the calcareous Yazoo clay which, when combined with sand and marl, is highly susceptible to expansion when wet and shrinking when dry. These areas are denoted below in **Figure E.9**.

Figure E.9: MAP OF MISSISSIPPI SOILS



Source: http://www.eoearth.org/view/article/152119/

HISTORICAL OCCURRENCES

There is no significant historical record of land subsidence in Leake County. However, local county officials have noted the impacts from these swings and changes in soil as roads and other infrastructure have experienced large cracks and breaks, causing stops in daily operations and significant costs to local, state, and federal budgets. Often the cost to repair this infrastructure can be in the range of millions of dollars depending on the degree of damage and necessity for quick repairs.

PROBABILITY OF FUTURE OCCURRENCES

The probability of future land subsidence events in the county is unlikely (less than 1 percent annual probability).

WIND-RELATED HAZARDS

E.2.10 Hurricane and Tropical Storm

LOCATION AND SPATIAL EXTENT

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

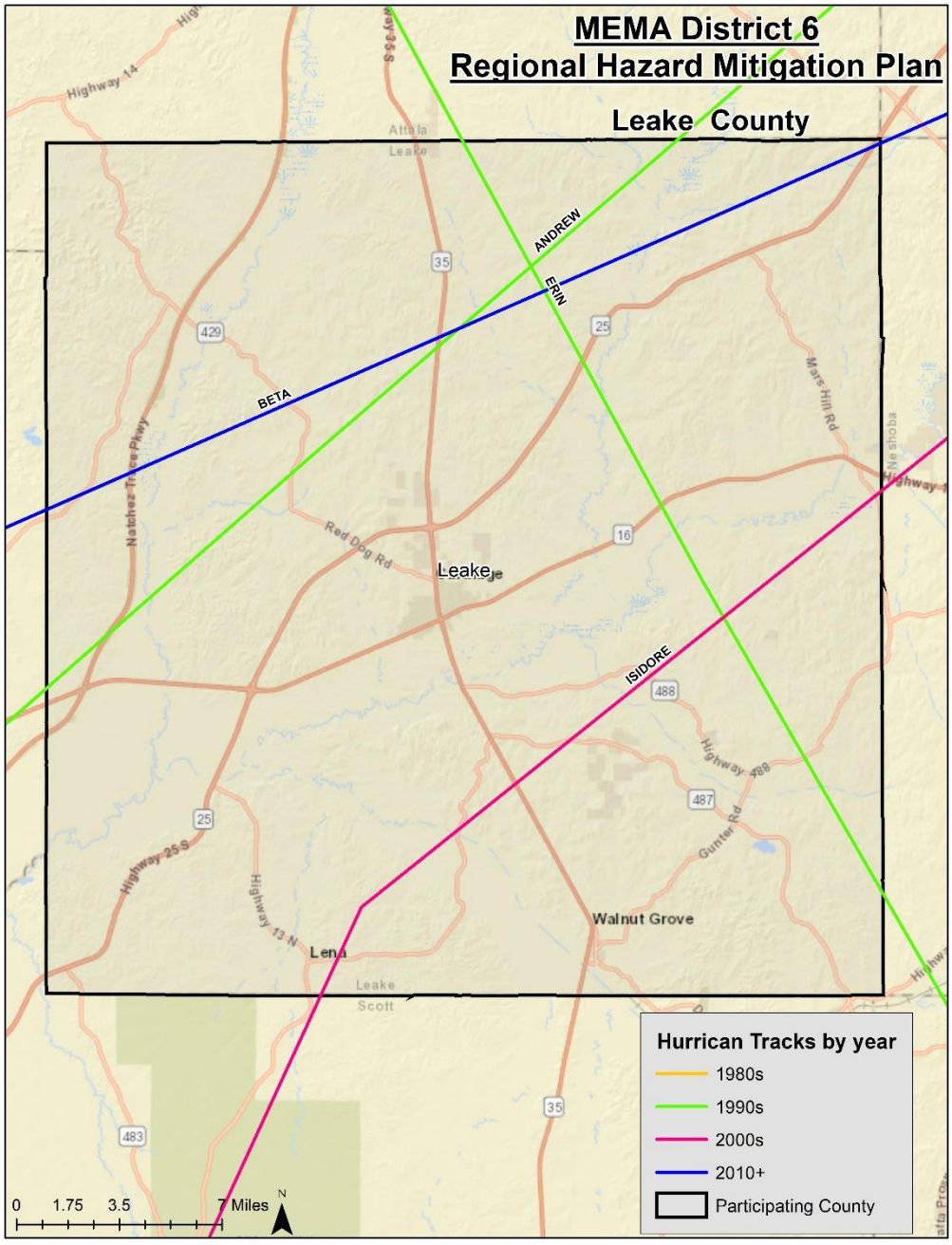
HISTORICAL OCCURRENCES

According to the National Hurricane Center's historical storm track records, 58 hurricane or tropical storm/depression tracks have passed within 75 miles of the MEMA District 6 Region since 1855. This includes: 1 Category 3 hurricane, 2 Category 2 hurricanes, 5 Category 1 hurricanes, 34 tropical storms, and 16 tropical depressions.

Of the recorded storm events, 35 hurricane or tropical storm/depression events traversed directly through the region as shown in **Figure E.10**. Notable storms include Hurricane Frederic (1979) and Hurricane Katrina (2005). **Table E.12** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the MEMA District 6 Region) and category of the storm based on the Saffir-Simpson Scale.[4]

[4] These storm track statistics include tropical depressions, tropical storms, and hurricanes. Lesser events may still cause significant local impact in terms of rainfall and high winds.

Figure E.10: HISTORICAL HURRICANE STORM TRACKS 1980 - 2020



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

Table E.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE MEMA 6 DISTRICT REGION (1850–2020)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/16/1855	UNNAMED	70	Category 1
9/15/1860	UNNAMED	70	Category 1
7/12/1872	UNNAMED	40	Tropical Storm
9/2/1879	UNNAMED	60	Tropical Storm
10/7/1879	UNNAMED	40	Tropical Storm
10/16/1879	UNNAMED	40	Tropical Storm
9/1/1880	UNNAMED	50	Tropical Storm
8/3/1881	UNNAMED	40	Tropical Storm
6/14/1887	UNNAMED	30	Tropical Depression
8/28/1890	UNNAMED	35	Tropical Storm
9/12/1892	UNNAMED	40	Tropical Storm
9/8/1893	UNNAMED	55	Tropical Storm
8/17/1895	UNNAMED	35	Tropical Storm
8/3/1898	UNNAMED	35	Tropical Storm
8/16/1901	UNNAMED	45	Tropical Storm
10/10/1905	UNNAMED	35	Tropical Storm
9/27/1906	UNNAMED	95	Category 2
9/22/1907	UNNAMED	35	Tropical Storm
6/13/1912	UNNAMED	50	Tropical Storm
7/17/1912	UNNAMED	25	Tropical Depression
9/14/1912	UNNAMED	50	Tropical Storm
9/30/1915	UNNAMED	60	Tropical Storm
7/6/1916	UNNAMED	80	Category 1
7/5/1919	UNNAMED	30	Tropical Depression
10/18/1923	UNNAMED	50	Tropical Storm
7/30/1926	UNNAMED	25	Tropical Depression
9/1/1932	UNNAMED	60	Tropical Storm
10/16/1932	UNNAMED	45	Tropical Storm
8/1/1936	UNNAMED	40	Tropical Storm
9/1/1937	UNNAMED	30	Tropical Depression
6/16/1939	UNNAMED	35	Tropical Storm
8/14/1939	UNNAMED	35	Tropical Storm
9/26/1939	UNNAMED	40	Tropical Storm
9/25/1940	UNNAMED	20	Tropical Depression
9/4/1948	UNNAMED	50	Tropical Storm
9/5/1949	UNNAMED	40	Tropical Storm
8/31/1950	BAKER	65	Category 1
6/1/1959	ARLENE	25	Tropical Depression
9/16/1960	ETHEL	35	Tropical Storm
9/26/1960	FLORENCE	15	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/18/1969	CAMILLE	100	Category 3
9/16/1971	EDITH	60	Tropical Storm
7/19/1977	UNNAMED	25	Tropical Depression
9/6/1977	BABE	30	Tropical Depression
7/11/1979	BOB	40	Tropical Storm
9/13/1979	FREDERIC	95	Category 2
8/12/1987	UNNAMED	25	Tropical Depression
8/27/1992	ANDREW	30	Tropical Depression
8/4/1995	ERIN	45	Tropical Storm
8/6/2001	BARRY	20	Tropical Depression
9/26/2002	ISIDORE	55	Tropical Storm
7/1/2003	BILL	45	Tropical Storm
7/11/2005	DENNIS	45	Tropical Storm
8/29/2005	KATRINA	80	Category 1
9/14/2007	HUMBERTO	20	Tropical Depression
8/24/2008	FAY	30	Tropical Depression
8/17/2009	CLAUDETTE	25	Tropical Depression
10/28/2020	Zeta	33	Tropical Depression

*It should be noted that the track of several major hurricanes that impacted the region fell outside of the 75-mile buffer. These storms were included in the table due to their significant impact. (Georges, 1988; Ivan, 2004; Issac, 2012)
Source: National Hurricane Center

Federal records indicate that disaster declarations were made in 2005 (Hurricane Dennis and Hurricane Katrina) and 2012 (Hurricane Issac). Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding and high winds from hurricanes and tropical storms can cause damage throughout the county. Anecdotes are available from NCEI for the major storms that have impacted the county as found below:

Tropical Storm Isidore – September 26, 2002
The heavy rainfall associated with Tropical Storm Isidore resulted in significant river and flash flooding across much of Mississippi. Twenty-four-hour rainfall totals between 5 and 10 inches were common over much of Mississippi, especially in the southern part of the state, where 24-hour amounts exceeded 9 inches near Hattiesburg. Gradient wind gusts between 35 and 45 miles per hour combined with the saturated ground to lead to numerous downed trees and powerlines over the state. Most of the damage was seen along and east of the Natchez Trace, near the path of the storm's diffuse center. One indirect fatality was reported just east of the Kalem community in Scott County. Here, a falling tree struck a truck driven by a 31-year-old male. Damage from Isidore was an estimated $500,000.

Hurricane Katrina – August 29, 2005
Hurricane Katrina will likely go down as the worst and costliest natural disaster in United States history. The amount of destruction, the cost of damaged property/agriculture and the large loss of life across the affected region has been overwhelming. Catastrophic damage was widespread across a large portion of

the Gulf Coast region. The devastation was not only confined to the coastal region, widespread and significant damage occurred well inland up to the Hattiesburg area and northward past Interstate 20.

Hurricane force winds were common across Central Mississippi. The region received sustained winds of 60-80 mph with gusts ranging from 80-120 mph. Wind damage to structures was widespread, with roofs blown off or partially peeled. Hundreds of signs were shredded or blown down. Many businesses sustained structural damage as windows were broken, roofs were blown off, and walls were collapsed. Millions of trees were uprooted and snapped. Power poles and lines were snapped and taken down from wind and trees. It was thousands of downed trees which caused the most significant structural damage as these trees fell onto homes and businesses. Power outages lasted from a few days to as long as four weeks. Agriculture and timber industries were severely impacted. Row crops, including cotton, rice, corn, and soybeans, took a hard hit. Other impacted industries were the catfish industry, dairy and cattle industry, and nursery businesses.

PROBABILITY OF FUTURE OCCURRENCES

Given the inland location of the county, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but still remains a real threat to Leake County due to induced events like flooding. Based on historical evidence, the probability level of future occurrence is likely (annual probability between 10 and 100 percent). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. However, when the county is impacted, the damage could be catastrophic, threatening lives and property throughout the planning area.

E.2.11 Thunderstorm (wind, hail, lightning)

LOCATION AND SPATIAL EXTENT

Thunderstorm / High Wind

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that Leake County has uniform exposure to an event and the spatial extent of an impact could be large.

The following Beaufort scale is an empirical measure for the intensity of the wind associated with windstorms.

Table E13A: Beaufort Wind Scale

Beaufort Scale					
NUMBER	**WIND SPEED (MPH)**	**DESCRIPTION**	**WAVE HEIGHT (FT)**	**SEA CONDITIONS**	**LAND CONDITIONS**
0	<1	Calm	0	Flat.	Calm. Smoke rises vertically.

Beaufort Scale					
NUMBER	**WIND SPEED (MPH)**	**DESCRIPTION**	**WAVE HEIGHT (FT)**	**SEA CONDITIONS**	**LAND CONDITIONS**
1	1-3	Light air	0.33	Ripples without crests.	Wind motion visible in smoke.
2	3-7	Light breeze	0.66	Small wavelets.	Wind felt on exposed skin. Leaves rustle.
3	8-12	Gentle breeze	2	Large wavelets.	Leaves and smaller twigs in constant motion.
4	13-17	Moderate breeze	3.3	Small waves.	Dust and loose paper rise. Small branches begin to move.
5	18-24	Fresh breeze	6.6	Moderate (1.2 m) longer waves. Some foam and spray.	Small trees sway.
6	25-30	Strong breeze	9.9	Large waves with foam crests and some spray.	Large branches in motion. Whistling heard in overhead wires. Umbrella use difficult.
7	31-38	High wind, Moderate Gale, Near Gale	13.1	Sea heaps up and foam begins to streak.	Whole trees in motion. Effort needed to walk against the wind.
8	39-46	Fresh Gale	18	Moderately high waves with breaking crests forming spindrift. Streaks of foam.	Twigs broken from trees. Cars veer on road.
9	47-54	Strong Gale	23	High waves (6-7 m) with dense foam. Wave crests start to roll over. Considerable spray.	Larger branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over. Damage to circus tents and canopies.
10	55-63	Whole Gale/Storm	29.5	Very high waves. The sea surface is white and there is considerable tumbling.	Trees uprooted. Considerable structural damage.

Beaufort Scale					
NUMBER	**WIND SPEED (MPH)**	**DESCRIPTION**	**WAVE HEIGHT (FT)**	**SEA CONDITIONS**	**LAND CONDITIONS**
11	64-72	Violent storm	37.7	Exceptionally high waves.	Widespread vegetation and structural damage.
12	≥73	Hurricane-force	≥46	Huge waves. Sea is completely white with foam and spray. Air is filled with driving spray, reduced visibility.	Massive and widespread damage to structures.

Source: www.spc.noaa.gov

Although wind damage associated with thunderstorms is normally minor, the extent to which MEMA District 6 could be affected by high winds is not insignificant. As an example of the intensity of winds that MEMA District 6 may experience, a thunderstorm on record in Lauderdale County indicated damage associated with 68 kts, which equates to 78 mile per hour straight line winds and a Number 12 on the Beaufort Scale. In this scenario, building damage would be significant, power lines downed, trees uprooted, and loss of life possible. This same category of thunderstorm wind could also happen elsewhere in the planning area. Historically, windstorms in the region fall within the 50-60kts, which equates to 57-69 miles per hour and a Number 10-11 on the Beaufort Scale.

