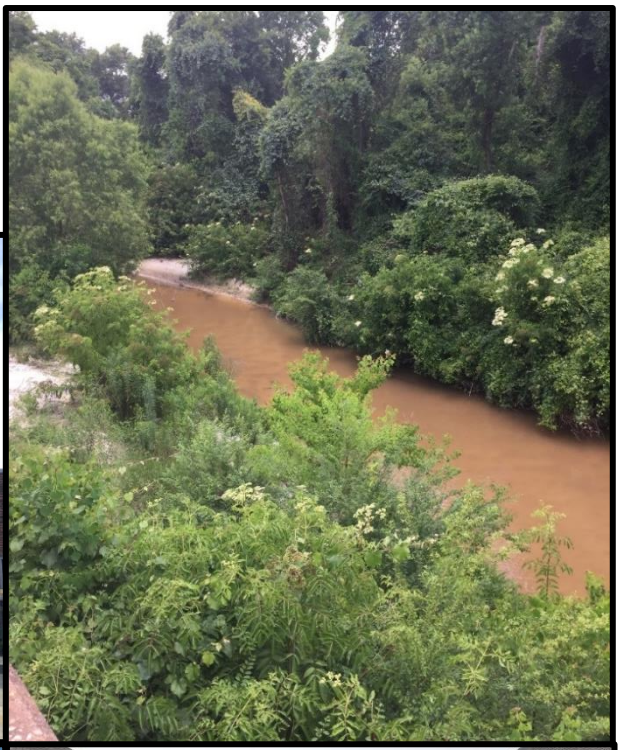
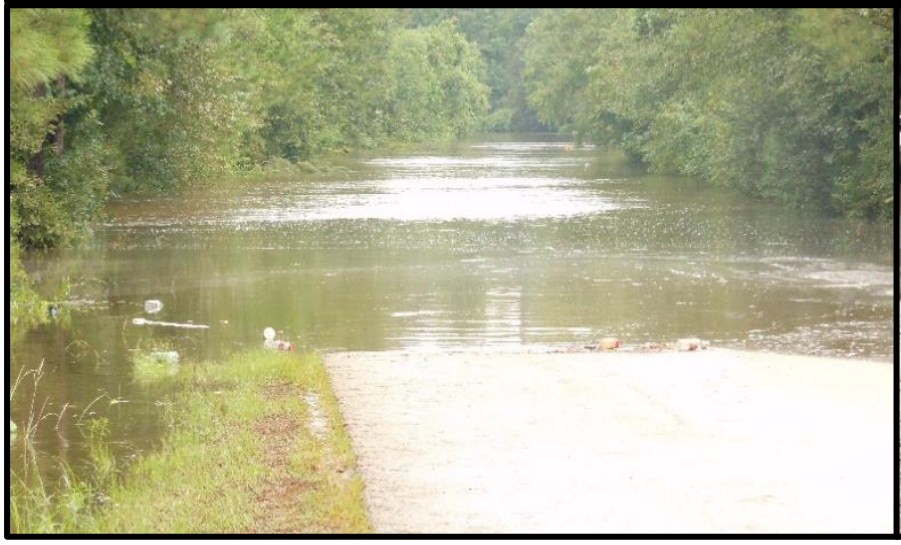
TANGIPAHOA PARISH

Hazard Mitigation Update 2020





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SECTION 1 INTRODUCTION

This plan will identify cost effective and environmentally sound mitigation strategies that will reduce or eliminate long-term risk to human life and property from natural hazards. Implementation of this plan can reduce the enormous cost of disasters to property owners and all levels of government. Mitigation strategies often include protecting critical community facilities, reducing exposure to liability and minimizing community disruption. Land development planning, adoption of building codes, elevation of homes, and acquisition and relocation of homes away from floodplains are just a few examples of mitigation strategies.

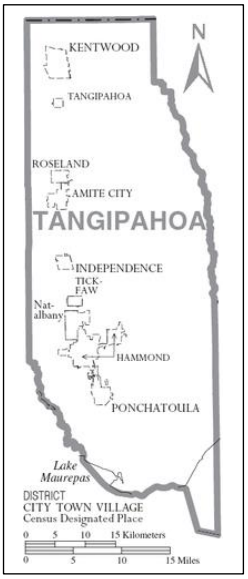
In the past, federal legislation has provided funding for disaster relief, recover, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 improved this planning process and became effective October 10, 2000, when the President signed the Act (Public Law 106-390). The new legislation reinforced the importance of mitigation planning and emphasized planning for disasters before they occur. The Act established a predisaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program. The Act increased the amount of funds available to states and local communities that have developed a comprehensive, enhanced mitigation plan prior to a disaster.

This hazard mitigation plan is a comprehensive plan for disaster resiliency in Tangipahoa Parish. As required by federal regulations under the Act of 2000, the Hazard profiles contained in this plan provide information on the natural and man-caused hazards that could affect the municipalities and rural areas of Tangipahoa Parish. Tangipahoa Parish prepared this Hazard Mitigation Plan to be better equipped for disasters before they occur. It is our hope that, with proper planning, our citizens can be more knowledgeable of things they can do to protect their property and their lives from the devastation caused by hazards like floods and hurricanes. In addition, it is our desire to objectively evaluate the hazards that occur in our Parish and, as government officials, prioritize the actions that we need to take to provide a safe place to live.

The Parish's first Hazard Mitigation Plan was funded in September 2002 by a Planning Grant from the Federal Emergency Management Agency (FEMA) and administered by the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) and was finalized in March 2006. In August 2005, one of the worst hurricanes to hit Louisiana in recent history came ashore. Hurricane Katrina caused significant flooding in south Louisiana and continued her path of destruction northward. Next, Hurricane Rita struck Louisiana approximately one month later. The entire State of Louisiana was named as part of a presidentially-declared disaster for both Hurricanes Katrina and Rita. Once again Tangipahoa Parish faced the cleanup after the storm. Subsequently, the Tangipahoa Parish Council was made aware of a Planning Grant that would assist in updating the existing hazard mitigation plan using funds made available through FEMA from the Hazard Mitigation Grant Program (HMGP) fund created after Hurricanes Katrina and Rita. The Parish applied for a Planning Grant and was awarded the grant in May 2007. This additional funding was made available through FEMA's Expanded Mitigation Strategies Planning Grant Pilot which is administered by the State of Louisiana and provides funds to update existing hazard mitigation plans and/or identify and document feasible mitigation projects. These funds assisted Tangipahoa Parish in updating the hazard mitigation plan to reflect new information, such as the Advisory Base Flood Elevation 9BFEs) and identifying cost-effective specific mitigation projects, focusing on those particular types of projects that may be eligible for HMGP funding. The Parish faced a powerful hurricane in August of 2012, when Hurricane Isaac brought heavy rainfall leading to severe inland flooding, peaking at 23.22 inches in Hammond, Louisiana[1]. And, in both March and August 2016, the Parish was heavily impacted by severe flooding that impacted more than 10,000 structures in the Parish. For this 2020 plan update, the Parish prepared the Plan using its own resources and staff.

Location and Hazard Risk

Tangipahoa Parish is located in southeast Louisiana, north of New Orleans and east of Baton Rouge. It is strategically situated to serve New Orleans, Baton Rouge and Mississippi. St. Tammany and Washington Parishes are located to the east of Tangipahoa. St. Helena and Livingston Parishes are located to the west of Tangipahoa Parish. The State of Mississippi is located to the north of the Parish. St. John the Baptist and Jefferson Parishes are located to the south of the Parish, meeting in Lake Pontchartrain. Tangipahoa Parish consists of an area of 790.3 square miles, or 505,790 acres. Tangipahoa Parish contains 8 incorporated communities: Hammond, Ponchatoula, Amite, Kentwood, Independence, Roseland, Tangipahoa and Tickfaw. Tangipahoa Parish is located in Louisiana Governor's Office of Homeland Security and Emergency Preparedness 9GOHSEP) Region 9.



The 2000 Census reports that Tangipahoa Parish population at 100,588 people with 36,558 households. Tangipahoa Parish's population from 1990 Census report was listed as 85,709 people, a population change of 17.4%. The 2006 Census reports show a total population of 113,137 and a housing stock in the Parish of 44,190 units. This change in the rural areas of Tangipahoa Parish can be attributed to the 6.6% increase int eh year following Hurricane Katrina. The City of Hammond's population fluctuates, with an additional 17,000 people due to Southeaster Louisiana University's enrollment. In 2010, the U.S. Census reports the population of the Parish at 121,101, up 7,964 from 2006.

Figure 1-1: Map of Tangipahoa Parish and Jurisdictions
(Source: http://upload.wikimedia.org)

Table 1-1 – Tangipahoa Parish Population

Tangipahoa Parish Population						
Name	Total 2017 population	Total 2010 Population	Total 2006 Population	Total 2000 Population	Total 1990 Population	Total 1980 Population
Tangipahoa Parish	132,497	121,101	113,137	100,588	85,709	80,698
Hammond, City of	20,480	20,019	19,134	17,639	15,871	15,043
Ponchatoula, City of	7,265	6,559	6,156	5,180	5,425	4,459
Amite, City of	4,442	4,152	4,287	4,110	4,236	4,301
Kentwood, Town of	2,404	2,206	2,309	2,205	2,468	2,637
Independence, Town of	1,891	1,665	1,828	1,724	1,632	1,684
Roseland, Town of	1,259	1,127	1,306	1,162	1,093	---
Tangipahoa, Village of	844	759	784	747	569	---
Tickfaw, Village of	771	695	683	617	565	---

This HM Plan will discuss twelve hazards affecting Tangipahoa Parish, five of which will be profiled and have proposed mitigation actions identified. The identified hazards of Tangipahoa Parish include flooding, tropical hurricanes, thunderstorms with lightning and high winds, tornadoes, severe winter/hailstorms, extreme heat, drought, wildfires, coastal erosion, saltwater intrusion. Hazard Profiles (see Section Two) are included for these hazards and contain information on the likelihood of occurrence, possible magnitude or intensity, areas of the Parish that could be affected and conditions that could influence the manifestation of the hazard.

Transportation

The main transportation arteries through Tangipahoa Parish are Interstate Highway 12 and U.S. Highways 51 and 190. The State Highways are 10, 16, 22, 38, 40, 442, 443, 445, 1054, 1058, and 1062. Interstate 12 runs east/west through the southern portion of the Parish. Interstate 55 runs north/south through the Parish. Some of these roadways are significant evacuation routes for Tangipahoa Parish, as well as surrounding Parishes during states of emergency.

Tangipahoa Parish is served by Illinois Central Gulf Railroad. The railroad runs north/south through the Parish, parallel to Interstate 55. Rail rates in Louisiana for many commodities tend to be lower than those in the other states, because of the competition from barge carriers. All lines handle a significant volume of containers, trailers on flat cars, and carload traffic between New Orleans and other parts of America. Baton Rouge Metropolitan Airport serves Tangipahoa Parish 56 miles to the west in Baton Rouge and is served by five commercial carriers, including Continental Airlines, American Airlines, Delta Airlines, Northwest Airlines, with 70 flights daily on 3 runways. The local airport is the Hamond Municipal Airport with 2 runways.

The closest international waterway port is located 56 miles to the west in Baton Rouge at the Port of Baton Rouge, with a channel depth of 45 feet. The nearest port facilities are located 24 miles to the south at the Port of Manchac with an 8-foot channel depth and 2 barge terminals.

History

Tangipahoa Parish is part of the area known as the Florida Parishes. It was established on March 6, 1869, the last of the Florida Parishes. It was cut from several surrounding parishes as a right-of-way for a railroad from New Orleans to Natchez. The Parish seat is in Amite.

The largest municipality in the Parish was named after Peter Hammond, a Swedish adventurer who first settled the area. The economic story of Hammond began in 1860, when C. E. Cate bought land and constructed a home, as well as a shoe factory, tannery and a sawmill. The railroad came through Hammond soon after, and Hammond became a key center for the Confederacy during the Civil War.

Soon after the Civil War, Peter Hammond laid out the town and merchandising businesses quickly made Hammond a commercial center for the area. In 1893, Colonel Henry Robinson built the first of 3 magnificent hotels on a site facing the railroad tracks near the middle of town. The town became a popular stop for northern visitors who would come south for the winter months and for New Orleans residents who wanted to escape the Yellow Fever season during the summer months.

By the early twentieth century, Hammond was known as the Strawberry Capital of America. Boxcar loads of the produce were shipped north from the City, until competition from California and other states decreased

the market share. Hammond is probably the smallest city at an intersection of 2 major interstate highways, but the diversity of commerce and industry in the City is a welcome contrast to its size.

The Town of Independence was originally known as Uncle Sam, when it was settled in the 1830's. Italian families began to arrive in the early 1880s and began working in the sugar cane fields. Because of its heritage, the Town became known as Little Italy. The Italian families began to establish strawberry and truck farms in Uncle Sam, which was ideally located along the railroad between Amite and Hammond. As these hard-working immigrants grew in numbers, they began to leave the fields and establish a retail industry to support employees at the nearby Southern Car Works. They eventually renamed the town Independence, and it remained a significant cultural force in the Parish.

Kentwood was named after Amos Kent, an early settler who established a sawmill and a brickyard, which eventually became the largest in the south. The lumber industry thrived in the area, until about 1920, when the virgin timber began to diminish. Kentwood had been the largest town in the Parish, but much of the population left when the timber trade declined. The people remaining in the Town turned to the dairy industry and began to prosper again, using cooperative breeding and marketing techniques. Today, it remains a principal industry in the northern reaches of the Parish.

The first railroad was chartered in 1852 by New Orleans, Jackson and Great Norther Railroad (later Illinoi Central). That event drew the first land developers to a site 68 miles from New Orleans that had been selected as a station stop, later to become known as Amite. The City of Amite has been the Parish seat since the creation of the Parish in 1869. The word Amite is derived from a French word describing the amiable Indians that the early explorers found in the area. Amite was the site of one of the principal Louisiana Confederate induction centers and training camps, during the Civil Ware, at a nearby Camp Moore which was named for Governor Thomas Overton Moore. Over 400 soldiers are buried at Camp Moore Cemetery.

Ponchatoula is a Choctaw Indian name, meaning falling or flowing hair, which was the Indian description of the fungus called Spanish moss. When the railroad was commissioned, Ponchatoula began to grow as the work crews needed a base camp. Eventually sawmills were built to harvest the abundant pine and cypress forests nearby. Strawberry and truck farms provide another basic industry to the area. The original Ponchatoula railroad depot was built by the New Orleans, Jackson & Great Northern Railroad. The depot burned when Union forces captured the Town in March 1863. It was then rebuilt in 1865. The present-day depot was built in 1894 and then remodeled in the late 1920s.

Topography

The topography of the Parish extends from low flat land in the south to rolling hills in the north. It is the center of the strawberry industry in the south. The true heartland of piney woods in Tangipahoa Parish is characterized by gently rolling hill country dotted with farmsteads and small towns, separated by a rich growth of pine forests and occasional hardwoods. The Parish is approximately 51 miles long and 18 miles wide.

The terrain of the Parish consists of gently rolling hills, with elevations that range from 370 feet, along the northern State boundary, to 0 feet in the wetlands along Lakes Maurepas and Pontchartrain.

Approximately 45% of the total land area of Tangipahoa Parish is located within FEMA's 100-year floodplain. The majority of the floodplain is found along the Tangipahoa River, Natalbany River, Lake Maurepas and Lake Pontchartrain shorelines, and the Tchefuncte River.

Climate

Tangipahoa Parish has a semi-tropical climate. Variations in daily temperature are determined by distance from the Gulf of Mexico and, to a lesser degree, by differences in elevation. The average annual temperature for the State of Louisiana as a whole is 68°F. January is the coldest month, averaging 55°F, and July the warmest, averaging 81°F. Winter months are usually mild, with cold spells of short duration. Snow fall is less than 1" per year. The summer months are quite warm. Average annual precipitation for the area is 68 inches. Tangipahoa Parish has an average of 300 days of sun per year. Prevailing winds are from the north and northeast in the winter and fall and from the southeast in the spring and summer.

Economy

The economic base of Tangipahoa Parish consists of companies in the lumber and wood products industries, food products industries, healthcare, educational institutions, agriculture and agricultural-related industries. Its hare-working labor force, excellent transportation network abundant raw materials, and land for commercial and industrial development make Tangipahoa Parish an ideal prospect for business investment. Tangipahoa Parish is ranked 12th out of 64 parishes in per capita retail sales.