Hailstorm

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

Lightning

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

HISTORICAL OCCURRENCES

Thunderstorm / High Wind

Severe storms were at least partially responsible for nine disaster declarations in Leake County in 1979, 1983, 1992, twice in 2001, 2003, 2014, 2019 and 2020. According to NCEI, there have been 273 reported thunderstorm and high wind events since 1966 in Leake County. These events caused almost $8.28 million in damages. There were also reports of one fatality and six injuries. **Table E.13B** summarizes this information.

Table E.13B: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN LEAKE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Carthage	40	0/1	$1,281,000
Lena	15	0/0	$3,137,000
Walnut Grove	20	0/0	$198,000
Unincorporated Area	198	1/5	$3,672,000
LEAKE COUNTY TOTAL	**273**	**1/6**	**$8,288,000**

Source: National Centers for Environmental Information

Hailstorm

According to the National Centers for Environmental Information, 94 recorded hailstorm events have affected Leake County since 1976. **Table E.14** is a summary of the hail events in Leake County. **Table E.20** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in approximately $533,500 in property damages. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Centers for Environmental Information. Therefore, it is likely that damages are greater than the reported value.

Table E.14: SUMMARY OF HAIL OCCURRENCES IN LEAKE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Carthage	12	0/0	$46,000
Lena	7	0/0	$52,000
Walnut Grove	6	0/0	$158,000
Unincorporated Area	55	0/0	$277,500
LEAKE COUNTY TOTAL	**94**	**0/0**	**$533,500**

Source: National Centers for Environmental Information

Lightning

According to the National Centers for Environmental Information, there have been three recorded lightning events in Leake County since 2008. These events resulted in more than $125,000 in damages, as listed in summary **Table E.15**. Detailed information on historical lightning events can be found in **Table E.16**.

It is certain that more than three events have impacted the county. Many of the reported events are those that cause damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

Table E.15: SUMMARY OF LIGHTNING OCCURRENCES IN LEAKE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Carthage	1	0/0	$8,899
Lena	0	0/0	$0
Walnut Grove	0	0/0	$0
Unincorporated Area	2	0/0	$116,143
LEAKE COUNTY TOTAL	**3**	**0/0**	**$125,042**

Source: National Centers for Environmental Information

Table E.16: HISTORICAL LIGHTNING OCCURRENCES IN LEAKE COUNTY

Location	Date	Deaths / Injuries	Property Damage*	Details
Carthage				
CARTHAGE	7/30/2009	0/0	$8,899	The 911 Dispatch Center Building in Carthage was struck by lightning.
Lena				
None Reported	--	--	--	--
Walnut Grove				
None Reported	--	--	--	--
Unincorporated Area				
THOMASTOWN	5/24/2008	0/0	$110,838	Lighting struck a church on Beamon Road and caused a fire.
EDINBURG	3/29/2011	0/0	$5,305	Lightning struck a tree next to the Edinburg Attendance Center. Debris from the tree damaged the building breaking a few windows.

Source: National Centers for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

Thunderstorm / High Wind
Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire county.

Hailstorm
Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that Leake County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

Lightning
Although there was not a high number of historical lightning events reported in Leake County via NCEI data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), Leake County is located in an area of the country that experienced an average of 4 to 6 cloud-to-ground lightning flashes per square kilometer per year between 2015 and 2019.[5] Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

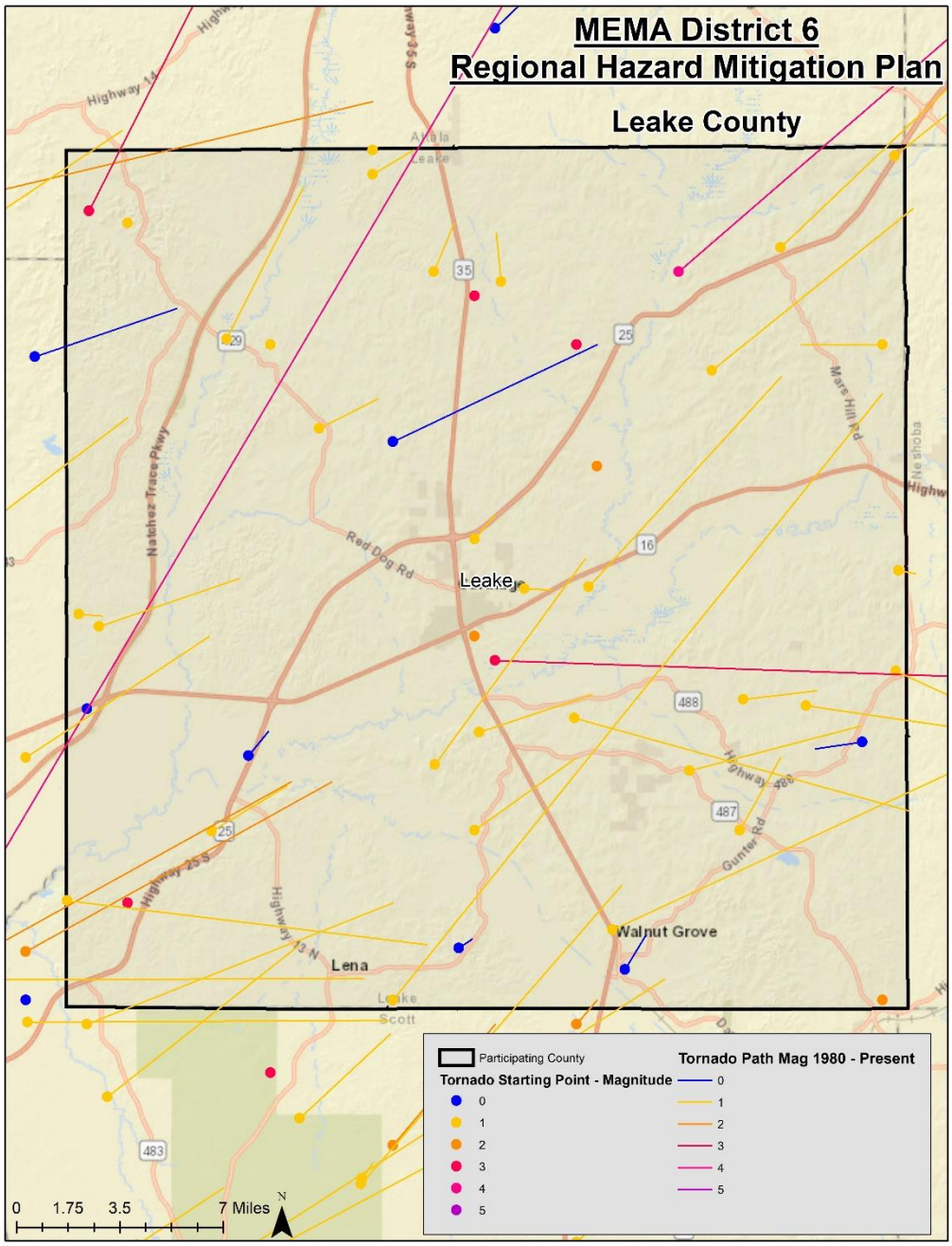
E.2.12 Tornado

LOCATION AND SPATIAL EXTENT

Tornadoes occur throughout the state of Mississippi, and thus in Leake County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Leake County is uniformly exposed to this hazard. With that in mind, **Figure E.10** shows tornado track data for many of the major tornado events that have impacted the county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

[5] Vaisala's Annual Lightning Report – 2020. Retrieved on 9.8.2021 from: https://www.vaisala.com/sites/default/files/documents/WEA-MET-Annual-Lightning-Report-2020-B212260EN-A.pdf

Figure E.11: HISTORICAL TORNADO TRACKS IN LEAKE COUNTY



Source: National Weather Service Storm Prediction Center

HISTORICAL OCCURRENCES

Tornadoes were at least partially responsible for seven disaster declarations in Leake County in 1979, 1983, 1992, 2001, 2003, 2014, and 2020. According to the National Centers for Environmental Information, there have been a total of 67 recorded tornado events in Leake County since 1958 (**Table E.17**), resulting in almost $293.2 million in property damages. In addition, 4 fatalities and 66 injuries were reported. The magnitude

of these tornadoes ranges from F0 to F5 and EF0 to EF2 in intensity, although an EF5 event is possible.

Table E.17: SUMMARY OF TORNADO OCCURRENCES IN LEAKE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Carthage	2	0/0	$220,000
Lena	2	0/0	$15,000
Walnut Grove	5	0/0	$2,361,000
Unincorporated Area	58	4/66	$63,389,500
LEAKE COUNTY TOTAL	**67**	**4/66**	**$65,985,500**

Source: National Centers for Environmental Information

PROBABILITY OF FUTURE OCCURRENCES

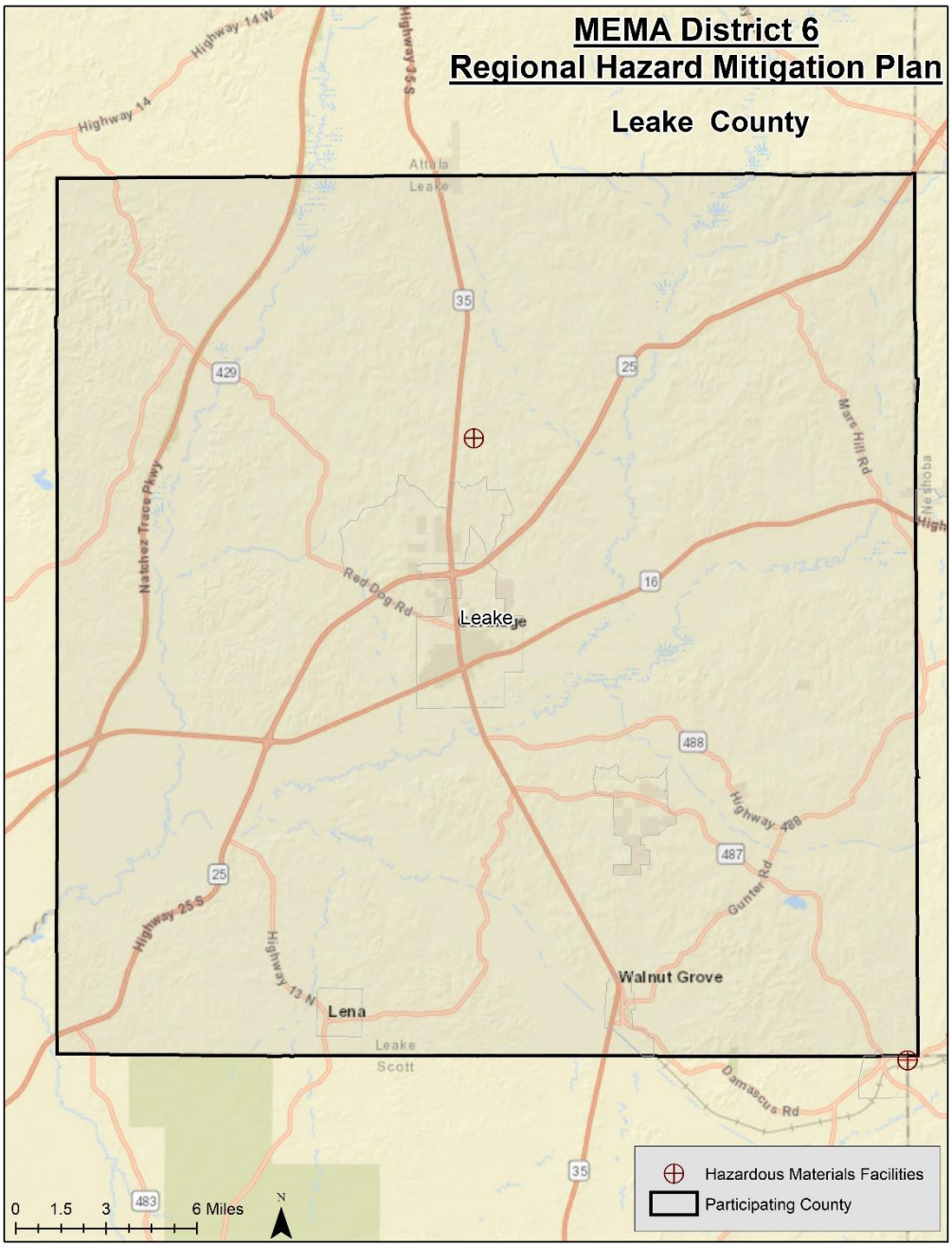
According to historical information, tornado events pose a significant threat to Leake County. The probability of future tornado occurrences affecting Leake County is likely (between 10 and 100 percent annual probability).

E.2.13 Hazardous Materials Incidents

LOCATION AND SPATIAL EXTENT

Leake County has one TRI site. This site is shown in **Figure E.12.**

Figure E.12: TOXIC RELEASE INVENTORY (TRI) SITES IN LEAKE COUNTY



Source: Environmental Protection Agency

In additional to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

HISTORICAL OCCURRENCES

There has been a total of four recorded HAZMAT incidents in Leake County since 1972 (**Table E.18**). These events did not result in any property damage; however, one injury was reported. **Table E.19** presents detailed information on historic HAZMAT incidents in Leake County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

Table E.18: SUMMARY OF HAZMAT INCIDENTS IN LEAKE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Carthage	1	0/1	$0
Lena	1	0/0	$0
Walnut Grove	2	0/0	$0
Unincorporated Area	0	0/0	$0
LEAKE COUNTY TOTAL	**4**	**0/1**	**$0**

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Table E.19: HAZMAT INCIDENTS IN LEAKE COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities/ Injuries	Damages ($)*	Quantity Released
Carthage							
I-1973010062	12/27/1972	CARTHAGE	Highway	No	0/1	$0	0
Lena							
I-1972090006	4/20/1972	LENA	Highway	No	0/0	$0	0
Walnut Grove							
I-1973010405	1/17/1973	WALNUT GROVE	Highway	No	0/0	$0	0
E-2014050322	11/13/2013	WALNUT GROVE	Highway	No	0/0	$0	0.13368 GCF
Unincorporated Area							
None Reported	--	--	--	--	--	--	--

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

PROBABILITY OF FUTURE OCCURRENCES

Given the location of one toxic release inventory site in Leake County and prior roadway incidents, it is likely (between 10 and 100 percent annual probability) that a hazardous material incident may occur in the county. County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

[23] Adjusted dollar values were calculated based on the average Consumer Price Index for a given calendar year. This index value has been calculated every year since 1913. For 2015, the June 2015 monthly index was used.

E.2.14 Pandemic

LOCATION AND SPATIAL EXTENT

Pandemics are global in nature. However, they may start anywhere. Leake County chose to analyze this hazard given the agriculture in the area and potential for this kind of event to occur in any location at any time.

All populations should be considered at risk to pandemic. Buildings and infrastructure are not directly impacted by the virus/pathogen but could be indirectly impacted if people are not able to operate and maintain them due to illness. Many buildings may be shutdown, at least temporarily, as a result. Employers may initiate work from home procedures for non-essential workers in order to help stop infection. Commerce activities, and thus the economy, may suffer greatly during this time.

HISTORICAL OCCURRENCES

Several pandemics have been reported throughout history. A short history of the flu/Spanish Flu was collected from The Historical Text Archive and is described below.

The first known pandemic dates back to 430 B.C. with the Plague of Athens. It reportedly killed a quarter of the population over four years due to typhoid fever. In 165-180 A.D., the Antonine Plague killed nearly 5 million people. Next, the Plague of Justinian (the first bubonic plague pandemic) occurred from 541 to 566. It killed 10,000 people a day at its peak and resulted in a 50 percent drop in Europe's population. Since the 1500s, influenza pandemics have occurred about three times every century or roughly every 10 to 50 years. The Black Death devastated European populations in the 14th century. Nearly a third of the population (20-30 million) was killed over six years. From 1817 to present, seven Cholera Pandemics have impacted to the world and killed millions. Perhaps most severe, was the Third Cholera Pandemic (1852-1959) which started in China. Isolated cases can still be found in the Western U.S. today. There were three major pandemics in the 20th century (1918-1919, 1957-1958, and 1968-1969). The most infamous pandemic flu of the 20th century, however, was that of 1918-1919. Since the 1960s, there has only been one pandemic, the 2009 H1N1 influenza. The pandemics of the 20th and 21st centuries that impacted the United States are detailed below.

1918 Spanish Flu: This was the most devastating flu of the 20th century. This pandemic spread across the world in three waves between 1918 and 1919. It typically impacted areas for around twelve weeks and then would largely disappear. However, it would frequently reemerge several months later. Worldwide, approximately 50 million persons died and over a quarter of the population was infected. Nearly 675,000 people died in the United States. The illness came on suddenly and could cause death within a few hours. The virus impacted those aged 15 to 35 especially hard. The movement of troops during World War I is thought to have facilitated the spread of the virus.

In Mississippi, state officials noted that "epidemics have been reported from a number of places in the State," on October 4th, 1918. By the 18th, twenty-six localities reported 1,934 cases (the real number of cases was likely much higher). West Point, Mississippi was hit especially hard and quarantine was established. Throughout the state, African Americans were impacted at a greater rate than white populations. This is thought to be partly caused from a shortage of caretakers. It is estimated that over 6,000 people died in Mississippi, though that number may be much higher as death records were not widely recorded.

1957 Asian Flu: It is estimated that the Asian Flu caused 2 million deaths worldwide. Approximately 70,000

deaths were in the U.S. However, the proportion of people impacted was substantially higher than that of the Spanish Flu. This flu was characterized as having much milder effects than the Spanish Flu and greater survivability. Similar to other pandemics, this pandemic has two waves. Elderly and infant populations were more likely to succumb to death. This flu is thought to have originated from a genetic mutation of a bird virus.

1968 Hong Kong Flu: The Hong Kong Flu is thought to have caused one million deaths worldwide. It was milder than both the Asian and Spanish influenza viruses. It was similar to the Asian Flu, which may have provided some immunity to the virus. It had the most severe impact on elderly populations.

2009 H1N1 Influenza: This flu was derived from human, swine, and avian virus strains. It was initially reported in Mexico in April 2009. On April 26, the U.S. government declared H1N1 a public health emergency. A vaccine was developed and over 80 million were vaccinated which helped minimize the impacts. The virus had mild impacts on most of the population but did cause death (usually from viral pneumonia) in high-risk populations such as pregnant women, obese persons, indigenous people, and those with chronic respiratory, cardiac, neurological, or immunity conditions. Worldwide, it is estimated that 43 million to 89 million people contracted H1N1 between April 2009 and April 2010, and between 8,870 and 18,300 H1N1 cases resulted in death.

2020 SARS-CoV-2 (COVID-19): Coronavirus Disease 2019 (COVID-19) was declared as pandemic by the World Health Organization on March 11th, 2020 mainly due to the speed and scale of the transmission of the disease. Prior to that, it started as an epidemic in mainland China with the focus being firstly reported in the city of Wuhan, Hubei province on February 26th, 2020. The etiologic agent of COVID-19 was isolated and identified as a novel coronavirus, initially designated as 2019-nCoV. Later, the virus genome was sequenced and because it was genetically related to the coronavirus outbreak responsible for the SARS outbreak of 2003, the virus was named as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) by the International Committee for Taxonomy of Viruses.

There is a considerable amount of data on the extent of COVID-19 throughout the State of Mississippi and Leake County. The number of reported cases and deaths across the State of Mississippi and Neshoba County are shown in the figure below.

Figure E.13: COVID-19 Cases as of 08/01/2021[6]

	Cases	Deaths
Mississippi	348,496	7,556
Leake County	2,878	75

In addition to the pandemics above, there have been several cases of pandemic threats, some of which reached epidemic levels. They were contained before spreading globally. Examples include Smallpox, Polio, Tuberculosis, Malaria, AIDS, SARS and Yellow Fever. Advances in medicine and technology have been instrumental in containing the spread of viruses in recent history.

In addition to the pandemics above, there have been several cases of pandemic threats, some of which reached epidemic levels. They were contained before spreading globally. Examples include Smallpox, Polio, Tuberculosis, Malaria, AIDS, SARS and Yellow Fever. Advances in medicine and technology have been instrumental in containing the spread of viruses in recent history.

[6] Mississippi State Department of Health. *COVID-19 Dashboard*. Retrieved from: https://msdh.ms.gov/msdhsite/_static/14,0,420.html

It is notable that no birds have been infected with Avian Flu in North and South America.

PROBABILITY OF FUTURE OCCURRENCES

Based on historical occurrence information, it is assumed that all of Leake County has a probability level of unlikely (less than 1 percent annual probability) for future pandemics events. While pandemic can have devastating impacts, they are relatively rare.

The Mississippi State Department of Health maintains a state pandemic plan which can be found here: http://www.msdh.state.ms.us/msdhsite/index.cfm/44,1136,122,154,pdf/SNSPlan.pdf

E.2.15 Conclusions on Hazard Risk

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

HAZARD EXTENT

Table E.20 describes the extent of each natural hazard identified for Leake County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

Table E.20: EXTENT OF LEAKE COUNTY HAZARDS

Flood-related Hazards	
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood 21.6 percent of the total land area in Leake County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was at the Pearl River near Lena on April 17, 1979. Water reached a discharge of 122,000 cubic feet per second and the stream gage height was recorded at 32.20 feet.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Leake County.
Dam Failure	Dam Failure extent is defined using the Mississippi Department of Environmental Quality criteria (Table 5.7). No dams are classified as high-hazard in Leake County.
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). Official long term snow records are not kept for any areas in Leake County. However, the greatest snowfall reported in Meridian (southeast of the county) was 14.0 inches in 1963.
Fire-related Hazards	
Drought / Heat Wave	Drought extent is defined by the U.S. Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought. According to the U.S. Drought Monitor Classifications, the most severe drought condition is Exceptional. Leake County has received this ranking once over the 10-year reporting period. The extent of extreme heat can be measured by the record high temperature recorded. Official long term temperature records are not kept for any areas in Leake County. However, the highest recorded temperature in Meridian (southeast of the county) was 107°F in 1980.

Wildfire	Wildfire data was provided by the Mississippi Forestry Commission and is reported annually by county from 2011-2020. The greatest number of fires to occur in Leake County in any year 102 in 2007. The greatest number of acres to burn in the county in a single year occurred in 2007 when 1,994 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.16), the Modified Mercalli Intensity (MMI) scale (Table 5.17), and the distance of the epicenter from Leake County. According to data provided by the National Geophysical Data Center, the greatest earthquake to impact the county was reported in Carthage with a MMI of V (slightly strong), 4.9 magnitude, and 461 km away from the epicenter.
Landslide	As noted above in the landslide profile, there is no extensive history of landslides in Leake County and landslide events typically occur in isolated areas. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is low throughout the entire county. There is also low susceptibility across the county.
Land Subsidence	The extent of land subsidence can be defined by the measurable rate of subsidence that occurs. There are no subsidence rate records located in Leake County nor is there any significant historical record of events.
Wind-related Hazards	
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5. The greatest classification of hurricane to traverse directly through Leake County was Unnamed 1879 Storm, a tropical storm which carried tropical force winds of 50 knots upon arrival in the county.
Thunderstorm / Hail / Lightning	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 70-year history from the National Centers for Environmental Information, the strongest recorded wind event in Leake County was reported on January 13, 2005 at 80 knots (approximately 92 mph). It should be noted that future events may exceed these historical occurrences. Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Leake County was 2.75 inches (reported on May 2, 2010). It should be noted that future events may exceed this. According to the Vaisala's flash density map, Leake County is located in an area that experiences 6 to 8 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA as well as the Fujita/Enhanced Fujita Scale. The greatest magnitude reported in Leake County was an F5 (reported on March 3, 1966).
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the Leake County was 0.13368 GCF released on the highway (reported on November 13, 2013). It should be noted that larger events are possible.

Pandemic	While pandemics remain to be rare occurrences overall, it cannot be ignored that as of the drafting of this plan the world continues to be engulfed by the COVID-19 Pandemic.

PRIORITY RISK INDEX RESULTS

In order to draw some meaningful planning conclusions on hazard risk for Leake County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.16.2.

Table E.21 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

Table E.21: SUMMARY OF PRI RESULTS FOR LEAKE COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Flood-related Hazards						
Flood	Likely	Critical	Moderate	6 to 12 hours	Less than 24 hours	**2.9**
Erosion	Possible	Minor	Small	More than 24 hours	More than 1 week	**1.8**
Dam Failure	Possible	Critical	Small	Less than 6 hours	Less than 6 hours	**2.4**
Winter Storm and Freeze	Likely	Limited	Moderate	More than 24 hours	Less than 24 hours	**2.4**
Fire-related Hazards						
Drought / Heat Wave	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Wildfire	Highly Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.6**
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.0**
Landslide	Unlikely	Minor	Small	Less than 6 hours	Less than 6 hours	**1.5**
Land Subsidence	Unlikely	Minor	Small	Less than 6 hours	Less than 6 hours	**1.5**
Wind-related Hazards						
Hurricane and Tropical Storm	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Thunderstorm Wind / High Wind	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	**3.1**
Hailstorm	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	**2.8**
Lightning	Highly Likely	Limited	Negligible	6 to 12 hours	Less than 6 hours	**2.4**
Tornado	Likely	Catastrophic	Small	Less than 6 hours	Less than 6 hours	**3.0**
Other Hazards						
Hazardous Materials Incident	Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.5**
Pandemic	Unlikely	Catastrophic	Large	More than 24 hours	More than 24hrs	**2.8**

E.2.16 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Leake County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table E.22**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Leake County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section E.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

Table E.22: CONCLUSIONS ON HAZARD RISK FOR LEAKE COUNTY

HIGH RISK	Thunderstorm Wind / High Wind Tornado Flood Hurricane and Tropical Storm Hailstorm Pandemic
MODERATE RISK	Wildfire Drought / Heat Wave Hazardous Materials Incident Dam and Levee Failure Winter Storm and Freeze Lightning
LOW RISK	Earthquake Erosion Landslide Land Subsidence

E.3 LEAKE COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Leake County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

E.3.1 Asset Inventory

Table E.24 lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, and schools located in Leake County according to Hazus-MH Version 2.2.

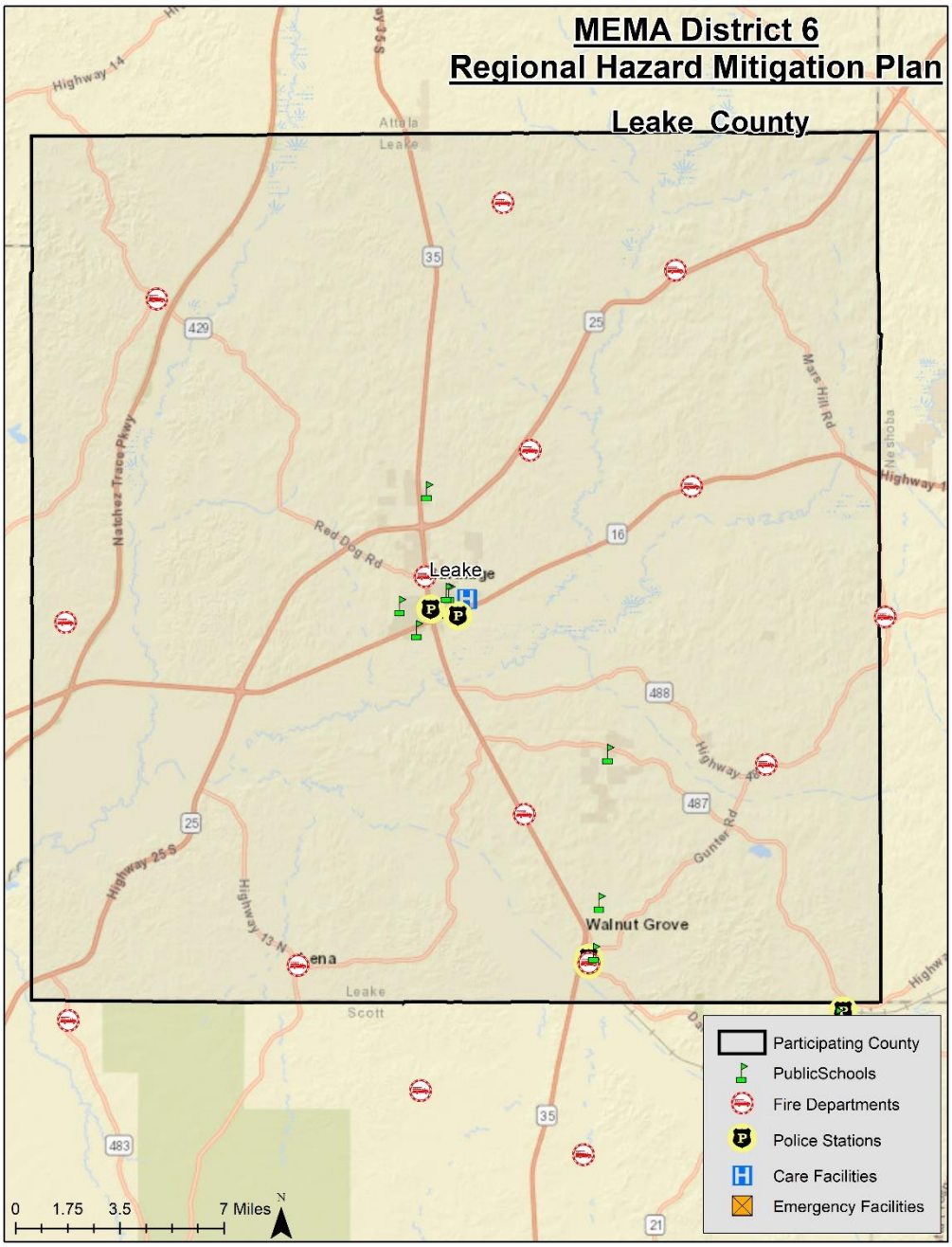
In addition, **Figure E.12** shows the locations of critical facilities in Leake County. At the end of this subsection, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided through Hazus.