Table 1-2 – Tangipahoa Parish Employer Sectors for 2016

Description of Sectors	NAICS Code	Total Establishments	Paid Employees for Pay Period	Annual Payroll ($1,000)
Agriculture, Forestry, Fishing and Hunting	11	5	7	$141
Mining, Quarrying, Oil and Gas Extraction	21	11	67	$4,431
Utilities	22	10	E	D
Construction	23	170	1,035	$52,928
Manufacturing	31-33	81	2,305	$93,670
Wholesale trade	42	103	2,305	$93,960
Retail trade	44-45	433	6,721	$175,561
Transportation and Warehousing	48-49	84	1,598	$69,809
Information	51	26	483	$22,223
Finance and Insurance	52	180	2,251	$182,056
Real Estate and Rental/Leasing	53	116	530	$20,155
Professional, Scientific, and Technical Services	54	204	1,017	$66,406
Management of Companies	55	9	137	$11,148
Educational Services	61	34	463	$13,246
Healthcare and Social Assistance	62	310	8,434	$323,941
Arts, Entertainment, Recreation	71	30	347	$4,468
Accommodations and Food Services	72	235	5,038	67,982
Other Services (except public administration)	81	246	1,528	$44,191
Industries not classified	99	6	9	$156

Source: https://factfinder.census.gov

Table 1-3 – Tangipahoa Parish Major Employers (Source: Tangipahoa Economic Development Foundation)

Major Employers in Tangipahoa Parish as of June 2019		
North Lake Support & Services Center	Medical	Not listed on TEDF for 2019
Tangipahoa Parish School System	Education	2760
North Oaks Health System	Medical	2700
Inner Parish Security Corp	Security	1100
Southeastern Louisiana University	Education	1100
Wal-Mart Distribution Center	Distribution	850
CARE, Inc.	Medical	800
Sanderson Farms, Inc.	Food Processing	600
C&S Distribution	Distribution	440
Wal-Mart Stores – Hammond	Retail	400
Tangipahoa Parish Government	Government	360
Smitty's Supply	Manufacturing & Distribution	325
City of Hammond	Government	300
Elmer's Candy Corporation	Manufacturing & Distribution	300
Options, Inc.	Education – Disabilities	300
Wal-Mart Stores – Amite	Retail	300
Wal-Mart Stores – Ponchatoula	Retail	300
First Guaranty Bank	Banking	290
Neill Corp	Beauty/Retail	250
Entergy	Utilities	240
North Cypress Fitness	Health Club	150
J&M Industries	Manufacturing & Distribution	145
LSU Regional Medical Center	Medical	125

The Tangipahoa Economic Development Foundation (TEDF), working together with the Tangipahoa Parish Economic Development Office, continues to identify opportunities and lead efforts to attract new jobs and investment, enhance the climate for retention and expansion of existing business, address education and workforce development needs, and provide advocacy for economic development public policy on behalf of all Tangipahoa Parish citizens. The TEDF Master Plan focuses on five strategic goals to create an environment conducive to increasing business investment and job creation within the Parish. These five goals are: marketing, business development, workforce development, infrastructure development and resource development.

GINGER & MIKE COMPLETE THIS SECTION

Hazard Mitigation

To fully understand hazard mitigation efforts in Tangipahoa Parish and throughout Louisiana, it is first crucial to understand how hazard mitigation relates to the broader concept of emergency management. In the early 1980s, the newly-created Federal Emergency Management Agency 9FEMA) was charged with developing a structure for how the federal, state, and local governments would respond to disasters. FEMA developed

the *four phases of emergency management*, an approach which can be applied to all disasters. The four phases are as follows:

- Hazard Mitigation – described by FEMA and the Disaster Mitigation Act of 2000 (DMA 2000) as "any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event." The goal of mitigation is to save lives and reduce property damage. Besides significantly aiding in the obviously desirous goal of saving human lives, mitigation can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical community facilities and minimize community disruption, helping communities return to usual daily living in the aftermath of disaster. Examples of mitigation involve a range of activities and actions, including the following: land-use planning, adoption and enforcement of building codes, and construction projects (e.g., flood-proofing homes through elevation, or acquisition or relocation away from floodplains).
- Emergency Preparedness – includes plans and preparations made to save lives and property and to facilitate response operations in advance of a disaster event.
- Disaster Response – includes actions taken to provide emergency assistance, save lives, minimize property damage, and speed recovery immediately following a disaster.
- Disaster Recovery – includes actions taken to return to a normal or improved operating condition following a disaster.

Illustrated below is the basic relationship between these phases of emergency management. While hazard mitigation may occur, both before and after a disaster event, it is significantly more effective when implemented before an event occurs. This is one of the key elements of this Plan and its overall strategy: reduce risk before disaster strikes, in order to minimize the need for post-disaster response and recovery.

Figure 1-2: The four phases of emergency management and their relation to future hazard mitigation
(Source: Louisiana State Hazard Mitigation Plan 2014)

As figure 1-2 demonstrates, mitigation relies upon updating in the wake of disaster. This can give the appearance that mitigation is only reactive rather than proactive. In reality, however, post-disaster revision

is a vital component of improving mitigation. Each hazardous event affords an opportunity to reduce the consequences of future occurrences.

Unfortunately, this cycle can be painful for a community. For instance, the risks of disasters that could create catastrophic incidents in Louisiana were thought to be relatively wee-understood, prior to 2005. However, the impact of the 2005 hurricane season on the Gulf Coast region of the United States prompted a new level of planning and engagement related to disaster response, recovery, and hazard mitigation. Hurricanes Katrina and Rita hit three weeks apart and together caused astonishing damage to human life and to property. The two storms highlighted a hurricane season that spawned 28 storms – unparalleled in American history. The 2005 hurricane season confirmed Louisiana's extreme exposure to natural disasters and both the positive effects and the concerns resulting from engineered flood-protection solutions.

The catastrophic events of 2005 and 2016 had profound impacts on emergency management and hazards mitigation throughout Louisiana. The storms also raised awareness of the importance of hazard mitigation among decision-makers and the general populations, which has been particularly important, especially since natural hazards will likely be increasing in frequency, magnitude, and impact in the coming years due to climate change.

General Strategy

During the last update, the Louisiana Hazard Mitigation Team (SHMT) began a long-term effort to better integrate key components of all plans with hazard mitigation implications in Louisiana to ensure that the programs, policies, recommendations, and implementation strategies are internally consistent. As each of these documents has been adopted by various agencies with the State, the SHMT has worked to incorporate this information into the decision process.

Part of the ongoing integration process is that GOHSEP requires the parishes and the local municipalities with independent hazard mitigation plans to utilize the same plan format and methodologies as the State Hazard Mitigation Plan, in order to create continuity of information from local-to-State mitigation plans and programs.

The 2015 and 2020 Tangipahoa Parish Hazard Mitigation Plan (HMP and Plan update) maintains some of the information from 2010 Plan version, but it now reflects the order and methodologies of the Louisiana State Hazard Mitigation Plan.

This Plan update now also coheres with the Plain Writing Act of 2010, which requires federal agencies to use clear communication that is accessible, consistent, understandable, and useful to the public. While the State of Louisiana and its political subdivision are not required to meet such standards, the Act aligns with the best practices in hazard mitigation. Since successful hazard mitigation relies on full implementation and cooperation at all levels of government and community, a successful hazard mitigation plan must also be easily used at all of these levels. Nevertheless, the Tangipahoa Parish Hazard Mitigation Steering Committee was not ignorant nor dismissive of the successful analysis and mitigation planning executed in previous Plan updates. This Plan update remains coherent with those documents, retaining language and content when needed, deleting when appropriate, and augmenting it when constructive.

2020 Plan Update

This 2020 Plan update proceeds with the three previous goals of the Tangipahoa Parish Hazard Mitigation Plan. The current goals are as follows:

Goal 1: Identify and Pursue preventative measures that will reduce future damages form hazards.

Goal 2: Reduce repetitive flood losses in the Parish and municipalities

Goal 3: Regulate sound development in the Parish and municipalities, so as to reduce or eliminate the potential impact of hazards

OTHER GOALS???

This Plan update makes a number of textual changes throughout. But the most obvious changes are data-related and structural. First, the Spatial Hazard Events and Losses Database for the United States (SHELDUS) was used as a data source for hazard identification, because it incorporates all storm event data from the National Climatic Data Center (NCDC) Storm Events Database used in previous plans, as well as storm events data from other sources, including the NOAA Storm Prediction Center, National Hurricane Center, and the U.S. Fire Administration. Furthermore, all of the sections were updated to reflect the most current information and the most current vision of the plan update. Second, instead of seven sections, separate sections of numerous tables, maps and appendices, the present plan update has four sections and five appendices. The most significant changes are the newly developed hazard profiles and risk assessments, the removal of much repetition between sections from the previous plan updates. The 2020 plan update is organized generally as follows:

- (note: be sure this section matches the 2020 Plan Table of Contents)
- Section 1 Introduction
- Section 2 Hazard Identification and Parish-wide Risk Assessment
- Section 3 Capability Assessment
- Section 4 Mitigation Strategies
- Appendix A Planning Process
- Appendix B Plan Maintenance
- Appendix C Mapping Methodology
- Appendix D Plan Adoption
- Appendix E State Required Worksheets

Section 2 of the old plan (Parish Profile) has been moved to Section 1 (Introduction) in the update.

The Hazard Identification and Profile was moved from Section 4 to Section 2 in the present Update. It was also synthesized with the Risk Assessments for Parish-wide and Parish- and municipally-0owned assets for each hazard. Additionally, Saltwater Intrusion and Sea Level Rise were added under the Coastal Erosion category, while other hazards were moved. Lightning, Hail, and High Wind were all profiled under Severe Thunderstorm, and Hurricanes and Tropical Storms are now classified as Tropical Hurricanes. Furthermore, Storm Surge was profiled as a subcategory of Tropical Hurricanes.

The Risk Assessment (previously comprising Section 4) and the Risk Assessment for Parish- and local-Owned Assets (previously comprising Section 4) were consolidated within Section 2 of the present update. In addition, this update changes the methodology used in the Risk Assessment for Parish- and Local-Owned Assets to reflect current data on damage.

The Planning Process (previously Section 3) has been moved to an appendix in this document.

Section 5 Mitigation Strategies was moved to Section 4 of the present update. The three identified goals from the previous plan remain in the current plan. The Mitigation Action Section has been revised to reflect the process used in this plan update, as well as the results from the Tangipahoa Parish evaluation and ranking hazards. New actions were added.

(Note: check to see if this matches w/appendix):
Lastly, Section 6 Plan Maintenance was moved to an appendix in this document.

Despite numerous changes in this plan update, the Plan remains consistent in its emphasis on the few types of hazards that post the most risk to loss of life, injury, and property in Tangipahoa Parish and its municipalities. The extent of this risk is dictated primarily by its geographic location. Most significantly, Tangipahoa Parish remains at high risk of water inundation from various sources, including backwater flooding, failure of dams/levees and forced drainage systems, tornadoes and tropical hurricane activity. All of the Parish is also at high risk of damages from high winds and wind-borne debris – caused by various meteorological phenomena. Other hazards threaten the Parish and/or its municipalities, although not to such a great degree and not in such widespread ways. In all cases, the relative social vulnerability of areas threatened and affected plays a significant role in how governmental agencies and their partners (local parish, State and federal) prepare for and respond to disasters.

Mitigation efforts related to particular hazards are highly individualized by jurisdiction. Flexibility in response and planning is essential. Indeed, although funding for relief from major disasters has been available and ample, funds are not always directed effectively to the appropriate areas due to relatively poor communication between federal, State, Parish and local authorities. The most important step forward to improve hazard management capability is to improve coordination and information sharing between the various levels of government regarding hazards.

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SECTION 2 HAZARD IDENTIFICATION AND PARISH-WIDE RISK ASSESSMENT

This section assesses the various hazard risks Tangipahoa Parish faces, in order to identify a strategy for mitigation. Having identified the categories of hazards, emergencies, disasters, and catastrophes, this section details the major climatological and natural/human-influenced hazards by (1) defining them, (2) explaining how they are measured, (3) describing their geographic extent, (4) surveying their previous occurrences, and (5) evaluating their future likelihood of occurrences.

The Table below provides an overview of the of the hazards that had been previously profiled in the Tangipahoa Parish Hazard Mitigation Plan published in 2015. Those hazards identified as high or medium risk by the State of Louisiana and previously identified as a risk by the Parish, have been determined to provide a medium to high risk to Tangipahoa Parish and will be profiled in this section. These hazards include:

Table 2-1: Hazard Profile Summary

Hazard	Profiled in the Last 2015 Parish Plan	Profiled in the 2020 Update
Coastal Land Loss	X	X
Flooding	X	X
Subsidence	X	X
Thunderstorms (Hail, Lightning & Wind)	X	X
Tornados	X	X
Tropical Cyclones/Hurricanes	X	X
Wildfires	X	X
Winter Storms	X	X
Cyber Security		x
Bioterrorism		x
Pandemic		x

Prevalent Hazards to the Community

While many of the hazards identified in Table 2-1 occur in the Parish, some other hazards occurrences are not merited for further study by the Parish Planning Committee. The determination was made to focus attention and resources of the most prevalent hazards which include the hazards previously profiled. The following hazards have been selected to be included in this Risk Assessment:

a. Coastal Land Loss
b. Flooding (backwater, storm surge, riverine, localized storm water event)
c. Subsidence (now included with Coastal Land Loss)
d. Thunderstorms (including hail, lightening, wind)
e. Tornadoes
f. Tropical Cyclones/Hurricanes (flooding and high winds, hurricanes)
g. Wildfires
h. Winter Storms
i. Cyber Security

j. Bioterrorism
k. Pandemic

For analysis purposes, the impact of the critical prevalent hazards is summarized as follows:

- Flooding from rivers and waterways, rainstorms, tropical storms, and hurricanes in the following forms:
    a. Riverine
    b. Stormwater
    c. Surge
    d. Back water flooding (as the result of river flooding and surge)
- High wind damage most commonly resulting from hurricanes, thunderstorms, cyclones, and tornadoes
- Coastal land loss as a result of land subsiding and coastal erosion which have been combined into a single hazard, since both result in increased potential for flooding

The potential destructive power of Tropical Hurricanes (flooding and high wind) was determined to be the most prevalent and the most frequent hazard to the Parish. Thirteen of the twenty-one presidential declarations Tangipahoa Parish has received resulted from tropical hurricanes which validates this as the most significant hazard. Therefore, the issue of hurricanes will serve as the main focus during the mitigation planning process. Hurricanes present risks from the potential flooding, primarily resulting from storm surge, and high wind speeds. While storm surge is considered the hazard with the most potential destructive potential, the risk assessment will also assess non-storm surge flooding as well. Since 1965, Tangipahoa Parish has received 5 Presidential Declarations, as a result of flooding.

Hurricanes, tropical storms, and heavy storms are fairly common occurrences and resultant wind damage is of utmost concern. Damage from high winds can include roof damage, destruction of homes and commercial buildings, downed trees and power lines, and damage and disruption to services caused by heavy debris. A wind map for Tangipahoa Parish is included as Figure 2-38.

Because Tangipahoa Parish is a parish with significant coastline along Lake Pontchartrain and Lake Maurepas, it is also susceptible to land loss through coastal erosion and land subsidence. The coastal wetlands serve as an important natural barrier to potential storm surge from tropical hurricanes and their loss through erosion and subsidence has the potential to significantly increase the risk to Tangipahoa Parish.

Tangipahoa Parish also has no dams located within the Parish boundaries that are considered to be significant potential hazard dams by the USACE. However, the Parish does have 12 low-risk dams as well.

Tangipahoa Parish identified many hazards that affected the community in the past and may possibly affect the Parish and municipalities in the future. These hazards are addressed individually through a widespread process that included input from the Steering Committee members (comprised of representatives from Parish/State departments and agencies, Parish and State Emergency Preparedness Offices, local businesses and local residents), public involvement, researching archived articles published or documented within the Parish pertaining to those disasters, past disaster declarations in the Parish, and a review of current FIRMs and Flood Insurance Studies.

FEMA has tracked and compiled a list of all the federally-declared disasters for the State of Louisiana. Therefore, we know that since 1965 this data is a complete and accurate list of all the federally declared disaster events in Tangipahoa Parish. Tangipahoa Parish has been a Presidential-declared major disaster area on 21 different occasions since 1965. Table 2-2 contains a detailed account of the federally declared disaster history of Tangipahoa Parish.

Table 2-2 summarizes the hazards the Steering Committee identified as impacting the Parish. The hazards were prioritized, based upon a number of factors including, frequency, severity, life and death consequences, potential impact, and ultimately ranked based on what the Steering Committee determined. This Table 2-2 also explains how the hazards were identified and why they were identified.

Table 2-2: Hazards that have a medium-to-high impact on Tangipahoa Parish

	How Identified	Why Identified	Priority
Hazard	Input from local residents and businesses	Major floods occurred in 1969, 1983, 2016	High
	Input from Parish and State Emergency Preparedness Officials	Effects from hurricanes which caused tremendous devastations in the Parish	
	Review of past disaster declarations	Numerous repetitive loss properties are located in the Parish	
	Review of DFIRMs and Flood Insurance Studies	Federally-declared disasters	
	Identification of NFIP repetitive loss properties in the Parish	The I-55 exit ramp frequently floods	
		Major concern is that 20,000 to 100,000 people would be trapped on the high rise, if it were not operable	
Floodwaters	?	?	High
	?	?	
Hurricanes	Input from local residents and businesses	Caused debris and wind damage	High
	Input from Parish and State Emergency Preparedness Officials	Power outages throughout the Parish	
	Review of past disaster declarations	Federally-declared disasters	

Thunderstorms, Lightning, High Winds and Hail	Input from local residents and businesses	Numerous thunderstorms and lightning events	High
	Input from Parish and State Emergency Preparedness Officials	Can be damaging to homes and businesses	
	Input from Parish Utilities Department		
Tornadoes	Input from industry	Potential for loss of residential and commercial structures	High
	Input from Parish and State Emergency Preparedness Officials	Potential for loss of life and bodily injury	
	Input from Department of Public Works	Several tornadoes have caused damages in the Parish	
	Input from Parish Planning Commission		
	Input from the Parish Sheriff's Office		
Wildfires	Input from local residents and businesses	Large part of the Parish is forested or agriculture	High
	Input from Parish and State Emergency Preparedness Officials	Drought can lead to fires	
	Input from Parish Fire Department	Fixed facilities are at risk for fires	
Winter Storms	Input from Parish and State Emergency Preparedness Officials	The Parish encountered a snow and ice storm in 1989, 2017	
Drought	Input from local residents and businesses	There has been at least one local declaration for drought	High
	Input from Parish and State Emergency Preparedness Officials	The Parish was in a drought for nearly 6 years from 2002-2008; and __?_____	
Extreme Heat	Input from local residents and businesses	The Parish is an area subject to heat index values in excess of 115 degrees F for the 5-percent-annual event	Medium
	Input from Parish and State Emergency Preparedness Officials		
	Input from Parish Utilities Department		
Coastal Land Loss (includes saltwater intrusion and subsidence)	Input from industry	Impacts the timber industry	Medium
	Input from Parish Planning Commission	Several aquifers in the Parish and drinkable	
	Input from the Department of Public Works	Erosion of soils are an ongoing problem that has occurred for years	
	Input from the Parish Water District	Variation in soils across the Parish	
		Coastal area classified within the Parish	
Cyber Security			
Bioterrorism			

Pandemic			

Natural hazards, the largest single contributor to catastrophic or repetitive damage to communities nationwide, evolve from atmospheric, geologic, hydrologic, and seismic events. They pose threats in all areas of the United States. The impacts of natural hazards can be local or widespread, predictable or unpredictable. Resulting property and infrastructure damage can range from minor to major, depending on whether hazard events affect major or minor population centers. When the damage to life and property becomes real, not just potential, the event is commonly called a natural disaster.