Table E.23: CRITICAL FACILITY INVENTORY IN LEAKE COUNTY

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools
Carthage	8	2	1	1	6
Lena	1	0	0	0	0
Walnut Grove	1	1	0	0	2
Unincorporated Area	1	1	0	0	2
ASSET VALUATION	**$25,532,315**	**$11,605,598**	**$2,823,193**	**$2,321,119**	**$95,785,627**
LEAKE COUNTY TOTAL	**11**	**4**	**1**	**1**	**10**

Source: Hazus-MH 2.2

Figure E.14: CRITICAL FACILITY LOCATIONS IN LEAKE COUNTY



Source: Hazus-MH 2.2

E.3.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Leake County that are potentially at risk to these hazards.

Table E.32 lists the population by jurisdiction according to U.S. Census American Community Survey 2019 population estimates. The total population in Leake County according to Census data is 22,792 persons. Additional population estimates are presented above in Section E.1.

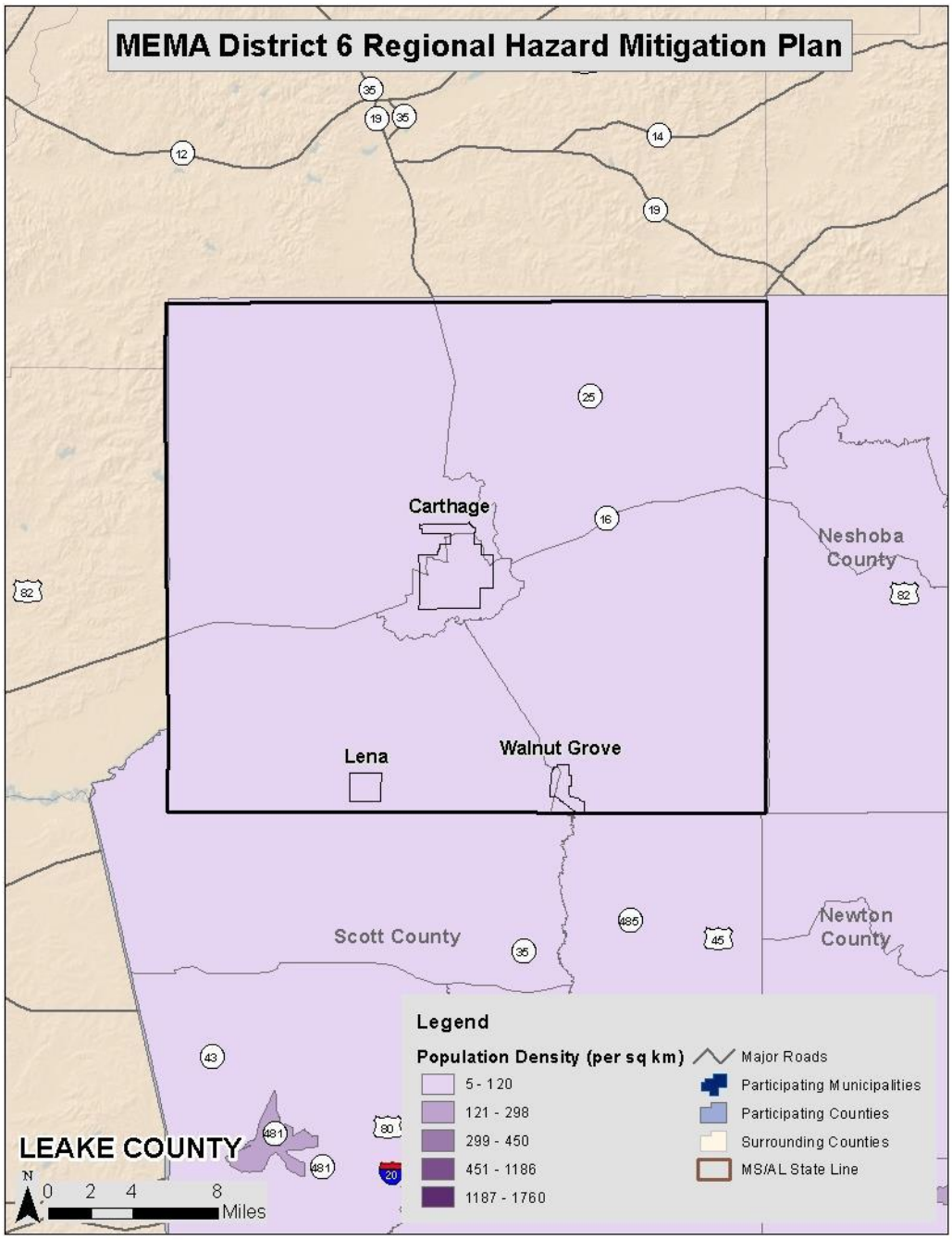
Table E.24: TOTAL POPULATION IN LEAKE COUNTY

Location	Total 2019 Population
Carthage	4,830
Lena	151
Walnut Grove	901
Unincorporated Area	16,910
LEAKE COUNTY TOTAL	**22,792**

Source: United States Census American Community Survey 2019

In addition, **Figure E.15** illustrates the population density per square kilometer by census tract as it was reported by the U.S. Census Bureau in 2010. This remains unchanged since last plan update.

Figure E.15: POPULATION DENSITY IN LEAKE COUNTY



Source: United States Census Bureau, 2010

E.3.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plan was approved (in 2015), Leake County has experienced limited growth and development. **Table E.26** shows the number of building units constructed since 2014 according to the U.S. Census American Community Survey.

Table E.25: BUILDING COUNTS FOR LEAKE COUNTY

Jurisdiction	Total Housing Units (2019)	Units Built 2014 or later	% Building Stock Built Post-2014
Carthage	1,628	0	0.0%
Lena	79	1	1.3%
Walnut Grove	280	0	0.0%
Unincorporated Area	7,580	125	1.6%
LEAKE COUNTY TOTAL	**9,567**	**126**	**1.3%**

Source: United States Census Bureau American Community Survey

Table E.27 shows population growth estimates for the county from 2015 to 2019 based on the U.S. Census Annual Estimates of Resident Population.

Table E.26: POPULATION GROWTH FOR LEAKE COUNTY

Jurisdiction	Population Estimates (as of July 1)					% Change 2015-2019
	2015	2016	2017	2018	2019	
Carthage	4,966	4,938	4,877	4,862	4,830	-2.73%
Lena	200	194	176	161	151	-24.5%
Walnut Grove	913	749	779	809	901	-1.31%
Unincorporated Area	17,074	17,130	17,104	17,038	16,910	-0.96%
LEAKE COUNTY TOTAL	**23,153**	**23,011**	**22,936**	**22,870**	**22,792**	**-1.55%**

Source: United States Census Bureau – American Community Survey

Based on the data above, there has been a low rate of residential development and population growth in the county since 2015, and the county has actually experienced a slight population decline. However, the unincorporated areas of the county experienced a slightly higher rate of development compared to the rest of the county, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards. However, with Leake County experiencing slight population decline of -1.55% while seeing a slight increase in new structures being built at 1.3%, the two values offset eachother resulting in no changes since the last plan update.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, moderate and high landside susceptibility areas, high wildfire risk areas, or primary and secondary TRI site buffers.

E.3.4 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, available modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Leake County, are presented here. All other hazards are assumed to impact the entire planning region (drought / heat wave; thunderstorm—wind, hail, lightning; tornado; and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (dam and levee failure, erosion, and land subsidence). In the case of landslide, local officials determined that the USGS data may be somewhat

amiss and that even the areas identified as moderate risks probably entailed an overall low risk. The total county exposure, and thus risk, was presented in **Table E.28**.

The hazards to be further analyzed in this subsection include: flood, wildfire, earthquake, hurricane and tropical storm winds, and hazardous materials incident.

The annualized loss estimate for all hazards is presented near the end of this subsection**.**

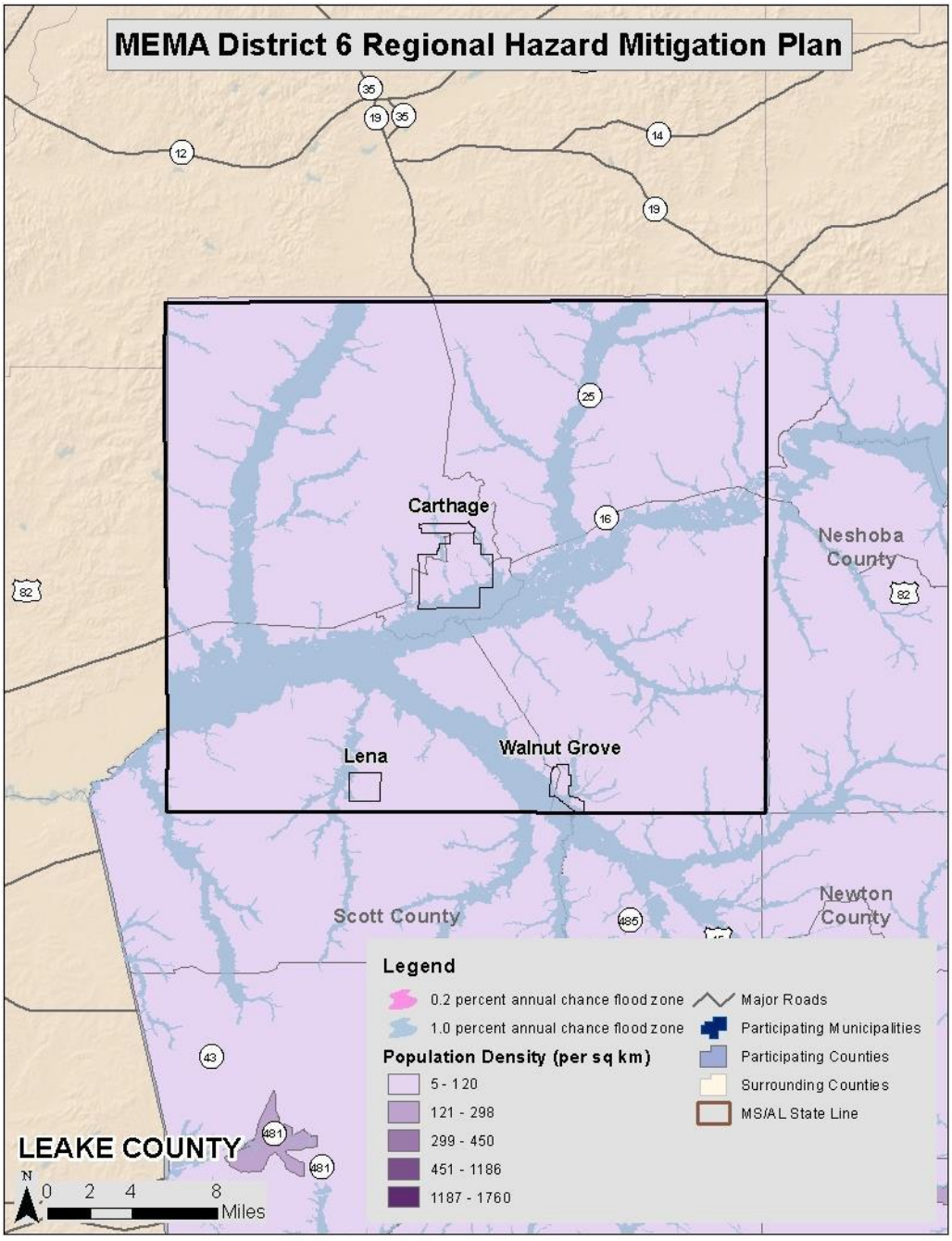
FLOOD

Historical evidence indicates that Leake County is susceptible to flood events. A total of 18 flood events have been reported by the National Centers for Environmental Information resulting in $14.1 million (2015 dollars) in property damage. On an annualized level, these damages amounted to $1.0 million for Leake County.

Social Vulnerability

Figure E.16 is presented to gain a better understanding of at-risk population by evaluating census tract level population data against mapped floodplains. There are areas of concern in several areas of the county. Indeed, nearly every incorporated municipality is potentially at risk of being impacted by flooding in some areas of its jurisdiction. Therefore, further investigation in these areas may be warranted.

Figure E.16: POPULATION DENSITY NEAR FLOODPLAINS



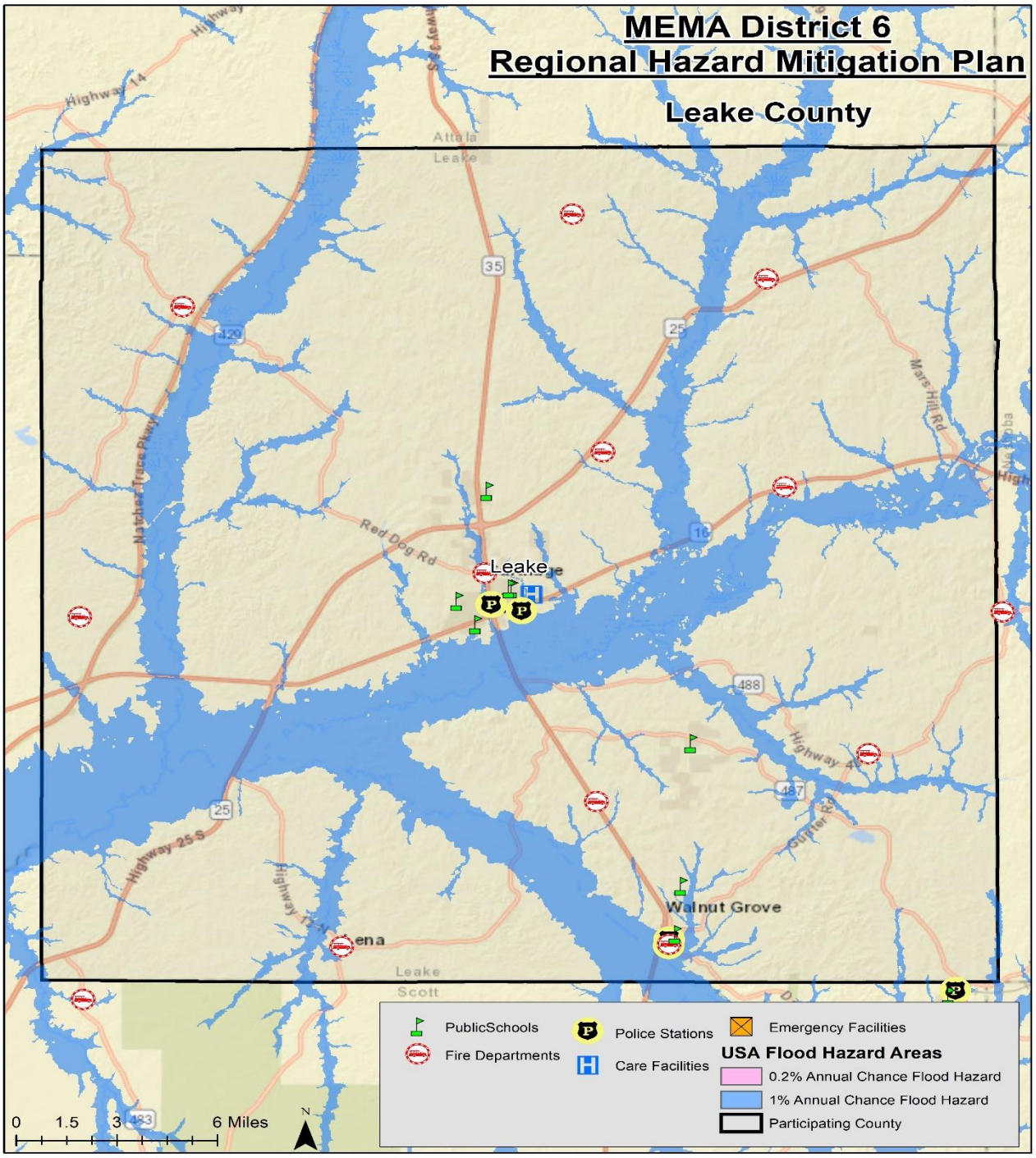
Source: Federal Emergency Management Agency DFIRM, United States Census 2010