Risk assessments provide the foundation for the rest of the mitigation planning process. It focuses attention on areas most in need by evaluating which populations and facilities are most vulnerable to natural hazards and to what extent injuries and damages may occur. It provides:

- the hazards to which the community is susceptible;
- what these hazards can do to physical, social and economic assets
- which areas are most vulnerable to damage from these hazards; and
- the resulting cost of damages or costs avoided through future mitigation projects.

In addition to the description of each hazard, the detailed hazard profiles will discuss:

- how likely it is that a hazard will impact the area (probability); often supported by previous occurrences, with the dates, frequency, extent and damage. When past events have not occurred, or data is missing or incomplete, probability potential is based on conditions that may cause the hazard event, i.e. dam failure, earthquake, storm surge, etc.
- how severe the hazard will be (magnitude);
- where the hazards will affect the community (geographic extent or location); and
- conditions in the community that may increase or reduce the effects of the hazard.

Based on the overall impact of the above considerations, the four hazards for which this Plan will develop mitigation actions are floods, hurricanes, thunderstorms with lightning, high winds and tornadoes. The remaining hazards were profiled, but it was determined that they do not pose a significant risk to the planning area within Tangipahoa Parish.

Previous Occurrences

Table 2-3 Summarizes federal disaster declarations for Tangipahoa Parish in the last 55 years. Information includes names, dates and types of disasters.

Table 2-3: Tangipahoa Parish Major Disaster Declarations.

Disaster Declaration Number	Date	Type of Disaster	Description
208	9/10/1965	Tropical Hurricane (Hurricane Betsy)	• Winds measured up to 115 mph in Hammond • Part of Interstate-10 broke off and floated away, making traffic movements impossible • Rising flood waters completely blocked the Illinois Central right-of-way • Many trains were stopped at Hammond on their southbound journey to New Orleans

			• Between $25,000 - $30,000 worth of cattle were lost • Crops suffered severe damage • Estimated 250,000 eggs were lost • A gas line burst in the 900 block of South Magnolia Street, spewing gas in the area • Shingles were ripped off and the roofs of many businesses and residential structures were blown away or collapsed • Buildings were smashed and windows shattered • Uprooted and fallen trees created heavy damage to homes, businesses and snapped power lines • Hammond was blacked out for a period of time • Over 14,000 people took refuge in shelters • Several people were injured due to the effects from the storm • Estimated damage for Hammond was $1 million
374	4/27/1973	Severe Storm, Flood	• Major damage to crops throughout the Parish • Several Bridges collapsed form overflow of water • Backwaters and overflow created problems in the Parish • Tangipahoa River was 16 feet above normal • Flood water levels were 8 inches short of a record
3031	2/22/1977	Drought and Freezing	• Power companies suffered damage to many distribution lines • Parish roads were closed • Drought kept production of hay low, hurting dairy farmers and cattle ranchers
534	5/2/1977	Severe Storm, Flood	• Recorded rainfall of 13.44 inches in 48 hours • Roads closed throughout the Parish • Estimated damages neared $3 million • Rescue personnel sent boats to rescue people trapped by flood waters Some areas reported 6 to 7 feet of water
679	4/20/1983	Severe Storm, Flood	• Water damage in homes were recorded above 2 feet • Heavy rains besieged the areas throughout the Parish • Several bridge sides were washed out due to overflow of waters • Several incidents of illegal poaching • Wildlife had to flee from rising waters • Estimated 453 families affected
752	11/1/1985	Tropical Hurricane (Hurricane Juan)	• Spawned rain for five days • Backed up water in rivers throughout the Parish caused flooding

			• E.t feet of water in buildings at peak • Estimated $1 million in damages for 3 parishes • 53 homes had water inside • 16 businesses had water damage • 95% of camps along Tangipahoa River had water inside
833	6/16/1989	Hurricane, Rain/Storm, Tornado	• 8 inches of rain fell • Electrical and phone service was knocked out Parish-wide • Many roads were covered by water and impassable
956	8/25/1992	Tropical Hurricane (Hurricane Andrew)	• Winds were estimated to have reached 75 mph • Amite reported moderate damage from strong gusts and rain • All schools in the Parish were closed • Fallen trees, power lines and high water blocked many streets and roads throughout the Parish • Virtually every road in the area contained debris • Parts of the State and Federal highways were impassable • About 28,000 customers were without electricity throughout the Parish
978	2/2/1993	Severe Storm, Flood	• Tides averaged two to three feet above normal • Flooding was generally confined to inundation of low-lying roads and nearby bayous • Numerous customers were without power
1049	5/8/1995	Rainstorm, Flood	• Received 12 inches of water in 2 days • Several culverts washed out and roads were underwater throughout the Parish • Tangipahoa River flowed over its banks, causing flooding in subdivisions • Roads closed throughout the Parish
1246	9/30/1998	Tropical Hurricane (Hurricane Georges)	• Winds hit at 30-40 mph • Schools were closed throughout the Parish • Reported wind damage to homes and power lines • Downed trees and widespread power outages were the main problems in the Parish • Residents in the extreme south end of the Parish were forced to evacuate • Parish roads were closed Drought kept production of hay low, hurting dairy farmers and cattle ranchers
1380	6/5/2001	Tropical Hurricane (TS Allison)	• Estimated rainfall received was more than 20 inches • Heavy rains dumped 4.3 inches of rain in Hammond, 4.2 inches in Ponchatoula and 1.75 in Amite • Parish disbursed over 3,000 sandbags

			• Reports of over a dozen weather-related accidents • Parish received extensive street flooding
1435	9/27/2002	Tropical Hurricane (TS Isadore)	• Storm surge of 4 to 5 feet above normal • 4 to 8 inches of rainfall occurred within 6 hours • Drainage systems were overwhelmed • Streets, homes and automobiles were flooded • Sustained winds of 35 to 45 mph, with gusts of 50 mph in squalls
1437	10/3/2002	Tropical Hurricane (Hurricane Lili)	• More than 40 roads were closed due to high water • Downed trees and power lines were widespread throughout the Parish • About 10,700 customers were without power in the Parish
1548	9/15/2001	Tropical Hurricane (Hurricane Ivan)	• Total damage in Louisiana was $7.9 million • Sustained winds of 83 mph, with gusts of 100 mph • At least 55,000 customers experienced power outages • Around Lake Pontchartrain and west of the Mississippi River, storm surge was 2 to 4 feet above normal.
1603	8/29/2005	Tropical Hurricane (Hurricane Katrina)	• Hurricane eye passed through the Parish approximately 35 miles east of Amite, La. • Hurricane-force winds exceeded 90 mph • Thousands of downed trees, a shortage of potable water, and loss of electricity and essential communication • Extensive obstruction of all roadways, rail crossings, bridges, and drainage systems, due to fallen trees • Power outage of 100% for 3 days, and some rural areas for up to 2 weeks • Flood damage occurred only in the low-lying areas of the Parish; observed precipitation over 10 inches • 89 homes were destroyed • Damage to critical infrastructure was over $8.4 million • Dairy industry suffered economic loss of $1.2 million • More than 75% of timber in Tangipahoa, St. Tammany and Washington Parishes was damaged
1607	9/24/2005	Tropical Hurricane (Hurricane Rita)	• Maximum sustained winds of 120 mph • Flooding occurred in areas adjacent to Lake Pontchartrain • Damage in southwest Louisiana estimated near $4 billion

1786	9/2/2008	Tropical Hurricane (Hurricane Gustav)	• Hammond received 4.65 inches of precipitation, while Amite received 6 inches • Most damage was isolated in the southern part of the Parish near Manchac, where severe flooding was observed
4080	8/29/2012	Tropical Hurricane (Hurricane Isaac)	• The Tangipahoa River reached major flood stage and all residents with a half-mile of the River were ordered to evacuate • Areas in the southern portion of the Parish were ordered to evacuate, including the Manchac area, the Akers community, Lee's Landing and all areas south of Wadesboro Road and Weinberger Road
4263	March 8, 2016	Flooding	• Major river flooding developed along the Tangipahoa River and other large streams.
4277	August 12, 2016	Flooding	• 12 to 18 inches of rainfall over a 2 day period • 11,000 homes and businesses suffered various degrees of flooding throughout the parish

Probability of Future Hazard Events

The probability of a future hazard event occurring in Tangipahoa Parish is estimated below. The percent chance of an event happening during any given year was calculated by posting past events and dividing by the time period. Unless otherwise indicated, the time period used to access probability followed the method used in the State of Louisiana's most current Hazard Mitigation Plan. The primary source for historical data used throughout the Plan is the Spatial Hazards Events and Losses Database (SHELDUS) which provides historical hazard data from 1960 to 2019. In staying consistent with the State Plan, the SHELDUS database was evaluated for the last 30 years (1989 – 2019), in order to determine future probability of a hazard occurring. While the 25-year record used by the State was adopted for the purpose of determining the overall probability, to assist with determining estimated losses, unless otherwise stated, the full 54-year record was used when HAZUS-HM wasn't available to determine losses. This full record was used to provide a more extensive record to determine losses. All assessed damages were adjusted to inflation, to reflect the equivalent amount of damages with the value of the U.S. dollar today. In addition, the National Climatic Data Center (NCDC) was also used to help identify hazard data specific to the municipalities, as it contains specific data for cities, whereas SHELDUS is limited to parishes.

The following tables show the annual probability for each hazard occurring across the Parish and in separate jurisdictions.

Table 2-4: Probability of Future Hazard Reoccurrence

	Probability				
Hazard	Tangipahoa Parish (unincorporated)	Amite	Hammond	Independence	Kentwood
Coastal Land Loss	100%	0%	0%	0%	0%

Dam Failure	0.01%	0%	0.01%	0%	0%
Drought	4%	4%	4%	4%	4%
Expansive Soils	100%	0%	0%	0%	0%
Floods	28%	4%	16%	4%	4%
Thunderstorm - Hail	28%	28%	28%	28%	28%
Thunderstorm-Lightning	60%	60%	60%	60%	60%
Thunderstorm – Winds	100%	100%	100%	100%	100%
Tornado	60%	60%	60%	60%	60%
Tropical Hurricanes	84%	84%	84%	84%	84%
Wildfires	1%	1%	1%	1%	1%
Winter Storms	12%	12%	12%	12%	12%

Table 2-5: Probability of Future Hazard Reoccurrence

	Probability			
Hazard	Ponchatoula	Roseland	Village of Tangipahoa	Tickfaw
Coastal Land Loss	0%	0%	0%	0%
Dam Failure	0%	0%	0%	0%
Drought	4%	4%	4%	4%
Expansive Soils	0%	0%	0%	0%
Floods	4%	4%	4%	4%
Thunderstorm - Hail	28%	28%	28%	28%
Thunderstorm-Lightning	60%	60%	60%	60%
Thunderstorm – Winds	100%	100%	100%	100%
Tornado	60%	60%	60%	60%
Tropical Hurricanes	84%	84%	84%	84%
Wildfires	1%	1%	1%	1%
Winter Storms	12%	12%	12%	12%

High winds from thunderstorms (100%) and tropical hurricanes (84%) are the most prevalent hazards within the Parish and its jurisdictions. This is followed by tornadoes (60%) and lightning from thunderstorms (60%). Flooding in the unincorporated part of the Parish has an annual probability of 28%, as does the chance of a hailstorm (28%). Flooding within Hammond is calculated at an annual probability of 16%, followed by windier storms. The remaining probabilities are considered extremely low, with the chance of drought and flood within the remaining jurisdictions calculated at 4%. The least likely event to occur is a dam failure which is calculated at annual probability of 0.01% and only has a potential impact on the unincorporated area of the Parish.

Inventory of Assets for the Entire Parish

As part of the Risk Assessment, the Planning team identified essential facilities throughout the Parish. Several Methods were used to assist in identifying all essential facilities, including field data collected by

the Louisiana Governor's Office of Homeland Security and Emergency Preparedness on critical infrastructure from a previous hazard mitigation project.

Within the entire planning area, there are is an estimated value of $9,555,337,000 in structures throughout the Parish. The table below provides the total estimated value for each structure by occupancy and were determined based on data collected from the latest version of HAZUS-MH released in 2015.

Table 2-6: Estimated total potential losses throughout Tangipahoa Parish

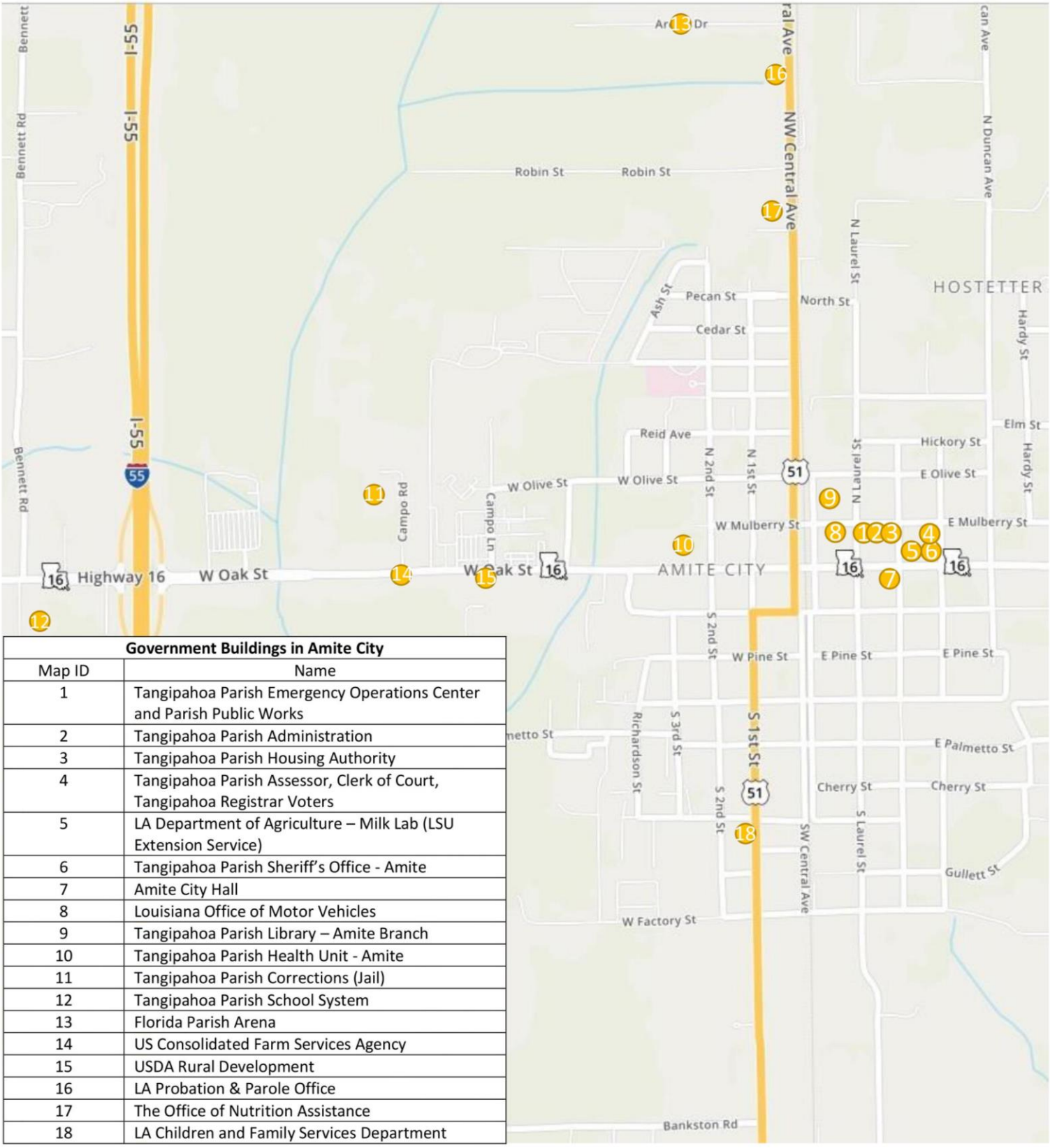
Occupancy	Tangipahoa Parish	Unincorporated Tangipahoa Parish	Amite	Independence	Hammond
Agricultural	$28,599,000	$26,456,000	$490,000	$0	$1,188,000
Commercial	$996,547,000	$583,100,000	$42,024,000	$14,388,000	$268,084,000
Government	$39,139,000	$21,537,000	$3,763,000	$983,000	$4,048,000
Industrial	$199,124,000	$134,018,000	$13,768,000	$3,887,000	$30,399,000
Religion	$206,348,000	$124,751,000	$14,225,000	$1,924,000	$44,338,000
Residential	$7,980,251,000	$5,648,869,000	$237,051,000	$76,024,000	$1,346,954,000
Education	$105,329,000	$70,109,000	$747,000	$3,177,000	$29,235,000
Total	$9,555,337,000	$6,608,840,000	$312,068,000	$100,383,000	$1,724,246,000