Critical Facilities

The following figure shows critical facilities in relation to Special Flood Hazard Areas. (Please note, as previously indicated, this analysis does not consider building elevation, which may negate risk.) Both facilities are located in the 1.0 percent annual chance flood zone, and they include one fire station and one school. A list of specific critical facilities and their associated risk can be found at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in Leake County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Figure E.17: CRITICAL FACILITY ANALYSIS - SFHA



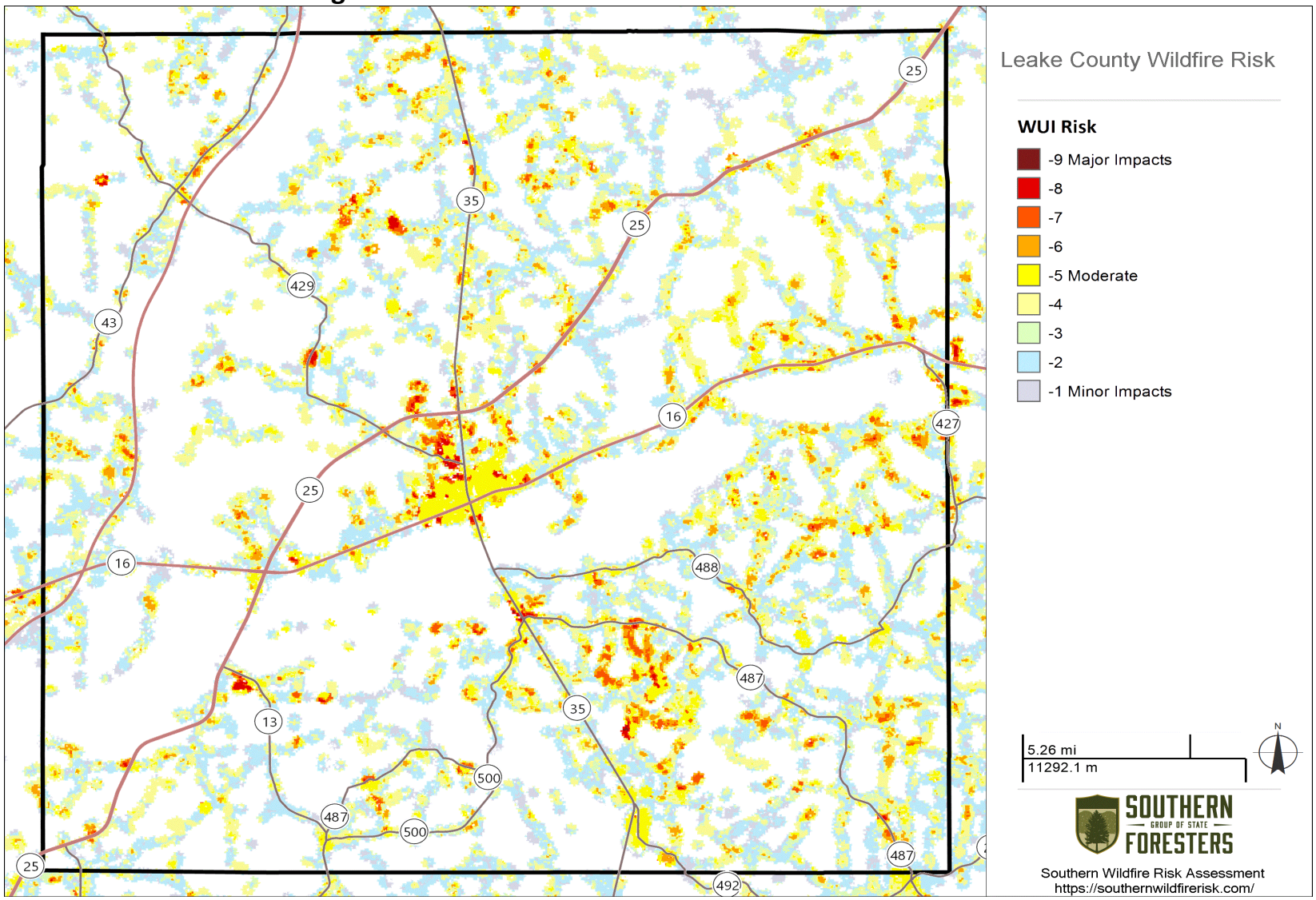
WILDFIRE

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

To estimate exposure to wildfire, building data was obtained from Hazus-MH 2.2 which includes information that has been aggregated at the Census block level and which has been deemed useful for analyzing wildfire vulnerability. However, it should be noted that the accuracy of Hazus data is somewhat lower than that of parcel data. For the critical facility analysis, areas of concern were intersected with critical facility locations.

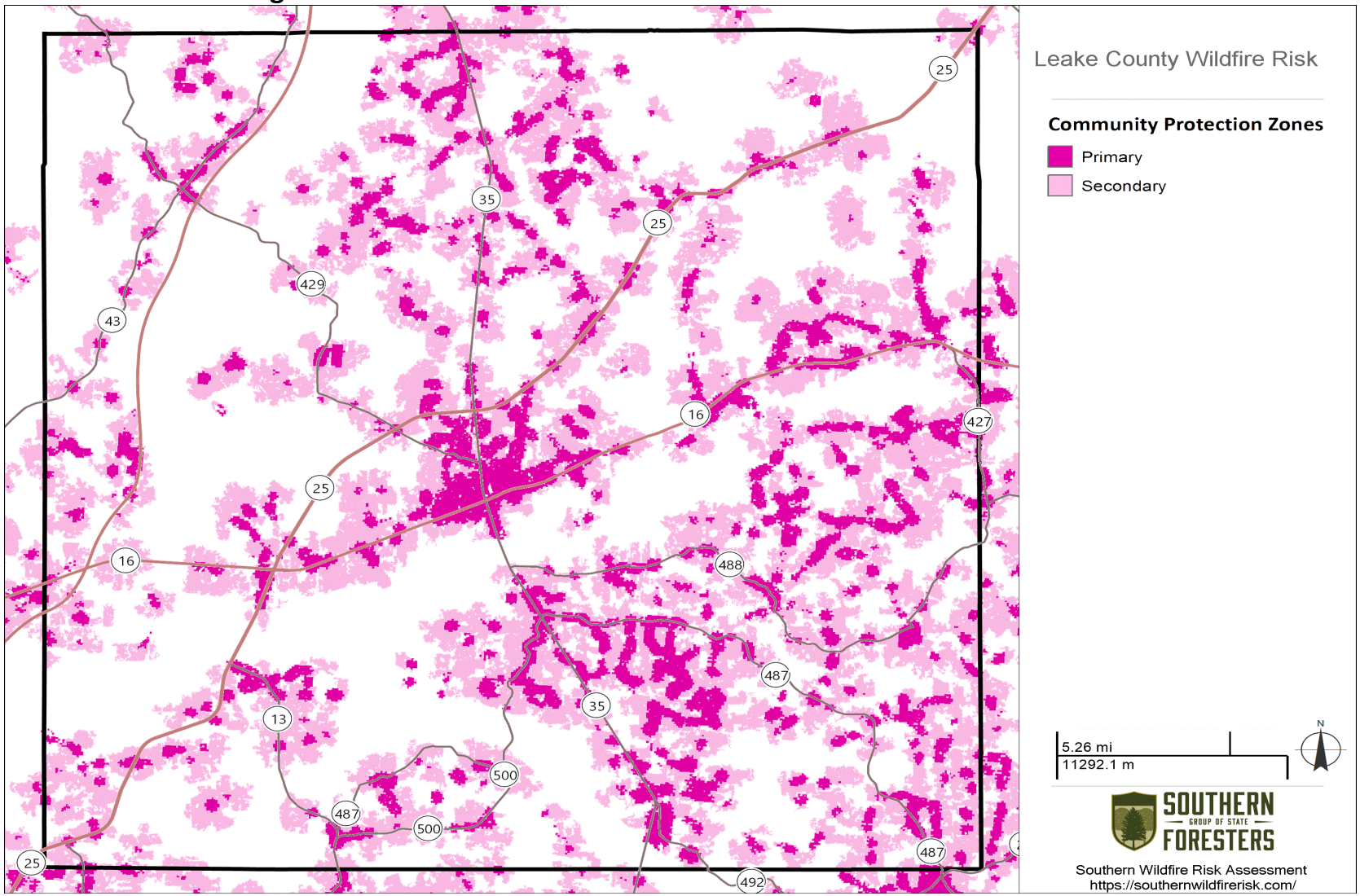
Figure E.18 shows the Wildland Urban Interface Risk Index (WUIRI) data, which is a data layer that shows a rating of the potential impact of a wildfire on people and their homes. The key input, Wildland Urban Interface (WUI), reflects housing density (houses per acre) consistent with Federal Register National standards. The location of people living in the WUI and rural areas is key information for defining potential wildfire impacts to people and homes. Initially provided as raster data, it was converted to a polygon to allow for analysis. The Wildland Urban Interface Risk Index data ranges from 0 to -9 with lower values being most severe (as noted previously, this is only a measure of relative risk). **Figure E.19** Community Protection Zones (CPZ) represent those areas considered highest priority for mitigation planning activities**.** CPZs are based on an analysis of the *Where People Live* housing density data and surrounding fire behavior potential. Rate of Spread data is used to determine the areas of concern around populated areas that are within a 2-hour fire spread distance. This is referred to as the Secondary CPZ. **Figure E.20** shows critical facility locations in relation to historical wildfire burns.

Figure E.18: WUI RISK INDEX AREAS IN LEAKE COUNTY



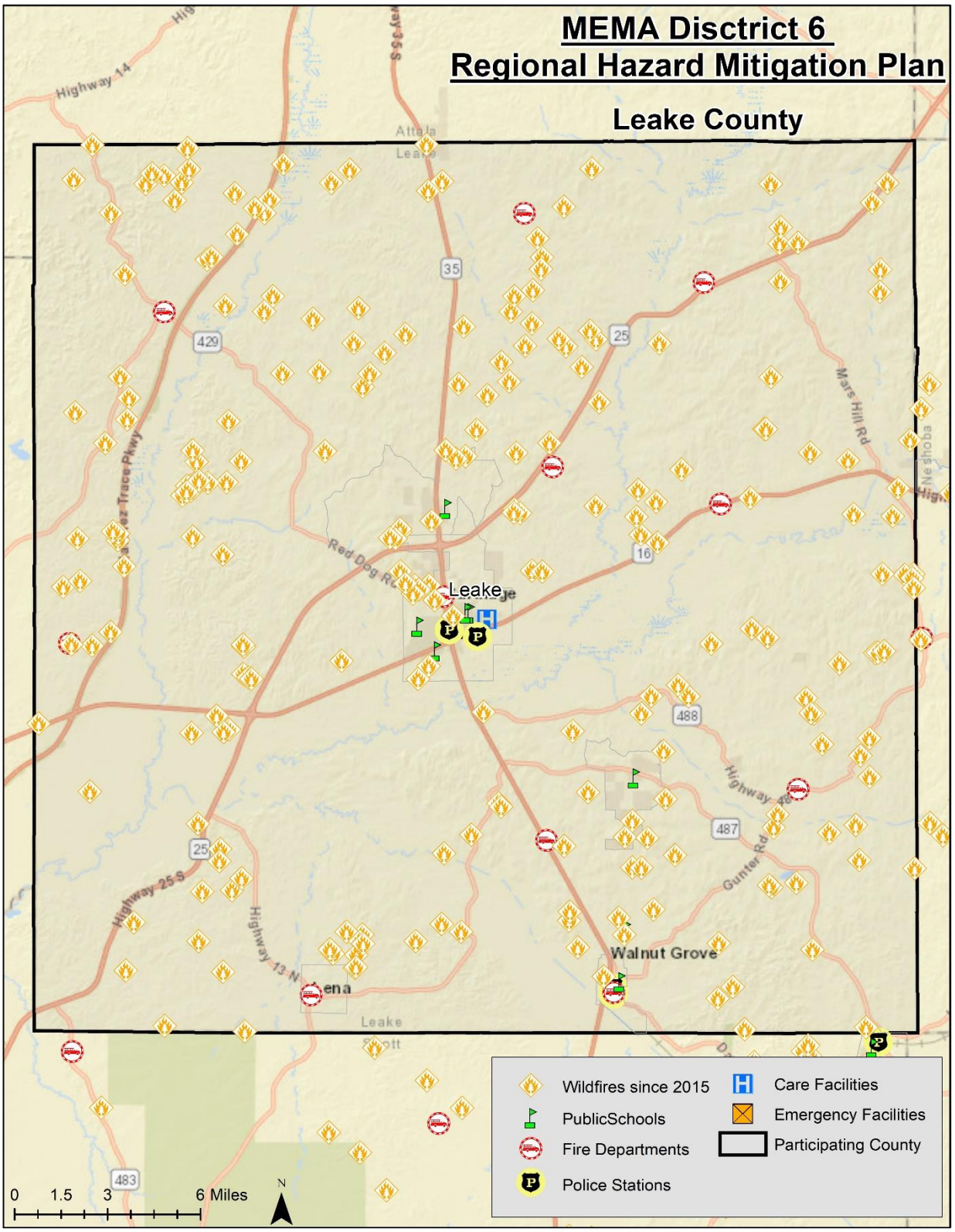
Source: Southern Wildfire Risk Assessment Data

Figure E.19: COMMUNITY PROTECTION ZONES IN LEAKE COUNTY



Source: Southern Wildfire Risk Assessment Data

Figure E.20: CRITICAL FACILITY ANALYSIS – WILDFIRE



Source: Southern Wildfire Risk Assessment Data

Social Vulnerability

Given some level of susceptibility across the entire county, it is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading. In particular, the expansion of residential development from urban centers out into rural landscapes, increases the potential for wildland fire threat to public safety and the potential for damage to forest resources and dependent industries. This increase in population across the region will impact counties and communities that are located within the Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk from wildfire.

For the Leake County Wildfire Risk project area, it is estimated that 23,654 people or 98.5 % percent of the total project area population (24,019) live within the WUI.