Table 2-7: Estimated total of potential losses throughout Tangipahoa Parish

Occupancy	Kentwood	Ponchatoula	Roseland	Village of Tangipahoa	Tickfaw
Agricultural	$465,000	$0	$0	$0	$0
Commercial	$31,448,000	$50,783,000	$4,671,000	$524,000	$1,525,000
Government	$1,335,000	$5,885,000	$1,506,000	$82,000	$0
Industrial	$6,683,000	$10,171,000	$0	$0	$198,000
Religion	$4,667,000	$9,694,000	$5,540,000	$775,000	$434,000
Residential	$99,185,000	$451,332,000	$59,795,000	$27,830,000	$33,211,000
Education	$319,000	$1,408,000	$334,000	$0	$0
Total	$144,102,000	$529,273,000	$71,846,000	$29,211,000	$35,368,000

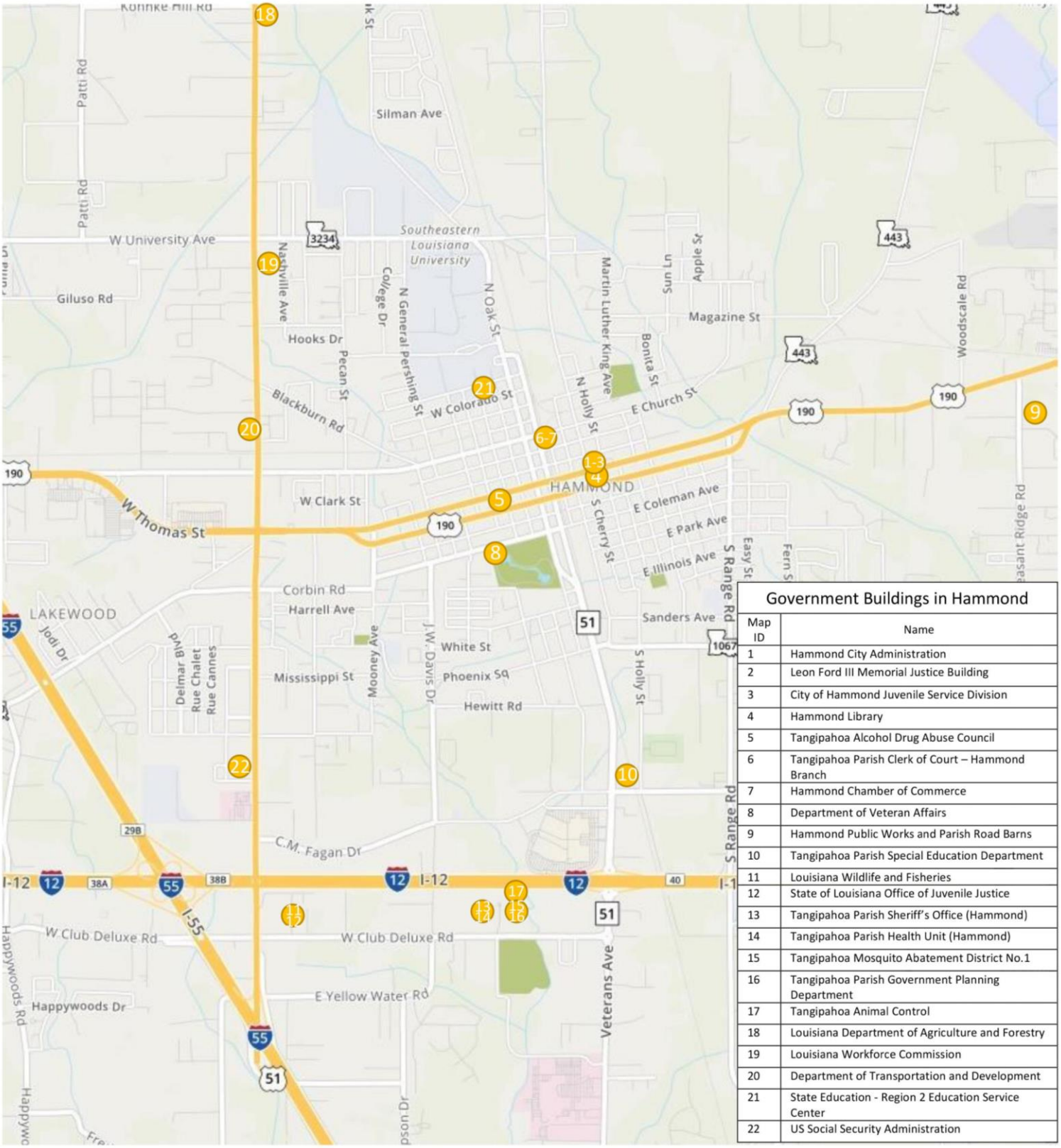
Essential Facilities of the Parish

Below are the locations and names of the essential facilities within the parish.



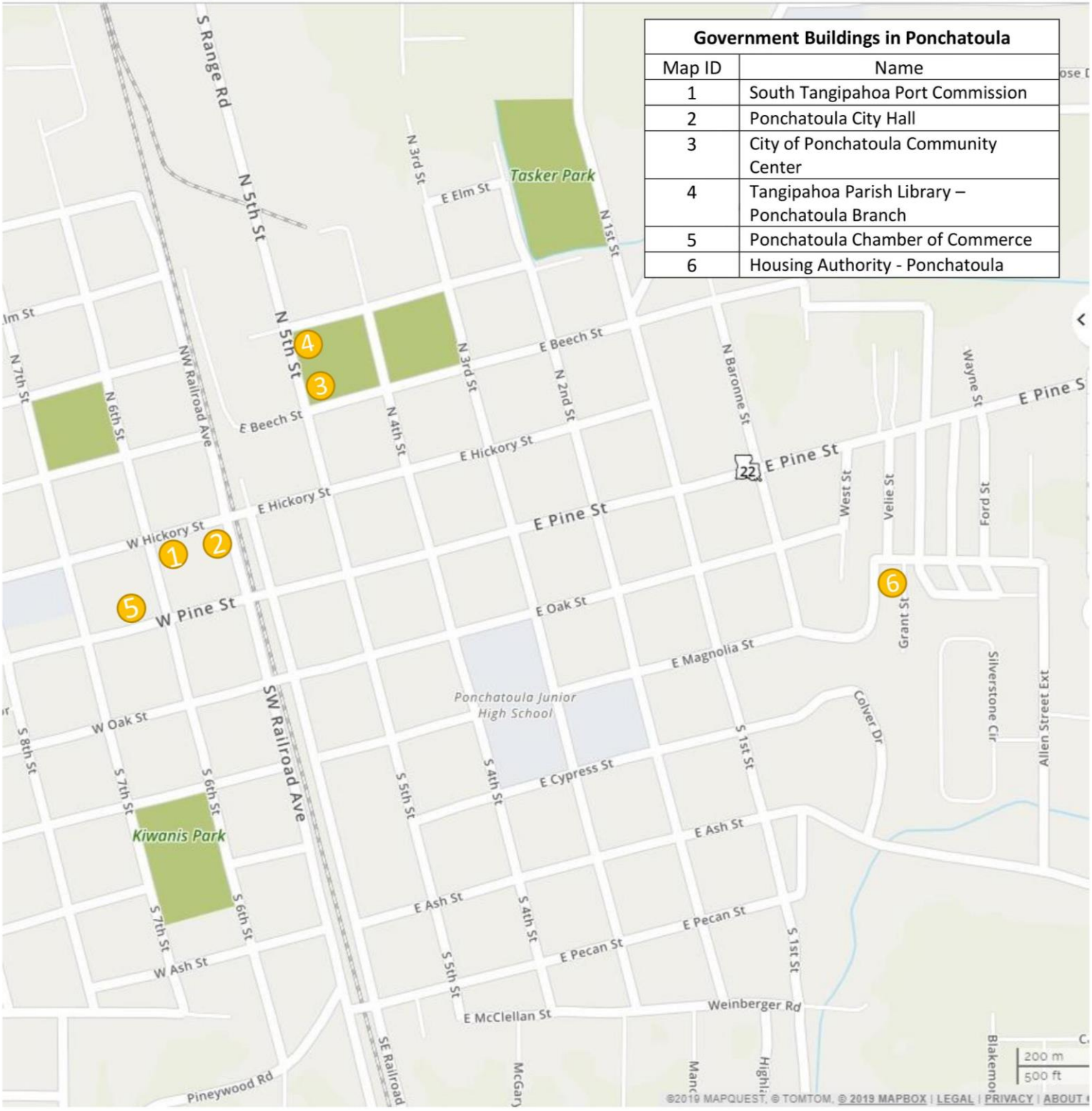
Government Buildings in Amite City	
Map ID	Name
1	Tangipahoa Parish Emergency Operations Center and Parish Public Works
2	Tangipahoa Parish Administration
3	Tangipahoa Parish Housing Authority
4	Tangipahoa Parish Assessor, Clerk of Court, Tangipahoa Registrar Voters
5	LA Department of Agriculture – Milk Lab (LSU Extension Service)
6	Tangipahoa Parish Sheriff's Office - Amite
7	Amite City Hall
8	Louisiana Office of Motor Vehicles
9	Tangipahoa Parish Library – Amite Branch
10	Tangipahoa Parish Health Unit - Amite
11	Tangipahoa Parish Corrections (Jail)
12	Tangipahoa Parish School System
13	Florida Parish Arena
14	US Consolidated Farm Services Agency
15	USDA Rural Development
16	LA Probation & Parole Office
17	The Office of Nutrition Assistance
18	LA Children and Family Services Department

Figure 2-1: Government Buildings throughout Amite City.



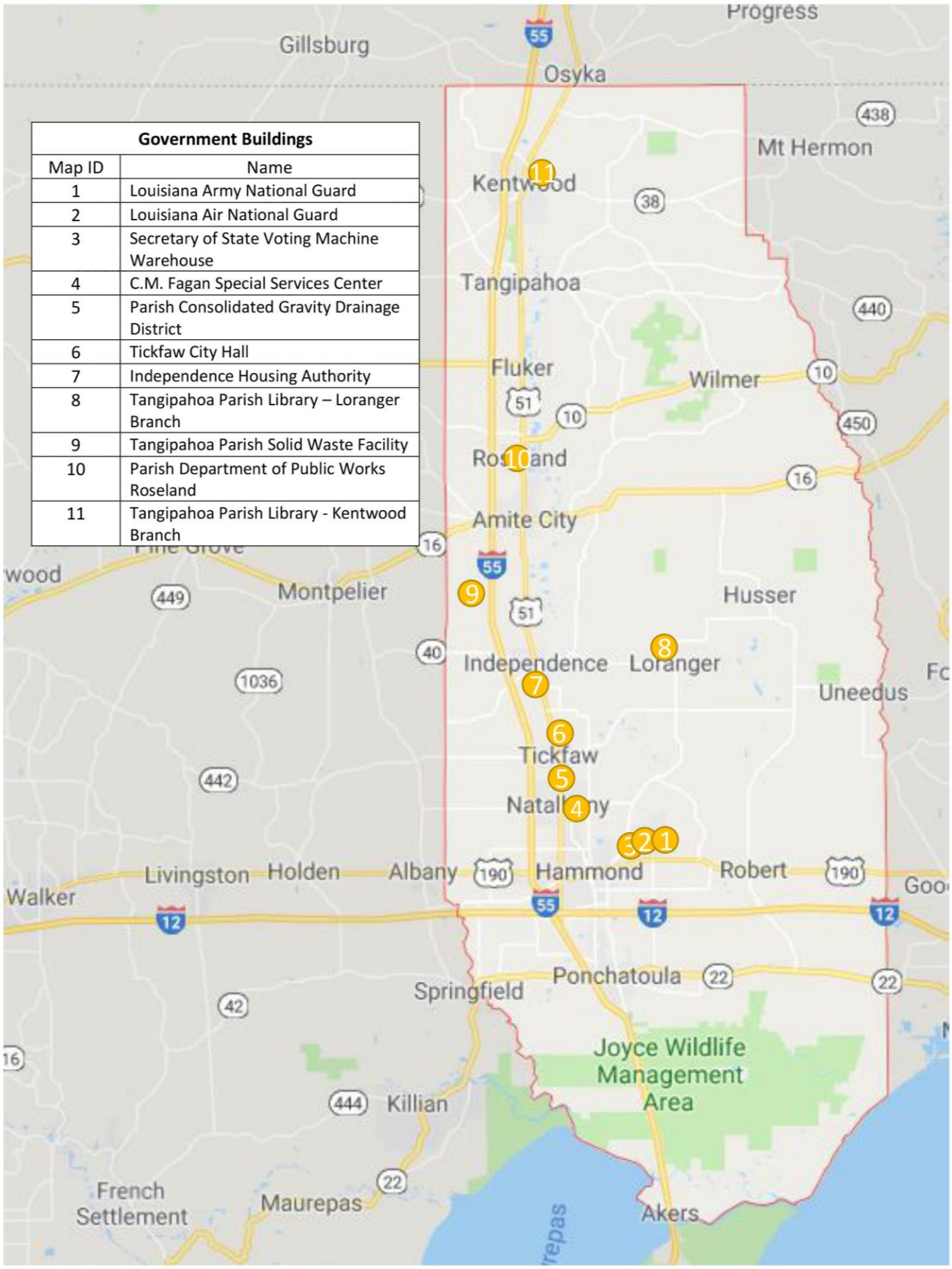
Government Buildings in Hammond	
Map ID	Name
1	Hammond City Administration
2	Leon Ford III Memorial Justice Building
3	City of Hammond Juvenile Service Division
4	Hammond Library
5	Tangipahoa Alcohol Drug Abuse Council
6	Tangipahoa Parish Clerk of Court – Hammond Branch
7	Hammond Chamber of Commerce
8	Department of Veteran Affairs
9	Hammond Public Works and Parish Road Barns
10	Tangipahoa Parish Special Education Department
11	Louisiana Wildlife and Fisheries
12	State of Louisiana Office of Juvenile Justice
13	Tangipahoa Parish Sheriff's Office (Hammond)
14	Tangipahoa Parish Health Unit (Hammond)
15	Tangipahoa Mosquito Abatement District No.1
16	Tangipahoa Parish Government Planning Department
17	Tangipahoa Animal Control
18	Louisiana Department of Agriculture and Forestry
19	Louisiana Workforce Commission
20	Department of Transportation and Development
21	State Education - Region 2 Education Service Center
22	US Social Security Administration

Figure 2-1: Government Buildings throughout Hammond.



Government Buildings in Ponchatoula	
Map ID	Name
1	South Tangipahoa Port Commission
2	Ponchatoula City Hall
3	City of Ponchatoula Community Center
4	Tangipahoa Parish Library – Ponchatoula Branch
5	Ponchatoula Chamber of Commerce
6	Housing Authority - Ponchatoula

Figure 2-1: Government Buildings throughout Ponchatoula.



Government Buildings	
Map ID	Name
1	Louisiana Army National Guard
2	Louisiana Air National Guard
3	Secretary of State Voting Machine Warehouse
4	C.M. Fagan Special Services Center
5	Parish Consolidated Gravity Drainage District
6	Tickfaw City Hall
7	Independence Housing Authority
8	Tangipahoa Parish Library – Loranger Branch
9	Tangipahoa Parish Solid Waste Facility
10	Parish Department of Public Works Roseland
11	Tangipahoa Parish Library - Kentwood Branch

Figure 2-1: Government Buildings throughout eastern Tangipahoa Parish.