Critical Facilities

The critical facility analysis revealed that there are two critical facilities located in wildfire areas of concern, including two schools. It should be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found at the end of this subsection.

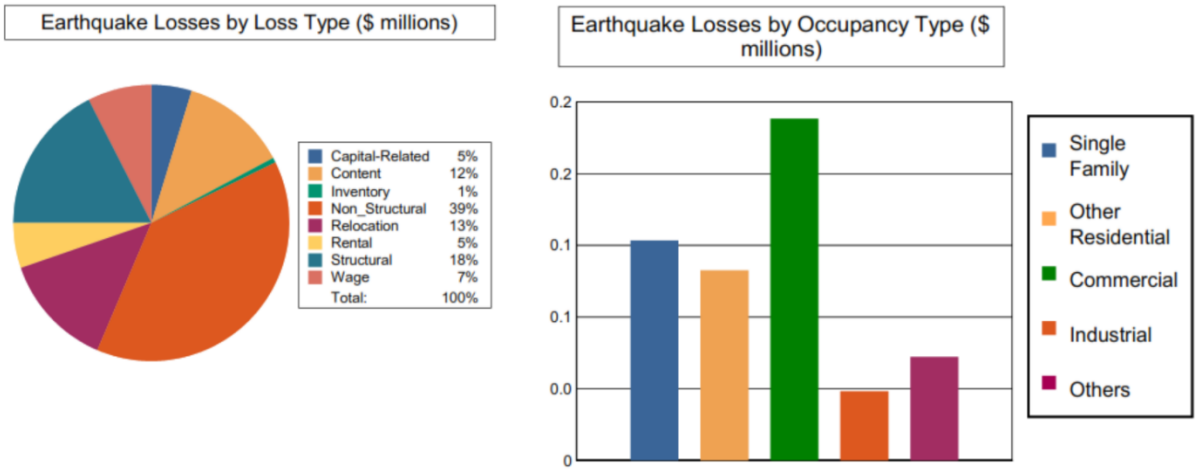
In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Leake County.

EARTHQUAKE

As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict minor damage to the county.

A probabilistic earthquake model was performed for the MEMA District 6 Region. As the Hazus-MH model suggests below, and historical occurrences confirm, any earthquake activity in the area is likely to inflict minor damage to the county. Hazus-MH 2.2 estimates the total building-related losses were $520,000; 31 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 44 % of the total loss. The figure below provides a summary of the losses associated with the building damage.

Figure E.21: MEMA D6 EARTHQUAKE LOSSES BY TYPE



For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the average annualized loss for the region. The results of the analysis are generated at the Census Tract level within Hazus-MH and then aggregated to the region level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to structure failure, building loss, contents damage, and inventory loss.

Social Vulnerability

It can be assumed that all existing and future populations are at risk to the earthquake hazard. Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 39 households to be displaced due to the earthquake. Of these, 32 people (out of a total population of 244,467) will seek temporary shelter in public shelters. [7] The total economic loss estimated for the earthquake is 76.76 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory.

Critical Facilities

The Hazus-MH probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. Before the earthquake, the region had 1,241 hospital beds available for use. On the day of the earthquake, the model estimates that only 1,035 hospital beds (83.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 93.00% of the beds will be back in service. By 30 days, 99.00% will be operational.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Leake County. The Hazus-MH scenario indicates that minimal to moderate damage is expected from an earthquake occurrence. While Leake County may not experience a large earthquake (the greatest on record is a magnitude V MMI), localized damage is possible with an occurrence. A list of specific critical facilities and their associated risk can be found at the end of this subsection.

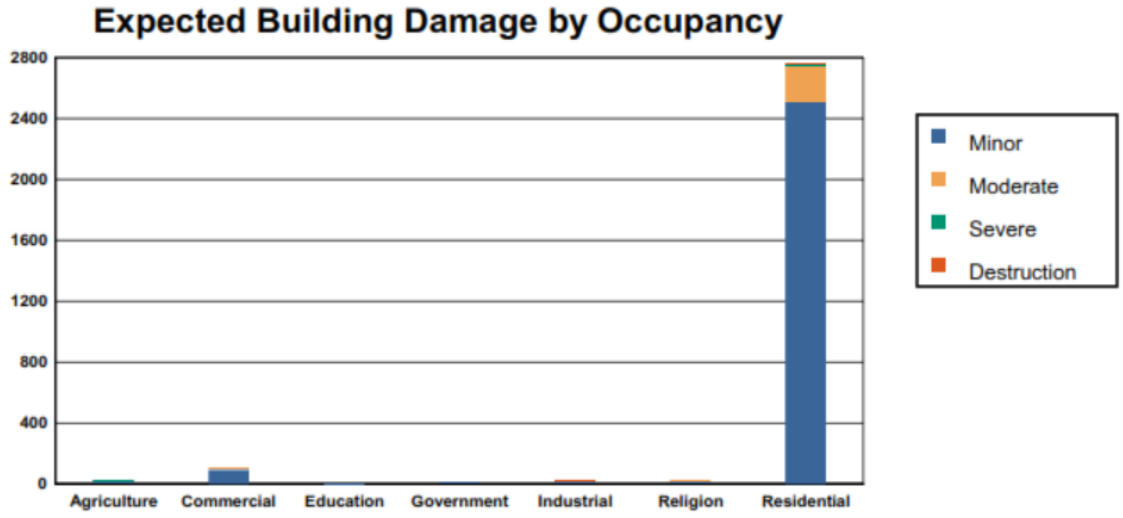
HURRICANE AND TROPICAL STORM

[7] HAZUS-MH utilizes 2010 Census Data

Historical evidence indicates that Leake County has some risk to the hurricane and tropical storm hazard. There have been three disaster declarations due to hurricanes (Hurricanes Dennis, Katrina, and Isaac). Several tracks have come near or traversed through the county, as shown and discussed in Section E.2.10.

A probabilistic 100-year hurricane model was performed for the MEMA District 6. Hazus estimates that about 289 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 12 buildings that will be completely destroyed. The figure below summarizes the expected damage by general occupancy for the buildings in the region.

Figure E.22: MEMA D6 100-YEAR HURRICANE



Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore, only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard.

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population, both current and future, is at risk to the hurricane and tropical storm hazard. Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 34 households to be displaced due to the hurricane. Of these, 26 people (out of a total population of 244,467) will seek temporary shelter in public shelters.

Critical Facilities

Given equal vulnerability across Leake County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable structures and/or critical facilities to mitigate against the effects of the hurricane hazard. A list of specific critical facilities can be found at the end of this subsection.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Leake County.

HAZARDOUS MATERIALS INCIDENT

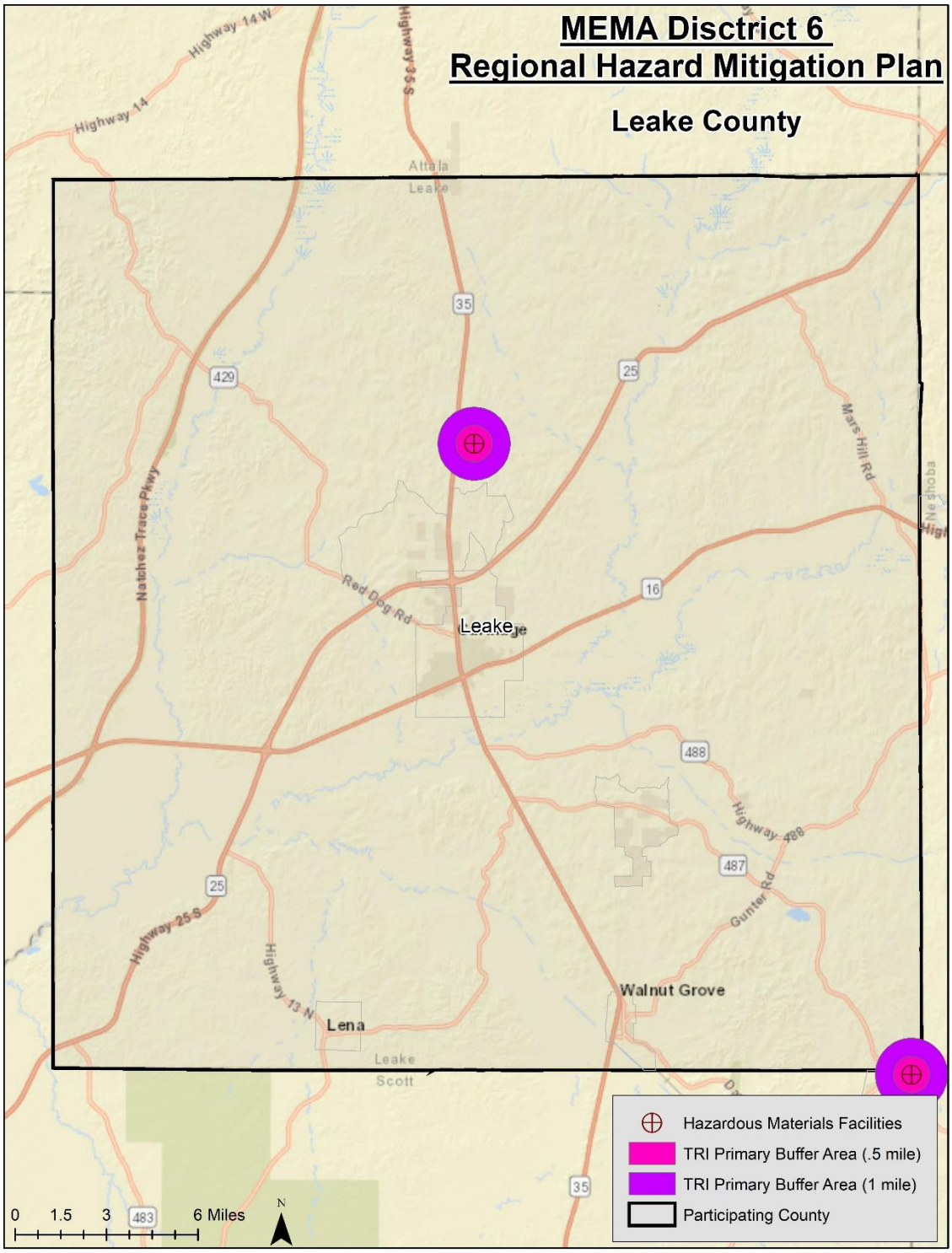
Although historical evidence indicates that Leake County is susceptible to hazardous materials events, there are no reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. It is assumed that while one major event could result in significant losses, annualizing structural losses over a

long period of time would most likely yield a negligible annualized loss estimate for Leake County.

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

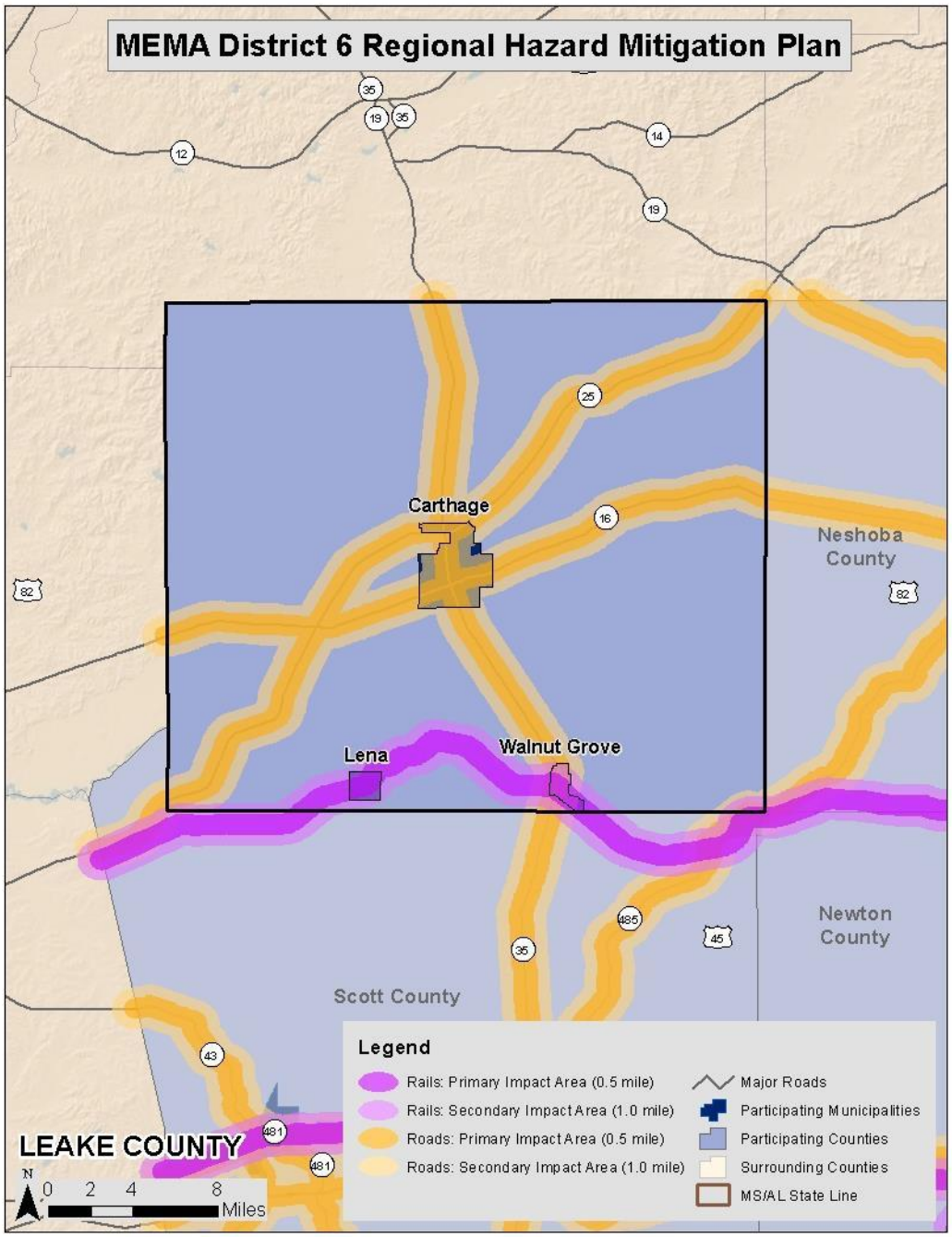
In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and building footprints/parcels. In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile—were used. These areas are assumed to represent the different levels of effect: immediate (primary) and secondary. Primary and secondary impact zones were selected based on guidance from the PHMSA Emergency Response Guidebook. For the fixed site analysis, geo-referenced TRI sites in the region, along with buffers, were used for analysis as shown in **Figure E.23.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure E.24** shows the areas used for mobile toxic release buffer analysis.

Figure E.23: TRI SITES WITH BUFFERS IN LEAKE COUNTY



Source: Environmental Protection Agency

Figure E.24: MOBILE HAZMAT BUFFERS IN LEAKE COUNTY



Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are no facilities located in a HAZMAT risk zone. A list of specific critical facilities and their associated risk can be found at the end of this subsection.