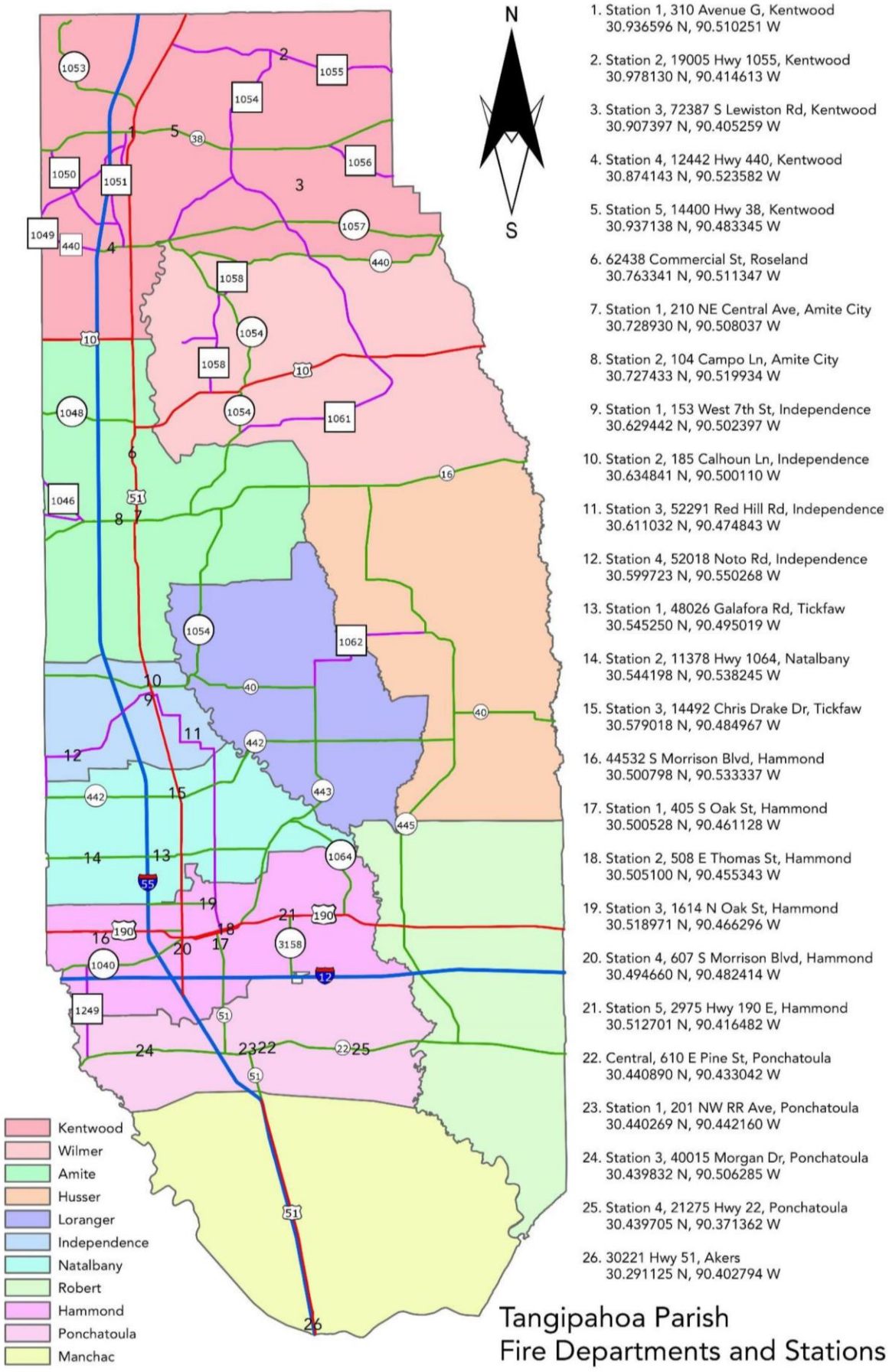


Figure 2-2: Fire Station locations throughout Tangipahoa Parish

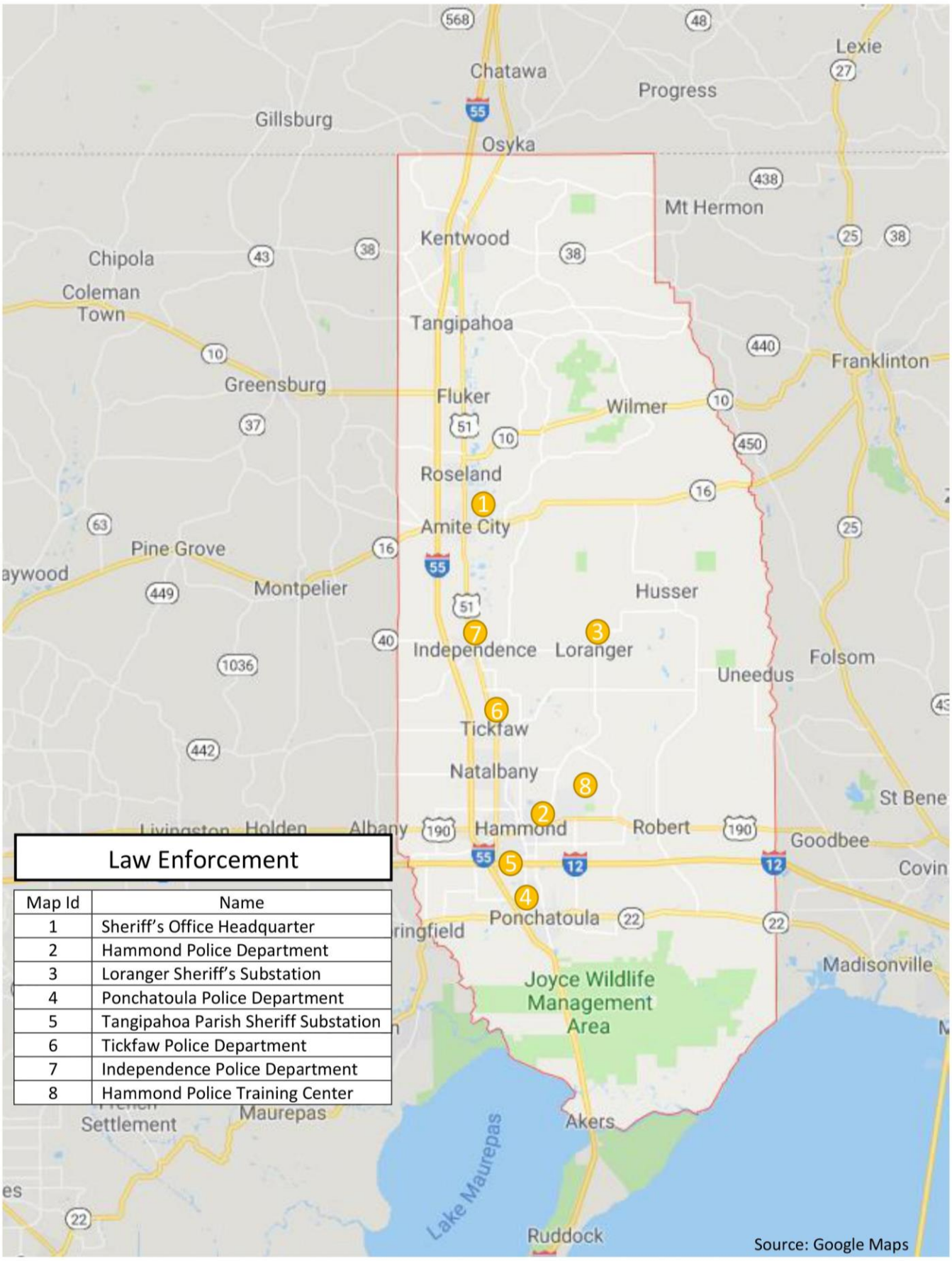


Figure 2-3: Law Enforcement facilities in Tangipahoa Parish

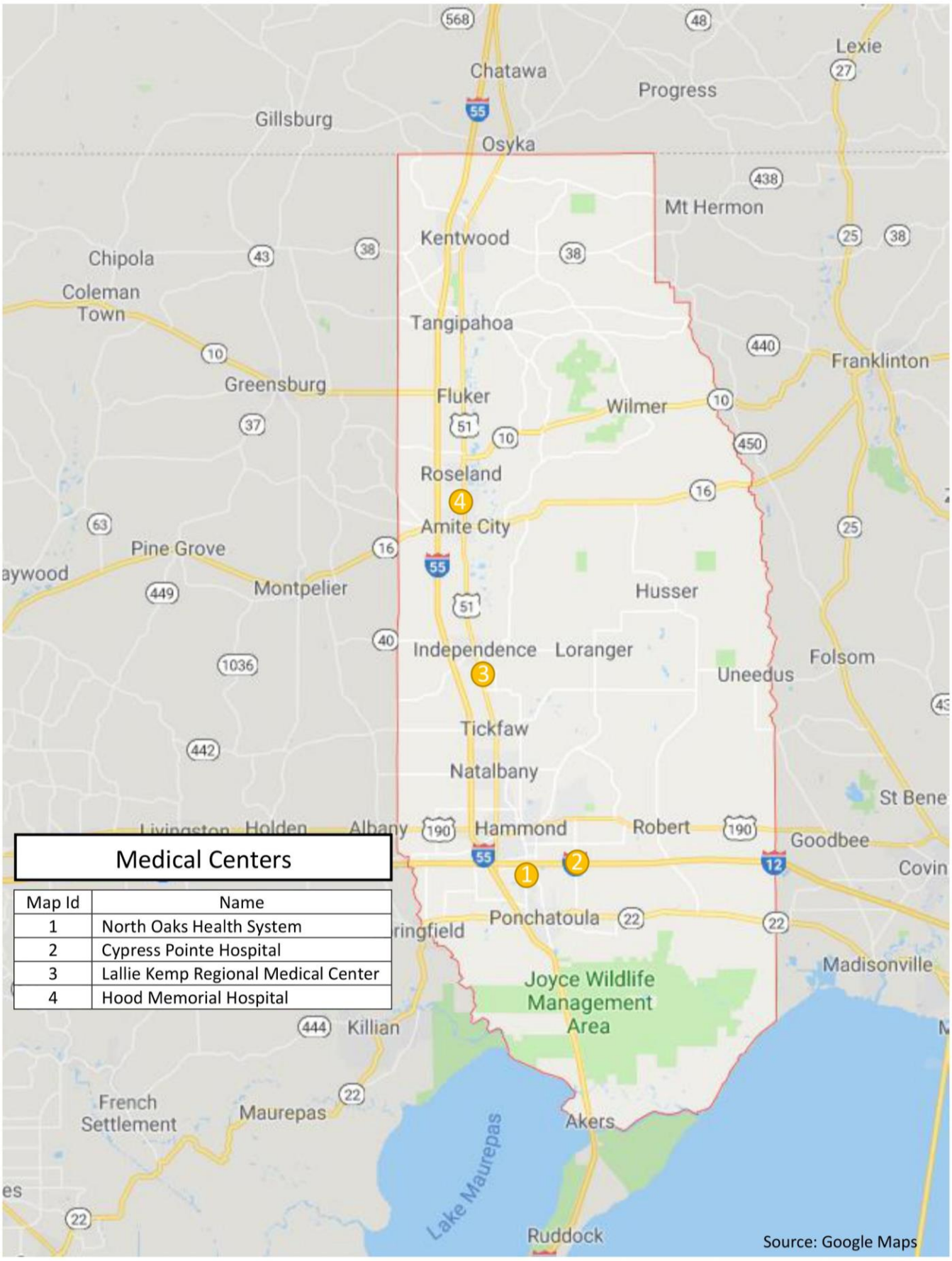
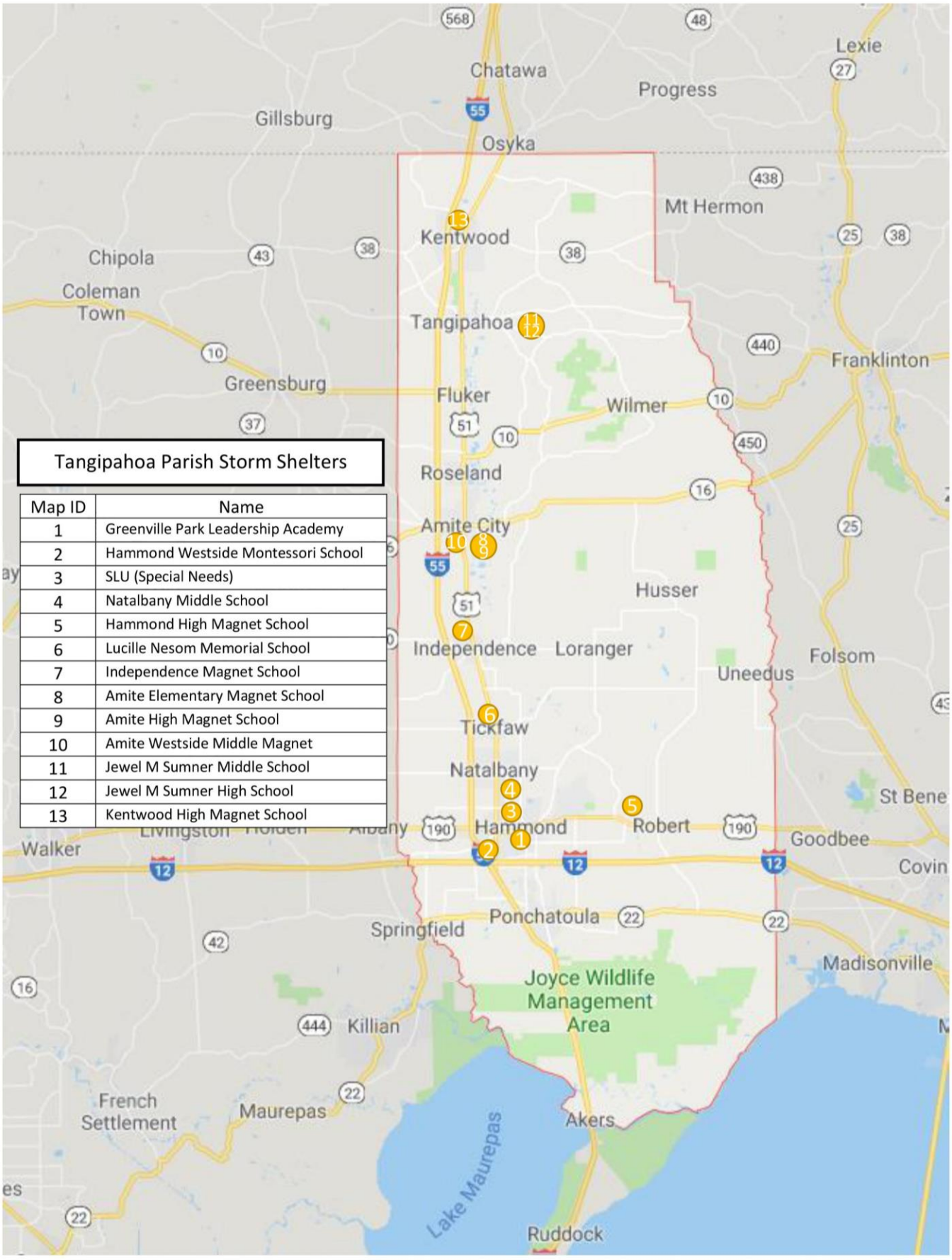


Figure 2-4: Medical centers facilities in Tangipahoa Parish

- 2-18 – Nursing Homes



Tangipahoa Parish Storm Shelters

Future Development Trends

The majority of Tangipahoa Parish growth is expected to take place in the southern portion of the Parish, near Hammond and Ponchatoula, but is also expected to grow in a northward direction. There has been a slow, steady growth over the last several years in Tickfaw and Independence, in terms of overall growth rate. In addition, as seen on Table 2-8 and Table 2-9, Tangipahoa Parish's population has increased significantly since 1980. Tangipahoa Parish's population grew by 58% between 1980 and 2000, from 80,698 to 100,826 person, which was an average growth rate of 1% annually. The Parish continued to grow at an accelerated rate the following 10-year period, with a 2010 population of 121,563 and annual growth rate of 1.7%. Hurricane Katrina redistributed New Orleans' population across the southern U.S. The City of Hammond received over 10,000 residents, nearly doubling its size during the aftermath of Katrina. The Parish population increased 6.6% from September 2005 to February 2007, exceeding its population growth for the preceding 10-year period. Estimates are that 7,000 new residents remain in the Parish from the sudden influx. Since the 2010 Census, the 2018 population for Tangipahoa Parish is estimated to be 130,000 people. While not maintaining the same level of growth as the previous decades, Tangipahoa still continued to grow at a modest rate of 1% annually. There has been a total change of 44,714 people since the 1980 Census, including all of the towns, as well as the unincorporated areas of the Parish. The Parish has a Comprehensive Plan which was adopted in 2008 and is intended to provide the Parish with a sound basis for making choices that will affect its future growth and development. The future population and number of buildings can be estimated using U.S. Census Bureau housing and population data. The tables below show population and housing unit estimates from 2000 – 2018.

Table 2-8: Population Growth Rate for Tangipahoa Parish

Total Population	Amite	Hammond	Independence	Kentwood	Ponchatoula
April 1, 2000	4,110	17,639	1,724	2,205	5,180
April 1, 2010	4,141	20,019	1,665	2,198	6,559
April 1, 2017	4,342	20,325	1,646	2,122	7,015
Population Growth between 2000-2010	0.75%	13.49%	-3.42%	-0.32%	26.62%
Average Annual Growth Rate between 2000-2010	0.08%	1.35%	-0.34%	-0.03%	2.66%
Average Annual Growth Rate between 2010-2017	0.07%	0.03%	0.17%	0.10%	0.12%

Table 2-9: Population Growth Rate for Tangipahoa Parish

Total Population	Roseland	Village of Tangipahoa	Tickfaw	Tangipahoa Unincorporated	Tangipahoa Parish
April 1, 2000	1,162	747	617	67,204	100,588
April 1, 2010	1,123	748	694	83,950	121,097
July 1, 2017	998	711	727	90,964	128,850
Population Growth between 2000-2010	-3.36%	0.13%	12.48%	24.92%	20.39%
Average Annual Growth Rate between 2000-2010	-0.34%	0.01%	1.25%	2.49%	2.04%
Average Annual Growth Rate between 2010-2017	-0.11%	-0.04%	0.04%	0.19%	.20%

Table 2-10: Housing Growth Rate for Tangipahoa Parish (units)

Total Housing Units	Amite	Hammond	Independence	Kentwood	Ponchatoula
April 1, 2000	1,450	7,014	735	979	2,175
April 1, 2010	1,502	8,059	708	967	2,852
July 1, 2017	1,711	7,636	727	987	2,910
Housing Growth between 2000-2010	3.59%	14.90%	-3.68%	-1.23%	31.13%
Average Annual Growth Rate between 2000-2010	0.36%	1.49%	-.037%	-0.12%	3.11%
Average Annual Growth Rate between 2010-2017	0.13%	-0.05%	0.02%	0.02%	0.02%

Table 2-11: Housing Growth Rate for Tangipahoa Parish (units)

Total Population	Roseland	Village of Tangipahoa	Tickfaw	Tangipahoa Unincorporated	Tangipahoa Parish
April 1, 2000	477	266	261	27,437	40,794
April 1, 2010	471	259	277	34,978	50,073
July 1, 2017	430	318	263	38,727	53,709
Housing Growth between 2000-2010	-1.26%	-2.63%	6.13%	27.48%	22.75%
Average Annual Growth Rate between 2000-2010	-0.13%	-0.26%	0.61%	2.75%	2.27%
Average Annual Growth Rate between 2010-2017	-0.08%	0.22%	-0.05%	0.10%	0.07%

As shown in the Tables 2-8 – Table 2-11, Tangipahoa Parish population and housing has grown over the last 18 years. Population rates grew at 2.04% between 2000 – 2010 and slowed significantly in the last 3 years, with a 0.4% in population between 2010 – 2018. Housing grew at a slightly faster rate at 2.27% from 2000 – 2010 and also slowed down in the last 3 years, while keeping up with the population growth rate of 0.4%. The largest growth areas have taken place in the town of Independence (8.9% annually over the last 3 years) and the village of Tickfaw (6.5% annually over the last 3 years). Growth everywhere else in the Parish has remained stagnant with annual growth rates from 0.1% to 1.3% annually. During the same 3-year period, the town of Kentwood and the village of Tangipahoa actually experienced annual declines exceeding 3%.

Future Hazard Impacts

Hazard impacts were estimated for 5 years and 10 years in the future (2020 – 2025). Yearly population and housing growth rates were applied to Parish inventory assets for composite flood, tropical hurricanes, and levee failures. Commercial structures were estimated to increase by 21 structures a year which has been a consistent average of growth over the past 3 years. Average growth rates were estimated at 448 new structures for housing and 0.6% for population, based on recent growth rates in the Parish which have been trending down. A summary of estimated future impacts is shown in the

table below. Dollar values assumed are expressed in future costs and assumed at an annual rate of inflation of 1.02%.

Table 2-12: Estimated Future Hazard Impacts, 2019 – 2024
(Source: HAZUS, US Census Bureau)

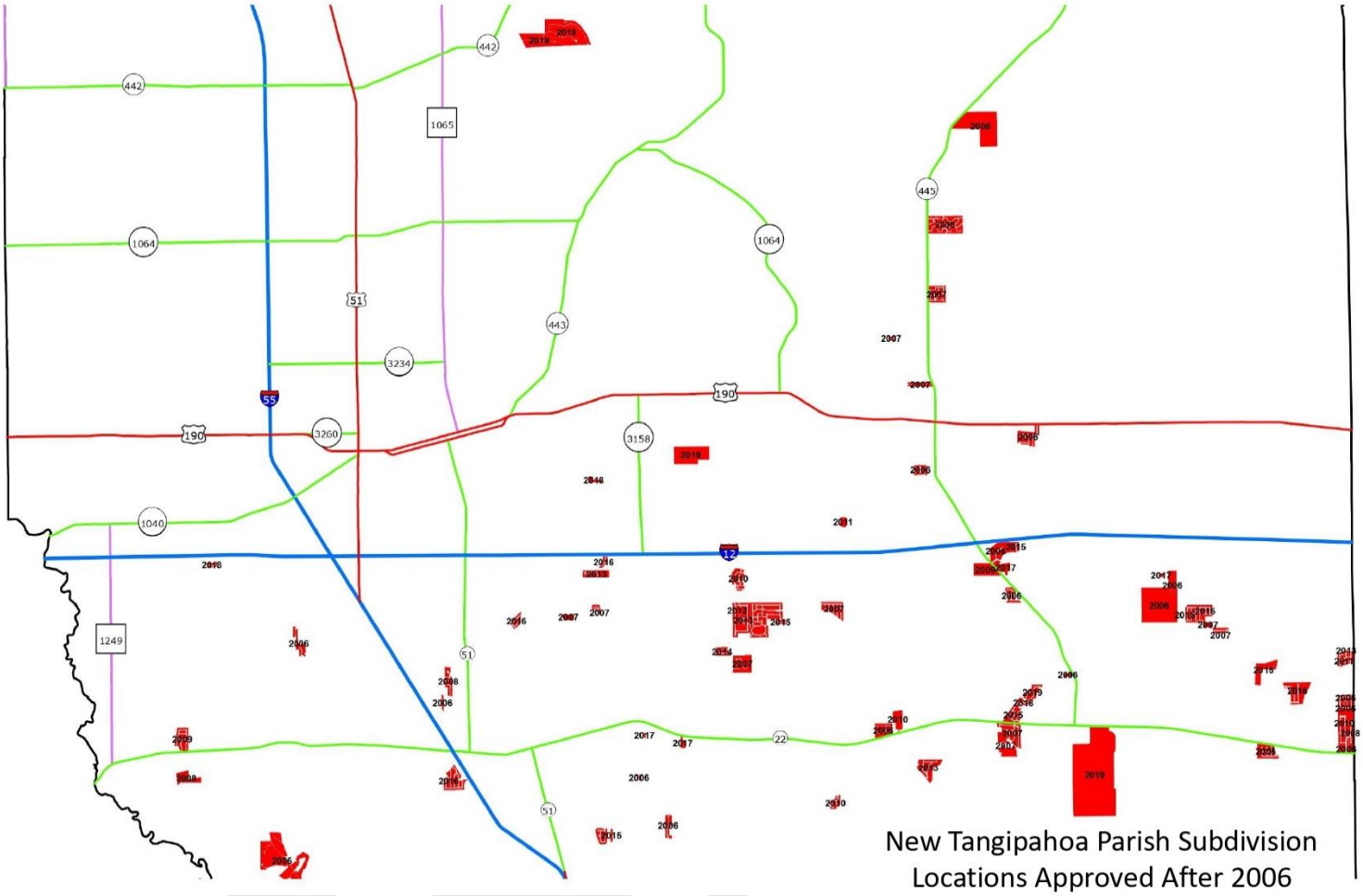
Hazard/Impact	Total in Parish (2014)	Hazard Area (2014)	Hazard Area (2019)	Hazard Area (2024)
Flood Damage				
Structures	53,890	43,112	44,421	45,770
Value of Structures	$9,555,337,000	$7,644,269,600	$9,233,452,139	$11,005,307,487
# of People	122,665	98,132	101,112	104,181
Tropical Hurricane				
Structures	53,890	53,890	56,276	58,768
Values of Structures	$9,555,337,000	$9,555,337,000	$11,541,815,174	$13,756,634,358
# of People	122,665	122,665	126,389	130,227

Tangipahoa Parish Major Developments-2006-2019

Year	Development	Location	Town	Lots	
2006					
	The Villas of Bedico Creek Sub	Hwy 22	Ponch	72	
	Fairfield Farms Sub	Weinberger Road, Ponch	Ponch	17	
	Crescent Acres Sub - Ph I-75/Ph II 17	Crescent Drive Ponch	Ponch	92	
	The Haven Sub Ph II	Hwy 445	Robert	17	
	Meadow Ridge Sub	Esterbrook Road	Ponch	16	
	Riverwood Sub	Hwy 22	Ponch	71	
	Cypress Ridge Estates Sub	Brown Road	Ponch	244	
	The Preserve at Whiskey Island Sub Ph II	Wadesboro Road	Ponch	34	
	Pheasant Run Sub	Hwy 445	Ponch	349	
	Paris Park Sub	Harvey Lavigne Road	Ponch	394	
	Logan Creek Sub	Hoffman Road	Ponch	21	
	Creekside Manor Townhomes	Hwy 22	Ponch	92	
	Lana Lakes Sub	Hwy 445	Robert	5	
	Coves of the Highland Sub	Hwy 445	Robert	264	
	Bon Aire Sub Ph IV	C. C Road	Ponch	46	
	Arbor Estates Sub	Hwy 190	Ponch	275	
	Timber Ridge Sub	Hwy 445	Robert	216	
	Autumn Trace Sub	North Bennett Road	Robert	46	
	Bedico Meadows Sub Ph II	C. C. Road	Ponch	218	
					2489
2007					
	Chemekette Heights Sub.	Chemekette Road	Robert	20	
	Plantations Sub.	Yokum Road	Ponch	44	
	Cabo Cove Sub.	Firetower Road	Ponch	26	
	Cresent Meadows Sub. Ph II	Cresent Drive	Ponch	13	
	Audubon Trace of Robert Sub.	Hwy 445 & Wittie Road	Robert	100	
	Emerald Estates Subdivision	Hwy 445	Robert	45	

	Ponder Trace Subdivision	Weinberger Road	Ponch	50	
	Landings Subdivision	Hwy 22	Ponch	248	
	Le Sommet Subdivision	Firetower Road	Ponch	5	
	Southern Pines Estates Sub	Sibley Road	Ponch	111	
	West Ridge Place Sub	Pleasant Ridge Road Extention	Ponch	18	
	West Ridge Place Apts	Pleasant Ridge Road Extention	Ponch	14	
					694
2008					
	Berry Ridge Subdivision	East Hoffman Road	Ponch	57	
	Coppermill Subdivision	Rosaryville Road	Ponch	63	
	Preserve at Whiskey Island Sub Ph I	Whiskey Island Lane	Ponch	64	
	Villages at Bocage Subdivision	Hwy 22	Ponch	47	
					231
2009					
	Crepe Myrte Sub	Brown Road	Ponch	32	
	The Haven Townhomes Ph I	Hwy 445	Robert	150	
	Maplewood Mix Use Development	Hwy 22 & Adams Rd	Ponch	158	
	Madison Business Park	Hwy 445	Robert	13	
					353
2010					
	Blythwood Estates Subdivision	Brown Road	Ponch	192	
	Tanglewood Estates Subdivision	Hwy 22	Ponch	9	
	Twin Lakes Sub Ph II	Howes Cemetary Road	Ponch	30	
	Village of Bocage Sub Ph II	Hwy 22	Ponch	102	
					333
2011					
	Wittie Estates Sub	Wittie Road	Ponch	6	
	Bedico Meadows Sub Ph IIIA	C.C. Road	Ponch	50	
					56
2012					

	None				
2013					
	Bedico Meadows Sub Ph IIIB	C. C. Road	Ponch	36	
	Blythwood Estates Sub Ph V	Brown Road	Ponch	175	
	Bass Lakes Sub Ph I	Pleasant Ridge Road	Ponch	34	
	Cest Si Bon Sub Ph I, II, III	John Wild Road	Ponch	59	
					304
2014					
	Scaret Glen Sub	Dunson Road	Ponch	43	
2015					
	Silver Hill Sub Ph I, II,III, IV, V	Firetower Road	Ponch	341	
	The Haven Sub Ph III	Hwy 445 & I-12	Ponch	26	
	The Retreat Sub Ph II	Byers Road	Bedico	12	
	The Landings Reserve Sub (name chg-Cypress Reserv	Hwy 445	Ponch	610	
	J T Jordan Apartments	Weinburger Road	Ponch	28	
	Kayley's Court Sub	Brown Road	Ponch	17	
					1034
2016					
	Costanza Estates Sub	South Range Road	Ponch	42	
	Bass Lake Sub Ph II	I-12 Service Road	Ponch	18	
	East Bedico Creek Sub Ph I-75, II-72, III-35	Byers Lane	Ponch	182	
	Island Trace Sub	Wadesboro Road	Ponch	58	
					300
2017					
	Village Town Homes	Hwy 22	Ponch	20	
	Mineral Point Estates Sub	Weaver Lane	Ponch	8	
	Averies Way Sub	Hwy 445	Robert	43	
	Piper's Allie Apartments	South Hoover Road	Ponch	10	
	Cadis Apartments	Harvey Lavigne Road	Ponch	12	
	East Bedico Creek Sub- Revision	Byers Lane	Ponch	8	
	Springwood Estates	Old Covington Hwy	Hammond	24	
					125
2018					
	Island Trace 2 Sub	Wadesboro Road	Ponch	74	
	Choctaw Ridge Sub (Preliminary)	Traino Road	Ponch	56	
	Morgan Creek Townhomes	General Ott Road	Hammond	59	
	Old Marigny Estates Sub	Old Covington Hwy	Hammond	15	
					204
2019					
	Fairhope Sub (Preliminary)	Hwy 22 & Hwy 445	Ponch	796	
	The Estate at SIlver Hills Sub	Harvey Lavigne Road	Ponch	280	
	Coburn Lakes	South Coburn Road	Hammond	359	
					1435
Total				**7512**	



New Tangipahoa Parish Subdivision Locations Approved After 2006

Zoning and Land Use

The Parish has no zoning regulations and few mechanisms to determine what type of development can go where in the Parish. The Parish and the incorporated areas adopted in the Comprehensive Plan which includes current planning efforts in 2008, and a Resiliency Plan adopted in 2017. The Comprehensive Plan will help identify new proposed buildings, infrastructure, and critical facilities and determine what regulations and infrastructure are needed for the growth in the Parish. As part of the Comprehensive Plan, a current land use map was developed and is available from the Parish Planner.

(See Figure 2-7 and Figure 2-8)

Figure 2-7: Tangipahoa Parish Land Use Map as of 2008.

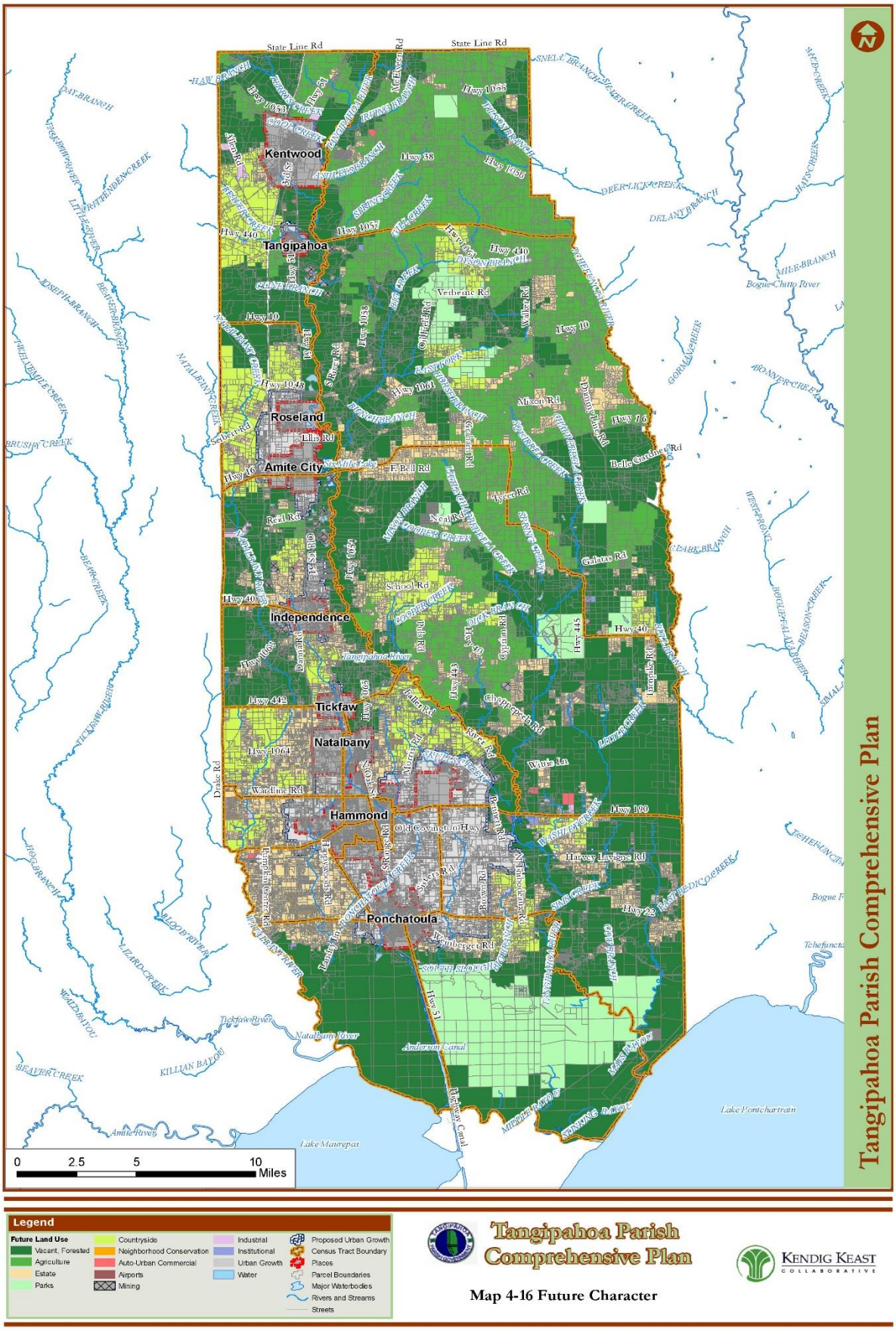


Figure 2-8: Tangipahoa Parish Future Land Use Map.
(Source: Tangipahoa Comprehensive Plan 2008)

Tangipahoa Parish Land Use Table is provided below, showing residential, commercial and industrial areas account for only 10% of the Parish's land use. Forestlands are the largest category, with over 199,000 acres (38%), followed by wetlands (32%), agriculture (16%), and water (4%).