Mobile Analysis:

It should be presumed that any facility located near a public roadway or rail line is susceptible to a potential HAZMAT event. A list of specific critical facilities and their associated risk can be found at the end of this subsection.

A list of specific critical facilities and their associated risk can be found at the end of this subsection.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Leake County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area (i.e., direction and speed of wind, volume of release, etc.). Further, incidents from neighboring counties could also impact the county and participating jurisdictions.

CONCLUSIONS ON HAZARD VULNERABILITY

The following table presents a summary of annualized loss for each hazard in Leake County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

Table E.27: ANNUALIZED LOSS FOR LEAKE COUNTY

Event	Leake County	Carthage	Lena	Walnut Grove
Flood-related Hazards				
Flood	$549,000	Negligible	$453,635	$452,135
Erosion	Negligible	Negligible	Negligible	Negligible
Dam and Levee Failure	Negligible	Negligible	Negligible	Negligible
Winter Storm & Freeze	$65,800	Negligible	Negligible	Negligible
Fire-related Hazards				
Drought / Heat Wave	$6,875	Negligible	Negligible	Negligible
Wildfire	Negligible	Negligible	Negligible	Negligible
Geologic Hazards				
Earthquake	Negligible	Negligible	Negligible	Negligible
Landslide	Negligible	Negligible	Negligible	Negligible
Land Subsidence	Negligible	Negligible	Negligible	Negligible
Wind-related Hazards				
Hurricane & Tropical Storm	$169,000	Negligible	Negligible	Negligible
Thunderstorm / High Wind	$20,909	$181,849	$220,321	$166,594
Hail	$12,411	Negligible	Negligible	Negligible
Lightning	$8,692	Negligible	Negligible	Negligible
Tornado	$1,049,142	Negligible	Negligible	$178,296
Other Hazards				
HAZMAT Incident	Negligible	Negligible	Negligible	Negligible
Pandemic	Negligible	Negligible	Negligible	Negligible

**In this table, the term "Negligible" is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept. It could also mean that event data was reported at the County-level only. Annualized losses were calculated based on the total number of years of reporting and damage totals.*

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought / heat wave, hurricane and tropical storm, thunderstorm (wind, hail, lightning), tornado, and winter storm and freeze. In addition, all buildings and populations are vulnerable to all of the man-made and technological hazards identified above. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. The following table shows the critical facilities vulnerable to additional hazards analyzed in this subsection. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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Table E.28: AT-RISK CRITICAL FACILITIES IN LEAKE COUNTY

		FLOOD-RELATED					FIRE-RELATED		GEOLOGIC			WIND-RELATED			OTHER						
FACILITY NAME	FACILITY TYPE	Flood – 100 yr	Flood – 500 yr	Erosion	Dam and Levee Failure[33]	Winter Storm and Freeze	Drought / Heat Wave	Wildfire	Earthquake	Landslide	Land Subsidence	Hurricane and Tropical Storm	Thunderstorm (wind, hail,	Tornado	Fixed HAZMAT – 0.5 mile	Fixed HAZMAT – 1.0 mile	Mobile HAZMAT – 0.5 mile (road)	Mobile HAZMAT – 1.0 mile (road)	Mobile HAZMAT – 0.5 mile (rail)	Mobile HAZMAT – 1.0 mile (rail)	Pandemic
LEAKE COUNTY																					
Barnes Volunteer Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X					X	X	X
Carthage Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X			X	X			X
Edinburg Volunteer Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X				X			X
Lena VFD	Fire Station			X	X	X	X		X	X	X	X	X	X					X	X	X
Madden Volunteer Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X							X
Marydell Volunteer Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X			X	X			X
Mississippi Forestry Commission	Fire Station			X	X	X	X		X	X	X	X	X	X					X	X	X
Ofahoma Volunteer Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X					X	X	X
Reformation Volunteer Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X				X			X
Thomastown Volunteer Fire Department	Fire Station			X	X	X	X		X	X	X	X	X	X					X	X	X
Walnut Grove Volunteer Fire Department	Fire Station	X		X	X	X	X		X	X	X	X	X	X							X
Baptist Medical Center	Medical Care Facility			X	X	X	X		X	X	X	X	X	X			X	X			X
Carthage Police Dept	Police Station			X	X	X	X		X	X	X	X	X	X			X	X			X
Leake County Sheriff	Police Station			X	X	X	X		X	X	X	X	X	X			X	X			X
Walnut Grove Police	Police Station			X	X	X	X		X	X	X	X	X	X					X	X	X

ANNEX E: LEAKE COUNTY

		FLOOD-RELATED					FIRE-RELATED		GEOLOGIC			WIND-RELATED			OTHER						
FACILITY NAME	FACILITY TYPE	Flood – 100 yr	Flood – 500 yr	Erosion	Dam and Levee Failure[33]	Winter Storm and Freeze	Drought / Heat Wave	Wildfire	Earthquake	Landslide	Land Subsidence	Hurricane and Tropical Storm	Thunderstorm (wind, hail,	Tornado	Fixed HAZMAT – 0.5 mile	Fixed HAZMAT – 1.0 mile	Mobile HAZMAT – 0.5 mile (road)	Mobile HAZMAT – 1.0 mile (road)	Mobile HAZMAT – 0.5 mile (rail)	Mobile HAZMAT – 1.0 mile (rail)	Pandemic
LEAKE COUNTY																					
Leake County Vocational Center	School			X	X	X	X		X	X	X	X	X	X			X	X			X
LEAKE CENTRAL ELEMENTARY SCHOOL	School			X	X	X	X		X	X	X	X	X	X					X	X	X
LEAKE CENTRAL HIGH SCHOOL	School			X	X	X	X		X	X	X	X	X	X					X	X	X
LEAKE CENTRAL JUNIOR HIGH	School			X	X	X	X		X	X	X	X	X	X					X	X	X
LEAKE CO CAREER & TECHNICAL CENTER	School			X	X	X	X		X	X	X	X	X	X					X	X	X
LEAKE COUNTY ELEMENTARY SCHOOL	School			X	X	X	X		X	X	X	X	X	X					X	X	X
LEAKE COUNTY HIGH SCHOOL	School			X	X	X	X		X	X	X	X	X	X					X	X	X
Red Water Elementary School	School			X	X	X	X	X	X	X	X	X	X	X			X	X			X
Standing Pine Elementary School	School			X	X	X	X		X	X	X	X	X	X							X

* As noted previously, these facilities could be at risk to dam failure if located in an inundation area. Data was not available to conduct such an analysis. There was no local knowledge of these facilities being at risk to dam failure.

E.4 LEAKE COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Leake County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

E.4.1 Planning and Regulatory Capability

The table below provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Leake County. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MEMA District 6 Regional Hazard Mitigation Plan.

Table E.29: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
LEAKE COUNTY	✓		✓					✓					✓		✓							✓	
Carthage	✓	✓						✓				✓	✓		✓	✓	✓			✓	✓	✓	
Lena	✓							✓					✓										
Walnut Grove	✓							✓					✓		✓							✓	

A more detailed discussion on the county's planning and regulatory capabilities follows.

EMERGENCY MANAGEMENT

Hazard Mitigation Plan
Leake County has previously adopted a hazard mitigation plan. The City of Carthage, Town of Lena, and Town of Walnut Grove were also included in this plan.

Emergency Operations Plan
Leake County maintains an Emergency Operations Plan through its Emergency Management Agency. The City of Carthage, Town of Lena, and Town of Walnut Grove are each covered by this plan.

GENERAL PLANNING

Comprehensive Land Use Plan
Leake County has not adopted a county comprehensive land use plan. However, the City of Carthage has adopted a municipal comprehensive plan.

Capital Improvements Plan
Leake County has not adopted a county capital improvement plan. However, the City of Carthage has adopted a municipal capital improvement plan.

Zoning Ordinance
Leake County does not have a zoning ordinance in place. However, the City of Carthage has adopted a zoning ordinance.

Subdivision Ordinance
Leake County does not have a subdivision ordinance in place. However, the City of Carthage has adopted a subdivision ordinance.

Building Codes, Permitting, and Inspections
The City of Carthage has adopted a building code.

FLOODPLAIN MANAGEMENT

The table below provides NFIP policy and claim information for each participating jurisdiction in Leake County.

Table E.30: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
LEAKE COUNTY†	09/15/89	09/16/11	23	$2,948,600	10	$92,350
Carthage	08/19/85	09/16/11	18	$1,838,400	18	$186,046
Lena*	--	--	--	--	--	--
Walnut Grove	09/16/11	09/16/11	0	$0	0	$0

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
Source: NFIP Community Status information as of 9/2/2015; NFIP claims and policy information as of 6/30/2015

Flood Damage Prevention Ordinance

All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Leake County, the City of Carthage, and the Town of Walnut Grove all participate in the NFIP and have adopted flood damage prevention ordinances.

E.4.2 Administrative and Technical Capability

The table below provides a summary of the capability assessment results for Leake County with regard to relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

Table E.31: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
LEAKE COUNTY				✓	✓		✓	✓		
Carthage		✓		✓	✓		✓	✓		
Lena				✓			✓	✓		
Walnut Grove				✓	✓		✓	✓		✓

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

E.4.3 Fiscal Capability

The table below provides a summary of the results for Leake County with regard to relevant fiscal resources. A checkmark (✓) indicates that the given fiscal resource is locally available for hazard mitigation purposes

(including match funds for state and federal mitigation grant funds) according to the previous county hazard mitigation plan.

Table E.32: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: other state and Federal funding sources
LEAKE COUNTY	✓	✓								✓
Carthage	✓	✓			✓					✓
Lena	✓	✓								✓
Walnut Grove	✓	✓			✓					✓

E.4.4 Political Capability

During the months immediately following a disaster, local public opinion in Leake County is more likely to shift in support of hazard mitigation efforts.

E.4.5 Conclusions on Local Capability

The table below shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its jurisdictions is 18.0, which falls into the limited capability ranking.

Table E.33: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
LEAKE COUNTY	20	Moderate
Carthage	26	Moderate

Jurisdiction	Overall Capability Score	Overall Capability Rating
Lena	9	Limited
Walnut Grove	17	Limited

E.5 LEAKE COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Leake County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Council and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

E.5.1 Mitigation Goals

Leake County developed 10 mitigation goals in coordination with the other participating MEMA District 6 Region jurisdictions. The regional mitigation goals are presented below.

Table E.34: MEMA DISTRICT 6 REGIONAL MITIGATION GOALS

Goal #		Goals & Objectives	Action #
#1	Goal	Local government will be able to maintain **effective mitigation programs**.	PEA-1
	Objective	***County works to get buy in on the importance of mitigation projects from key leadership.***	
#2	Goal	The community will work together to create a **disaster-resistant community**.	PEA-2
	Objective	***County works with RedCross and Department of Human Services for strong partnerships.***	
#3	Goal	The community will be able to initiate and sustain **emergency response operations.**	PEA-2
	Objective	***County is currently pursuing a new EOC / Sheriff's Office location to be able to host other departments and entities during times of emergency as the current location doesn't support that.***	
#4	Goal	**Government operations** will not be significantly disrupted by disasters.	
	Objective	**County maintains a COOP that is updated.**	
#5	Goal	The **health, safety, and welfare of the community's residents and visitors** will be protected.	ES-5
	Objective	***County subscribes to NIXLE for emergency alerts to their community and actively works to get residents to sign up.***	
#6	Goal	**Local government will support effective hazard mitigation programming** in the community.	
	Objective	***County has pushed NFIP and flood plain ordinances.***	
#7	Goal	Residents of the community will have **homes, institutions, and work places that are safer**.	PEA-3
	Objective	***Continually encourages residents to install saferooms and are seeking additional community shelters***	
#8	Goal	The **local economy** of the community will be prepared for a disaster.	
	Objective	***County strongly encourages insurance to cover potential hazards.***	
#9	Goal	**Local infrastructure will not be significantly disrupted by a disaster**.	ES-4
	Objective	***County maintains redundant communications systems and are seeking to build a new EOC.***	
#10	Goal	All **members of the community will understand the hazards threatening their community.**	PEA-1
	Objective	***Public information campaigns and outreach so residents are aware of the hazards they face. This has significantly increased during the COVID pandemic.***	

To attain the listed mitigation goals, the county has also identified objectives that will assist them in the mitigation action process. Objectives are broader than specific actions, but are measurable, unlike goals. Objectives connect goals with the actual mitigation actions. The action plan describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered and incorporated into the community's existing planning mechanisms.

E.5.2 Mitigation Action Plan

The mitigation actions proposed by Leake County, Carthage, Lena, and Walnut Grove are listed in the following individual Mitigation Action Plans.

Leake County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
Prevention							
P-1	Waterway maintenance of flood-prone waterways, including: clearing and removal of debris; dredging of waterways; and erosion prevention measures, such as rip rap and planting of vegetation.	Flood	High	Board of Supervisors	FEMA/MEMA, CDBG, US Army Corps of Engineers, Local funds	2025	Ongoing. This action has been partially completed as there is a plan in place for clearing and debris removal. However, the county is seeking funding for erosion prevention measures and dredging.
P-2	Development of a permit system for the County.	Flood	High	Board of Supervisors	FEMA/MEMA, CDBG, Local funds	2017	Completed
P-3	Work with Leake County Schools to identify which roads their buses have trouble crossing during heavy rains because of flooding.	Flood	High	County Emergency Management, County School System	FEMA/MEMA, CDBG, State DOE, Local funds	2025	The county has been in contact with the school system concerning this issue, but a comprehensive plan to address these issues is not in place as there was a lack of funding. Seeking funding.
P-4	Establish and publish base flood elevations throughout the County.	Flood	High	Board of Supervisors, County Emergency Management	FEMA/MEMA, Homeland Security, US Army Corps of Engineers, Local funds	2025	The county has not published base flood elevations throughout the county. This is a goal the county is still working towards so it will remain in the plan.
P-5	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in flood-prone areas.	Flood	Moderate	Board of Supervisors	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
P-6	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in heavily wooded areas.	Wildfire	Moderate	Board of Supervisors	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.
P-7	Consider adoption of the International Code Council's International Building Code.	All	Moderate	Board of Supervisors	FEMA/MEMA, Local funds	2025	The International Building Code has not been adopted. The county will review this code and consider adoption, so this action will remain in the plan.
P-8	Collect additional data to define hazards, risk areas, and vulnerabilities to be used in future updates of the plan.	All	Low	County Emergency Management	FEMA/MEMA, Homeland Security, Local funds	2025	Although much work has been done to collect data on risks, especially through this planning process, there are still significant needs in terms of data collection. Therefore, this action will remain in the plan.
P-9	Collect additional data on the number of buildings located in flood-prone areas near the Pearl River and determine their assessed value in order to determine potential losses due to a flood event.	Flood	Low	County Emergency Management	FEMA/MEMA, Local funds	2025	Although some data has been collected and analyzed on buildings that are flood prone in this area, the flood risk is not static and needs further evaluation, so this action is being deferred.
Property Protection							
PP-1							
Natural Resource Protection							
NRP-1							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
Structural Projects							
SP-1	Build a new EOC.	All	High	County EMA / Sheriff	FEMA, MEMA, Local	2022	New Action
Emergency Services							
ES-1	Installation of texting/paging system for the County.	All	High	County Emergency Management	FEMA/MEMA, Homeland Security, Local funds	2017	Completed
ES-2	Develop a plan to notify and evacuate residents living in special hazard areas, mobile homes, and areas of substandard housing before a hurricane strikes.	Hurricane	High	County Emergency Management	FEMA/MEMA, Local funds	2017	Some discussions have taken place concerning an evacuation plan for residents with high vulnerability but the county is seeking funding to develop a full plan.
ES-3	Install radios on all Leake County Schools buses for emergency contact during flooding.	Flood	Moderate	County Emergency Management, County School System	FEMA/MEMA, State DOE, Local funds	2020	Completed
ES-4	Installation of a camera atop Leake County Communications Office to monitor weather conditions from E-911 Center.	Tornado, High Wind	Moderate	County Emergency Management	FEMA/MEMA, Local funds	2020	Completed