Table 2-13: Tangipahoa Parish Land Use

Land Use	Acres	Percentage
Agricultural Land, Cropland, and Pasture	86,828	16%
Wetlands	167,215	32%
Forest land *(not including forested wetlands)*	199,411	38%
Urban/Development	51,304	10%
Water	22,122	4%

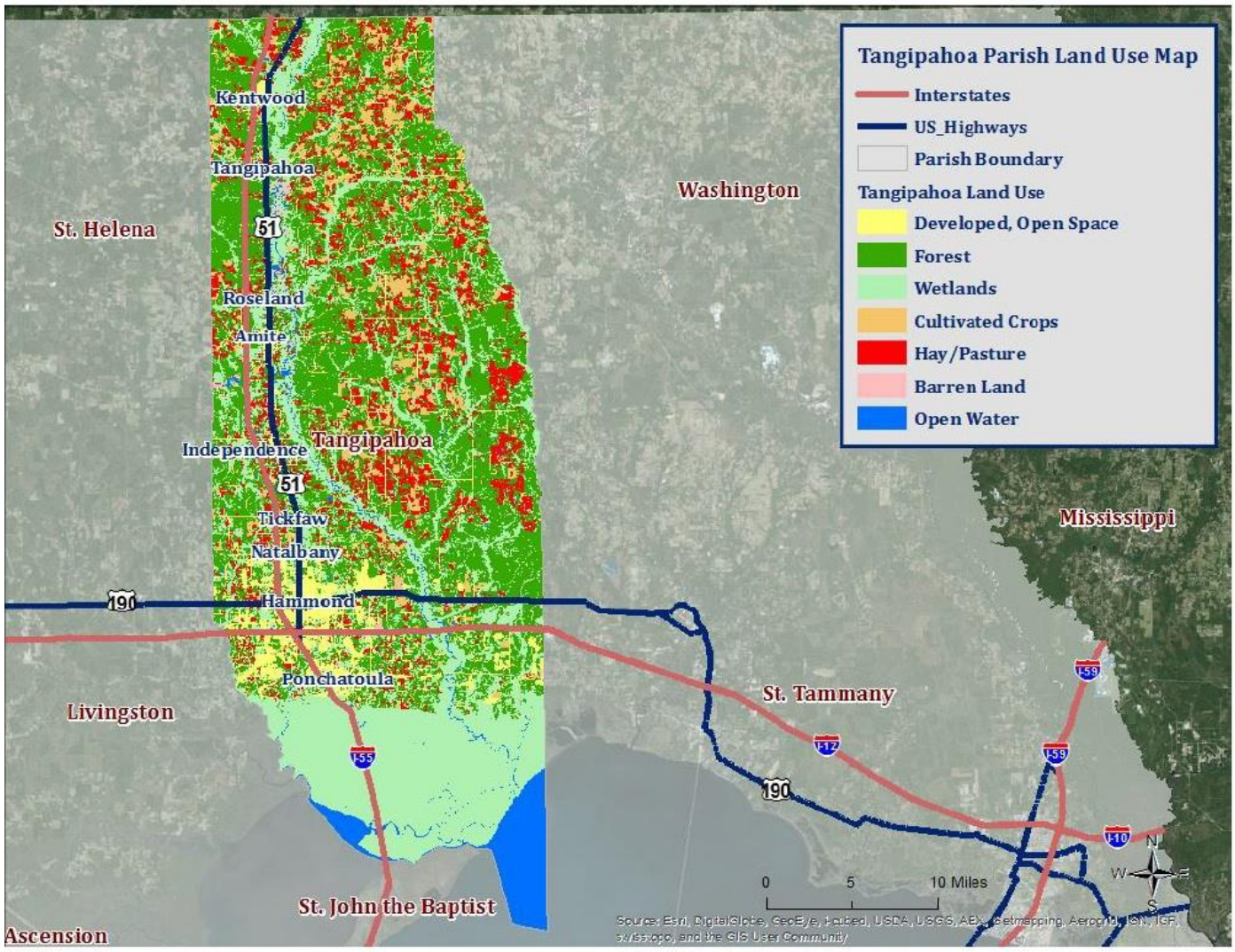


Figure 2-9: Tangipahoa Parish Land Use Map.
(Source: USGS Land Use Map)

Hazard Identification

Coastal Land Loss

Coastal land loss is the loss of land (especially beach, shoreline, or dune material) by natural and/or human influences. Coastal land loss occurs through various means, including erosion, subsidence (the sinking of land over time as a result of natural and/or human-caused action), saltwater intrusion, coastal storms, littoral drift, changing currents, manmade canals, rates of accretion, and sea level rise. The effects of these processes are difficult to differentiate, because of their complexity and because they often occur simultaneously, with one influencing each of the others.
Some of the worst recent contributors to coastal land loss in the State are the tropical hurricanes of the past decade. Two storms that stand out in this regard are Hurricanes Katrina and Rita. These powerful hurricanes completely covered large tracts of land in a very brief period, permanently altering the landscape. The disastrous legacy of these storms concentrated already ongoing efforts to combat coastal land loss. Consistent with the 2014 State Hazard Mitigation Plan Update, coast land loss is considered in terms of two of the most dominant factors: sea level rise and subsidence.

Sea level rise and subsidence impact Louisiana in similar manner – again making it difficult to separate impacts. Together, rising sea level subsidence – known together as relative sea level rise – can accelerate coastal erosion and wetland loss, exacerbate flooding, and increase the extent and frequency of storm impacts. According to NOAA, global sea level rise refers to the upward trend currently observed in the average global sea level. Local sea level rise is the level that the sea rises relative to a specific location (or, benchmark) at the coastline. The most prominent causes of se level rise are thermal expansion, tectonic actions (such as sea floor spreading), and the melting of the Earth's glacial ice caps.

The current U.S. Environmental Protection Agency (EPA) estimate of global sea level rise is 10-12 inches per century, while future sea level rise could be with the range of 1-4 feet by year 2100. According to the U.S. Geological Survey (USGS), the Mississippi Delta plan is subject the highest rate of relative sea level rise of any region in the nation, largely due to rapid geological subsidence.

Subsidence results from a number of factors, including:

- Compaction/consolidation of shallow strata caused by the weight of sediment deposits, soil oxidation, and aquifer draw-down (shallow component)
- Gas/oil/resource extraction (shallow & intermediate component)
- Consolidation of deeper strata (intermediate components)
- Tectonic effects (deep component)

For the most part, subsidence is a slow-acting process, with effects that are not as evident as hazards associated with discrete events. Although the impacts of subsidence can be readily seen in coastal parishes over the course of decades, subsidence is a "creeping" hazard. The highest rate of subsidence is occurring at the Mississippi River Delta (estimated at greater than 3.5 feet/century). Subsidence rates tend to decrease inland, and they also vary across the coast.

Overall, subsidence creates three distinct problems in Louisiana:

- By lowering elevations in coastal Louisiana, subsidence accelerates the effects of saltwater intrusion and other factors that contribute to land loss.
- By lowering elevations, subsidence may make structures more vulnerable to flooding.

- By destabilizing elevations, subsidence undermines the accuracy of surveying benchmarks (including those affecting levee heights, coastal restoration programs, surge modeling, BFEs, and other engineering inputs) which can contribute to additional flooding problems, if construction occurs at lower elevations than anticipated or planned.

Location

Historic areas of coastal land loss and gain (Figure 2-10) and subsidence rates (Figure 2-11) have been quantified for Tangipahoa Parish using data from the U.S. Geologic Survey and Louisiana Coastal Protection and Restoration Authority (CPRA). Since 1932, the average annual land loss in Louisiana is 35 mi^2, while the average annual land gain has been 3 mi^2 for a net loss of 32 mi^2 per year. Minimal land loss is primarily currently occurring on the north shore of Lake Pontchartrain and in unincorporated Tangipahoa Parish (Figure 2-10). Subsidence is occurring in southeast Tangipahoa Parish, outside of incorporated jurisdictions (Figure 2-11).

Previous Occurrences/ Extent

Coast land loss is an ongoing process, including discrete (hurricanes) and continuous (subsidence, sea level rise) processes. While historic flood loss data undoubtedly include the effects of coastal land loss, specific previous occurrences have not been identified as a source of direct disaster damage in Louisiana. Rather, the effects of the underlying flood or hurricane storm surge hazard are recorded. Land loss is a significant hazard, however, and assessment of the added flood impacts caused by land loss is quantified in the following sections.

Frequency/Probability

Subsidence, sea level rise, and coastal land loss are ongoing hazards. Based on historical subsidence rates and land loss/gain trends, the probability of future land loss in Louisiana is 100% certain, but actual rates of subsidence and land loss/gain vary along the coast, based on various meteorological, geological, and human-influenced dynamics (e.g., water/resource extraction, canal dredging, saltwater intrusion, marsh restoration projects, etc.).

Table 2-14: Annual Probability of Coast Land Loss in Tangipahoa

Coastal Land Loss Probability Tangipahoa Parish								
Unincorporated Tangipahoa Parish	Amite	Hammond	Independence	Kentwood	Ponchatoula	Roseland	Tangipahoa	Tickfaw
100%	0%	0%	0%	0%	0%	0%	0%	0%

Inserted here in 2015 plan is FIGURE 2-10: Historical areas of land loss and gain between 1932 & 2010 (see page 2-28 in ORIGINAL 2015 hm plan)

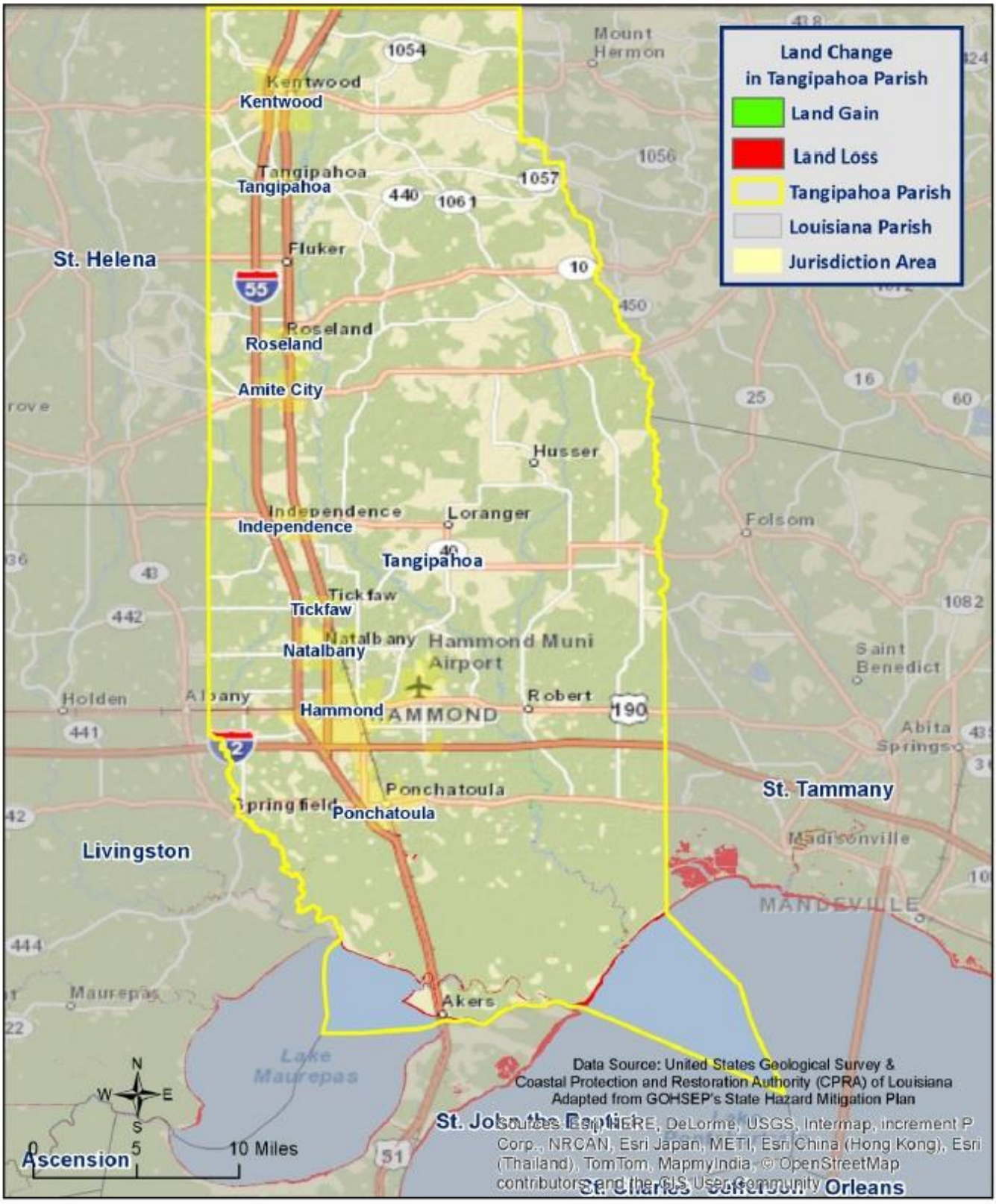


Figure 2-10: Historical areas of land loss and gain between 1932 and 2010
(Source: State of Louisiana Hazard Mitigation Plan)

[Insert here is Figure 2-11: Maximum annual subsidence rates… (See 2015 Original Document Page 2-32]

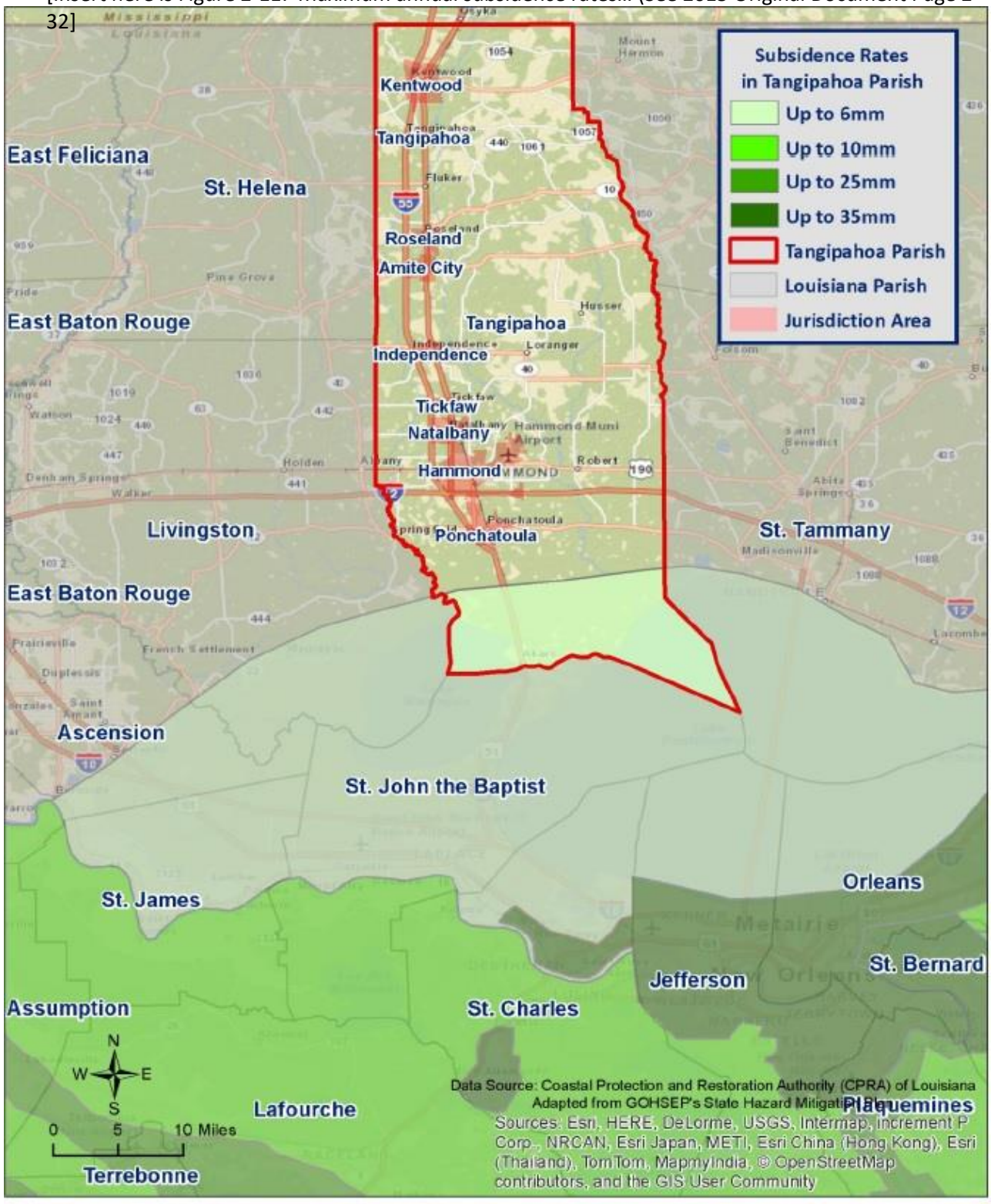


Figure 2-11: Maximum annual subsidence rates based on subsidence zones in coastal Louisiana. (Source: State of Louisiana Hazard Mitigation Plan)

Estimated Potential Losses

To determine the estimated potential losses, the methodology implemented in the 2014 Louisiana State Plan Update was used. The State Plan, 2 parameters were considered to estimate the projected increase in coastal flood losses from storm surge scenarios – global sea level rise and subsidence. A timeframe of 10 years was used for elevation of future effects of sea level rise and subsidence for comparison with current conditions. The NOAA Sea, Lake and Overland Surges from Hurricane (SLOSH) model was used to estimate the maximum of maximum (MOM) storm surge elevations for a Category 1 hurricane at mean tide along the coast of Louisiana. The MOM scenario is not designed to describe the storm surge that would result from a particular event, but rather evaluates the impacts of multiple hurricane scenarios with varying forward speeds and storm track trajectories, to create the maximum storm surge elevation surface that would occur given the simultaneous occurrence of all hurricane events for a given category.