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
ES-5	Installation of emergency warning systems at all 10 fire stations in the County.	Tornado, High Wind	Moderate	County Fire Service	FEMA/MEMA, Homeland Security, Local funds	2025	Ongoing. Emergency warning systems have not been installed at fire stations. The county will continue seeking
ES-6	Purchase of generators for the County's seven rural fire departments.	Tornado, High Wind	Moderate	County Fire Service	FEMA/MEMA, Homeland Security, AFGP, Local funds	2025	Ongoing. Generators have not been purchased for all of the rural fire departments, so this action will remain in the
ES-7	Increasing specialized training of local emergency responders in order to improve response.	All	Moderate	County Emergency Management	FEMA/MEMA, AFGP, Homeland Security, Local funds	2025	Ongoing. Although some training of local responders has taken place, there is a continual need to train new responders and keep current responders up to date, so this action will remain in place.
ES-8	Conducting mock emergency exercises to improve local response capabilities.	All	Moderate	County Emergency Management	FEMA/MEMA, AFGP, Homeland Security, Local funds	2025	The county has conducted mock emergency exercises, but these will still need to be carried out going forward. The county will continue to carry these out in the future.
ES-9	County maps will be provided to all emergency responders to improve overall emergency response.	All	Moderate	County Emergency Management	FEMA/MEMA, Local funds	2017	Completed
ES-10	Purchase of a tower for emergency communications repeater station.	All	Moderate	County Emergency Management	FEMA/MEMA, Homeland Security, Local funds	2020	Completed

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
ES-11	Digitize mapping and upgrades to current E-911 system to make it Phase II compatible with mapping and data information for emergency response, situation tracking, identification of hazard areas, and other information that may be implemented in Hazard Mitigation Planning and response.	All	High	County Emergency Management	FEMA/MEMA, Homeland Security, Local funds	2016	Completed
Public Education and Awareness							
PEA-1	Education of local citizens on the dangers of driving across flooded roads.	Flood	High	County Emergency Management	FEMA/MEMA, LLEBG, Local funds	2025	The county has worked hard to inform citizens of the dangers of driving across flooded roads, but this action needs to be continued going forward.
PEA-2	Education of local residents on being prepared for all hazards including tornadoes, high winds, and severe weather.	All	High	County Emergency Management	FEMA/MEMA, Local funds	2025	The county has implemented education activities mostly through local radio and print ads The county will continue to work on better public information techniques and improve public communication.
PEA-3	Encourage the construction of safe rooms and tornado shelters.	Tornado, High Wind	Moderate	County Emergency Management	FEMA/MEMA, Local funds	2025	Safe room construction has been encouraged throughout the county, especially with new construction, but the county will continue to seek funding to install additional safe rooms and shelters.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
PEA-4	Improve the County's library of hazard response reference materials.	All	Moderate	County Emergency Management	FEMA/MEMA, AFGP, Homeland Security, Local funds	2020	Completed
PEA-5	Development of a Leake County website with links to all County Offices, emergency plans, etc.	All	Moderate	Board of Supervisors	FEMA/MEMA, Local funds	2020	Completed
Previously Completed Actions							

City of Carthage Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
Prevention							
P-1	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in flood-prone areas.	Flood	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.
P-2	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in heavily wooded areas.	Wildfire	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.
P-3	Collect additional data to define hazards, risk areas, and vulnerabilities to be used in future updates of the plan.	All	Low	Fire Department , Police Department	FEMA/MEMA, Homeland Security, Local funds	2025	Although much work has been done to collect data on risks, especially through this planning process, there are still significant needs in terms of data collection. Therefore, this action will remain in the plan.
P-4	Collect additional data on the number of buildings located in flood-prone areas near the Pearl River and determine their assessed value in order to determine potential losses due to a flood event.	Flood	Low	Fire Department , Police Department	FEMA/MEMA, Local funds	2025	Although some data has been collected and analyzed on buildings that are flood prone in this area, the flood risk is not static and needs further evaluation, so this action is being deferred.
Property Protection							
PP-1	Acquire large capacity Sump/Water Pump to assist with flooding of prone areas in city of Carthage	Flood	High	Board of Aldermen	FEMA/MEMA, Local Funds	2020	Complete (pumps are leased)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
Natural Resource Protection							
NRP-1							
Structural Projects							
SP-1	Drainage improvements along Allenwood Drive, Terry Lane, and South Valley Street. Existing drainage system is not capable of handling runoffs from heavy rains.	Flood	High	Public Works	FEMA/MEMA, Local funds	2025	Improvements have not been implemented in these areas, but the city will continue seeking funding.
SP-2	Upgrade levee system on Town Creek south side of Carthage.	Flood	High	Public Works	Local, FEMA, MEMA	2025	New Action
Emergency Services							
ES-1	Develop a plan to notify and evacuate residents living in special hazard areas, mobile homes, and areas of substandard housing before a hurricane strikes.	Hurricane	High	Fire Department , Police Department	FEMA/MEMA, Local funds	2025	Some discussions have taken place concerning an evacuation plan for residents with high vulnerability but the county is seeking funding to develop a full plan.
Public Education and Awareness							
PEA-1	Encourage the construction of safe rooms and tornado shelters.	Tornado, High Wind	Low	Fire Department , Police Department	FEMA/MEMA, Local funds	2025	Safe room construction has been encouraged throughout the county, especially with new construction, but the county will continue to seek funding to install additional safe rooms and shelters.
PEA-2	Education of local residents on being prepared for all hazards including tornadoes, high winds, and severe weather.	All	Low	Fire Department , Police Department	FEMA/MEMA, Local funds	2025	The county has implemented education activities mostly through local radio and print ads The county will continue to work on better public information techniques and improve public communication.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
PEA-3	Education of local citizens on the dangers of driving across flooded roads.	Flood	Low	Fire Department , Police Department	FEMA/MEMA, Local funds	2025	The county has worked hard to inform citizens of the dangers of driving across flooded roads, but this action needs to be continued going forward.
Previously Completed Actions							

Town of Lena Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2016)
Prevention							
P-1	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in flood-prone areas.	Flood	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.
P-2	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in heavily wooded areas.	Wildfire	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.
P-3	Consider adoption of the International Code Council's International Building Code.	All	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	The International Building Code has been adopted. The county will need to review this code over the next 5 years, so this action will remain in the plan.
P-4	Collect additional data to define hazards, risk areas, and vulnerabilities to be used in future updates of the plan.	All	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Homeland Security, Local funds	2025	Although much work has been done to collect data on risks, especially through this planning process, there are still significant needs in terms of data collection. Therefore, this action will remain in the plan.
P-5	Collect additional data on the number of buildings located in flood-prone areas near the Pearl River and determine their assessed value in order to determine potential losses due to a flood event.	Flood	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	Although some data has been collected and analyzed on buildings that are flood prone in this area, the flood risk is not static and needs further evaluation, so this action is being deferred.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2016)
Property Protection							
PP-1							
Natural Resource Protection							
NRP-1							
Structural Projects							
SP-1							
Emergency Services							
ES-1	Purchase of a generator to provide adequate standby power for the Town of Lena's water system.	Tornado, High Wind	High	Public Works	FEMA/MEMA, Homeland Security, Local funds	2017	Completed
ES-2	Develop a plan to notify and evacuate residents living in special hazard areas, mobile homes, and areas of substandard housing before a hurricane strikes.	Hurricane	High	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	Some discussions have taken place concerning an evacuation plan for residents with high vulnerability but the county is seeking funding to develop a full plan.
ES-3	Purchase of a generator to provide adequate standby power for the Lena Volunteer Fire Department.	Tornado, High Wind	Moderate	Volunteer Fire Department	FEMA/MEMA, AFGP, Homeland Security, Local funds	2025	A generator for the fire department has not been purchased due to lack of funding. The town will continue to try to find a funding source for this project.
ES-4	Renovate existing emergency warning system so that it can be remotely activated by the E-911 Center during emergencies.	Tornado, High Wind	Moderate	Board of Aldermen	FEMA/MEMA, Homeland Security, Local funds	2025	The existing emergency warning system has not been renovated to have remote activation capabilities. The county will continue to seek funding to implement this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
Public Education and Awareness							
PEA-1	Education of local citizens on the dangers of driving across flooded roads.	Flood	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, LLEBG, AAA (free booklets?), Local funds	2025	The county has worked hard to inform citizens of the dangers of driving across flooded roads, but this action needs to be continued going forward.
PEA-2	Encourage the construction of safe rooms and tornado shelters.	Tornado, High Wind	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	Safe room construction has been encouraged throughout the county, especially with new construction, but the county will continue to seek funding to install additional safe rooms and shelters.
PEA-3	Education of local residents on being prepared for all hazards including tornadoes, high winds, and severe weather.	All	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	The county has implemented education activities mostly through local radio and print ads The county will continue to work on better public information techniques and improve public communication.
Previously Completed Actions							

Town of Walnut Grove Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
Prevention							
P-1	Clean out debris and enlarge the main drainage ditch that runs through the Town of Walnut Grove to Tusculometa Creek.	Flood	High	Public Works	FEMA/MEMA, CDBG, Local funds	2017	Completed
P-2	Waterway maintenance of flood-prone waterways, including: clearing and removal of debris; dredging of waterways; and erosion prevention measures, such as rip rap and planting of vegetation.	Flood	Moderate	Public Works	FEMA/MEMA, CDBG, US Army Corps of Engineers, Local funds	2025	This action has been partially completed as there is a plan in place for clearing and debris removal. However, the county is seeking funding for erosion prevention measures and dredging.
P-3	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in flood-prone areas.	Flood	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.
P-4	Work with ECPDD to develop a model ordinance to regulate new/existing construction and infrastructure in heavily wooded areas.	Wildfire	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	Deferred. A model ordinance has not been developed. The action is currently under consideration from local officials and will remain in the plan.
P-5	Consider adoption of the International Code Council's International Building Code.	All	Moderate	Board of Aldermen	FEMA/MEMA, Local funds	2025	The International Building Code has been adopted. The county will need to review this code over the next 5 years, so this action will remain in the plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
P-6	Collect additional data to define hazards, risk areas, and vulnerabilities to be used in future updates of the plan.	All	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Homeland Security, Local funds	2025	Although much work has been done to collect data on risks, especially through this planning process, there are still significant needs in terms of data collection. Therefore, this action will remain in the plan.
P-7	Collect additional data on the number of buildings located in flood-prone areas near the Pearl River and determine their assessed value in order to determine potential losses due to a flood event.	Flood	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	Although some data has been collected and analyzed on buildings that are flood prone in this area, the flood risk is not static and needs further evaluation, so this action is being deferred.
P-8	Work to become compliant with National Flood Insurance Program (NFIP) guidelines.	Flood	Low	Board of Aldermen	FEMA/MEMA, Local funds	2025	The town has worked hard to become compliant with the NFIP. This is an action that still requires some work, so the town will leave it in place in the plan.
Property Protection							
PP-1							
Natural Resource Protection							
NRP-1							
Structural Projects							
SP-1	Installation of a larger culvert on Main Street at Walnut Grove Town Hall to alleviate flooding in the downtown area.	Flood	High	Public Works	FEMA/MEMA, CDBG, Local funds	2025	A larger culvert has not been installed on Main Street due to lack of funding. The town will continue to seek funding to implement this project.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
SP-2	Installation of a larger culvert on the north side of Spruce Street near South Leake High School.	Flood	Moderate	Public Works	FEMA/MEMA, CDBG, Local funds	2020	Completed
Emergency Services							
ES-1	Purchase of a generator to provide adequate standby power for the Town of Walnut Grove water system.	Tornado, High Wind	High	Public Works	FEMA/MEMA, Homeland Security, Local funds	2017	Completed
ES-2	Develop a plan to notify and evacuate residents living in special hazard areas, mobile homes, and areas of substandard housing before a hurricane strikes.	Hurricane	High	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	Some discussions have taken place concerning an evacuation plan for residents with high vulnerability but the county is seeking funding to develop a full plan.
ES-3	Renovate existing emergency warning system so that it can be remotely activated by the E-911 Center during emergencies.	Tornado, High wind	Moderate	Board of Aldermen	FEMA/MEMA, Homeland Security, Local funds	2020- 2025	Partially completed. The existing emergency warning system has not been renovated to have remote activation capabilities. The county will continue to seek funding to implement this action.
ES-4	Construction of a new fire station for so the Walnut Grove Volunteer Fire Department can most effectively respond to emergencies and to serve as the emergency response post during such emergencies.	Tornado, High Wind	Moderate	Volunteer Fire Department	FEMA/MEMA, CDBG, Local funds	2020	Completed

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
ES-5	Increasing specialized training of local emergency responders in order to improve response capabilities.	All	Moderate	Volunteer Fire Department	FEMA/MEMA, AFGP, Homeland Security, Local funds	2025	Although some training of local responders has taken place, there is a continual need to train new responders and keep current responders up to date, so this action will remain in place.
ES-6	Conducting mock emergency exercise to improve local response capabilities.	All	Moderate	Volunteer Fire Department	FEMA/MEMA, AFGP, Homeland Security, Local funds	2025	The county has conducted mock emergency exercises, but these will still need to be carried out going forward. The county will continue to carry these out in the future.
Public Education and Awareness							
PEA-1	Education of local citizens on the dangers of driving across flooded roads.	Flood	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, LLEBG, AAA, Local funds	2025	The county has worked hard to inform citizens of the dangers of driving across flooded roads, but this action needs to be continued going forward.
PEA-2	Encourage the construction of safe rooms and tornado shelters.	Tornado, High Wind	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	Safe room construction has been encouraged throughout the county, especially with new construction, but the county will continue to seek funding to install additional safe rooms and shelters.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2021)
PEA-3	Education of local residents on being prepared for all hazards including tornadoes, high winds, and severe weather.	All	Low	Volunteer Fire Department, Police Department	FEMA/MEMA, Local funds	2025	The county has implemented education activities mostly through local radio and print ads The county will continue to work on better public information techniques and improve public communication.
Previously Completed Actions							