Table 2-15: Estimated annual losses for coastal land loss in Tangipahoa Parish
(Source: HAZUS-MH)

Coastal Land Loss Estimated Annual Potential Losses for Tangipahoa Parish								
Unincorporated Tangipahoa Parish	**Amite**	**Hammond**	**Independence**	**Kentwood**	**Ponchatoula**	**Roseland**	**Village of Tangipahoa**	**Tickfaw**
$2,000	$0	$0	$0	$0	$0	$0	$0	$0

Table 2-14 shows the current and future exposure potential, based on the HAZUS-MH 2.2 inventory database.

Threat to People

Coast land loss can impact all demographics and age groups. Buildings located within highly vulnerable coastal land loss areas could be eventually permanently shut down and forced to re-locate. Long-term sheltering and permanent relocation could be eventually permanently shut down and forced to re-locate. Long-term sheltering and permanent relocation could be a concern for communities that are at the highest risk for future coastal land loss. The total population within the Parish that is susceptible to the effects of coastal land loss is shown in Table 2-16.

Table 2-16: Number of people susceptible to coastal land loss in Tangipahoa Parish.
(Source: Census 2010)

Number of People Exposed to Coastal Land Loss			
Location	# in Community	# in Hazard Area	% in Hazard Area
Tangipahoa Parish (unincorporated)	83,950	7,500	8.9%
Amite	4,141	0	0%
Hammond	20,019	0	0%
Independence	1,665	0	0%
Kentwood	2,198	0	0%
Ponchatoula	6,559	33	0.5%
Roseland	1,123	0	0%
Village of Tangipahoa	748	0	0%
Tickfaw	694	0	0%

The HAZUS-HM hurricane model was used to identify populations vulnerable to coastal land loss throughout the jurisdictions in the tables below:

Table 2-17: Population vulnerable to coastal land loss in unincorporated Tangipahoa Parish. (Source: HAZUS-MH)

Tangipahoa Parish (Unincorporated)		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	7,500	100%
Persons Under 5 years	551	7.4%
Persons Under 18 years	1,936	25.8%
Persons 65 years and over	826	11%
White	5,546	73.9%
Minority	1,954	26.1%

Table 2-18: Population vulnerable to coastal land loss in Ponchatoula (Source: HAZUS-MH)

Ponchatoula		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	33	100%
Persons Under 5 years	2	6.1%
Persons Under 18 years	9	27.3%
Persons 65 years and over	4	12.1%
White	21	63.6%
Minority	12	36.4%

Based on historical data, coastal land loss is determined not to pose a significant risk to planning area within Tangipahoa Parish.

Dam Failure

Dams are water storage, control, or diversion barriers that impound water upstream in reservoirs. Dams are a vital part of our nation's infrastructure, providing drinking water, flood protection, renewable hydroelectric power, navigation, irrigation, and recreation. These critical daily benefits are also inextricably linked to the potential harmful consequences of a dam failure.

Dam failure is a collapse or breach in the structure. A dam failure can result in sever loss of life, economic disaster, and extensive environmental damage. While most dams have storage volumes small enough that failures have few repercussions, dams with large storage volumes can cause significant flooding downstream. Dam failures often have a rapid rate of onset, leaving little time for evacuation. The first signs of the failure may go unnoticed upon visual inspection of the dam structure. However, continual maintenance and inspection of dams often provide the opportunity to identify possible deficiencies in their early stages and can prevent a possible catastrophic failure event.

The duration of the flooding event caused by the failure depends largely on the amount of water and downstream topography. Given smaller volumes of water and a topography suited for transporting the water rapidly downstream, the event may only last hours. Because of the lack of seasonality and other predictive factors, a predictive frequency or likelihood of dam failures cannot be determined. However, the National Dam Safety Program (NDSP) produces hazard rankings (high, significant, and low) and definitions of dam structures, based on potential impact.

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

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

The USACE National Inventory of Dams classifies dams as a "high hazard potential," "significant Hazard potential," and "low hazard potential." These categories are defined below.

- *High hazard potential* dams are dams where failure or improper operation will probably cause loss of human life.
- *Significant hazard potential* dams are those where failure or improper operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or other impacts. Dams classified as having "significant hazard potential" are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
- *Low hazard potential* dams are those where failure or improper operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

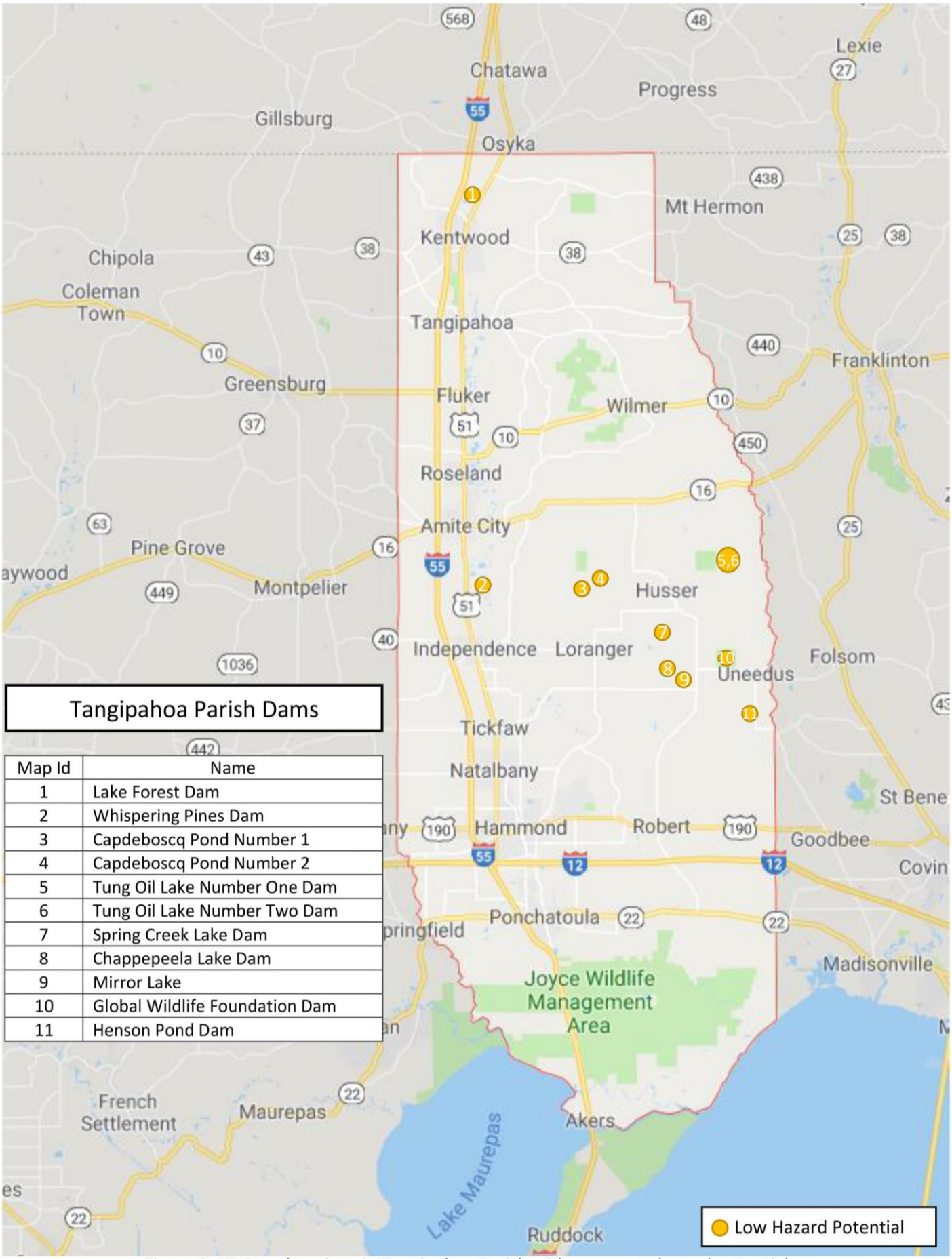
In Louisiana, there are 609 dams included in the Army Corps of Engineers National Inventory of Dams. Of these, 46 are considered high hazard, 69 are significant hazard, and 492 are low hazard potential dams.

Location

According to the National Inventory of Dams, Tangipahoa Parish has 12 low hazard potential dams. All of the low hazard dams are located in unincorporated Tangipahoa Parish. All dams in Tangipahoa Parish are privately owned. The following is a summary of the low hazard dam data contained within the National Inventory of Dams by location.

Table 2-19: Low hazard dams located in Tangipahoa Parish
(Source: National Inventory of Dams)

Inventory of Low Hazard Dams in Tangipahoa Parish						
Dam Name	Year Completed	Structural Height (Ft)	Hydraulic Height (Ft)	Surface Area (Acres)	Normal Storage (Acre-Ft)	Drainage Area (Sq. Miles)
Unincorporated Tangipahoa Parish						
Capdeboscq Pond No. 1	1969	20	-	-	362	-
Capdeboscq Pond No. 2	1950	20	-	14	140	-
Chappepeela Lake	1938	12	9	47	325	1
Dogwood Lake	1938	16	12	16	200	1
Global Wildlife Foundation Dam	1974	10	5	21.1	127	2
Henson Pond Dam	1984	10	8	15.1	151	2
Lake Forest	1968	10	7	25	320	0.06
Mirror Lake	1938	9	7	14	105	4
Spring Creek Lake Dam	1938	18	14	51	230	8
Tung Oil Lake No. 1	1951	15	8	5	75	1
Tung Oil Lake No. 2	1951	10	6	-	75	-
Whispering Pines	1973	15	10	23	300	1



Map Id	Name
1	Lake Forest Dam
2	Whispering Pines Dam
3	Capdeboscq Pond Number 1
4	Capdeboscq Pond Number 2
5	Tung Oil Lake Number One Dam
6	Tung Oil Lake Number Two Dam
7	Spring Creek Lake Dam
8	Chappepeela Lake Dam
9	Mirror Lake
10	Global Wildlife Foundation Dam
11	Henson Pond Dam

Figure 2-15: Dam locations in Tangipahoa Parish with respect to hazard potential
(Source: National Inventory of Dams)

Previous Occurrences/Extent - Dams
The National Performance of Dams Program (NPDP), a database of dam incidents maintained by Stanford University, lists one dam incident in Louisiana which occurred at the Kisatchie Lake Dam in Grant Parish in 1991. After heavy rains, the 25 ft. high earthen dam was breached at the concrete spillway structure. There are no other reports of dam incidents in Louisiana reported by NPDP.

Frequency/Probability
Guidance from the Bureau of Reclamation, among others, suggest an average probability of failure of dams to be 10^{-4}, or 0.1% annual probability, to be appropriate. The probability of a dam failure in unincorporated Tangipahoa Parish and Hammond is therefore assessed at 0.1%.
Because the dams located in and near Tangipahoa Parish are low hazard dams, dam failure is not carried forward into risk assessment.

Drought

A drought is a deficiency in water availability over an extended period of time, caused by precipitation totals and soil water storages that do not satisfy the environmental demand for water, either by evaporation or transpiration through plant leaves. It is important to note that the lace of precipitation alone does not constitute drought; the season during which the precipitation is lacking has a major impact on whether drought occurs. For example, a week of no precipitation in July, when the solar energy to evaporate water and vegetation's need for water to carry on photosynthesis are both high, may trigger a drought, while a week of no precipitation in January may not initiate a drought.

Drought is a unique and insidious hazard. Unlike other natural hazards, no specific threshold of "dryness" exists for declaring a drought. In addition, the definition of drought depends on stakeholder needs. For instance, the onset (and demise) of agricultural drought is quick, as crops need water every few days; once they get rainfall, they improve. But hydrologic drought sets in (and is alleviated) only over longer time periods. A few dry days will not drain a reservoir, but a few rain showers cannot replenish it either. Moreover, different geographical regions define drought differently, based on the deviation from local, normal precipitation. And drought can occur anywhere, triggered by changes in the local-to-regional-scale atmospheric circulation over an area or by broader-scale circulation variations, such as the expansion of semi-permanent oceanic high-pressure systems or the stalling of an upper-level atmospheric ridge in place over a region. The severity of a drought depends upon the degree and duration of moisture deficiency, as well as the size of the affected area. Periods of drought tend to be associated with other hazards, such as wildfires and/or heat waves as well. Lastly, drought is a slow onset event, causing less direct – but tremendous indirect – damage. Depletion of aquifers, crop loss, and livestock and wildlife mortality rates are examples of direct impacts. Since the groundwater found in aquifers is the source of about 38% of all county and city water supplied to households (and comprises 97% of the water for all rural populations that are not already supplied by cities and counties), droughts can potentially have direct, disastrous effects on human populations. The indirect consequences of drought, such as unemployment, reduced tax revenues, increased food prices, reduced outdoor recreation opportunities, higher energy costs as water levels in reservoirs decrease and consumption increases, and water rationing are not often fully known. This complex web of impacts causes drought to affect people and economies well beyond the area physically experiencing the drought.

Results from the Drought Severity Index (PDSI) indicate that the drought risk across Tangipahoa Parish Increased, although not significantly from a statistical perspective, between 1958 and 2007. The PDSI

best measures the duration and intensity of drought-inducing circulation patterns at a somewhat long-term time scale, although not as long term as the PHDI. Long-term drought is cumulative, so the intensity of drought during the current month is dependent on the current weather patterns plus the effects of cumulative patterns of previous months – or longer. Although weather patterns can change almost literally overnight from a long-term drought pattern to a long-term wet pattern, as a medium-response indicator, the PDSI responds relatively rapidly. The current drought severity index published by the National Drought Mitigation Center indicates that Tangipahoa Parish is currently at abnormally dry conditions but is not experiencing any drought events (Figure 2-16).

The experimental "Long-Term blend" approximates drought-related impacts (such as reservoir stores, irrigated agriculture, groundwater levels, and well water depth) that responds to precipitation on time scales ranging from several months to a few years by blending data from those time scales. As of March 7, 2019, conditions in Tangipahoa Parish are normal.

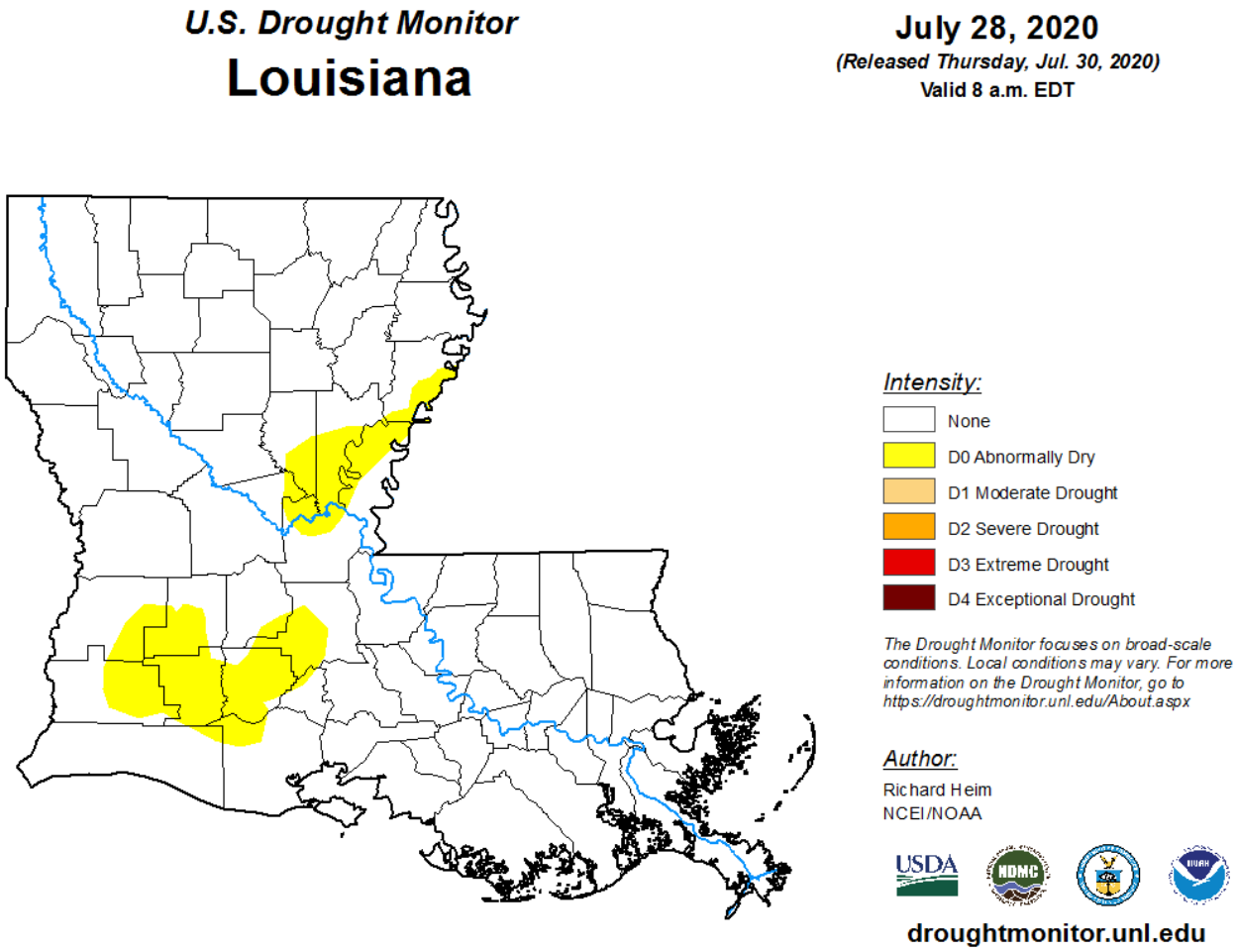


Figure 2-16: Drought monitor for the State of Louisiana

Drought typically impacts a region and not one specific parish or jurisdiction. Because drought is a climatological based hazard and has the same probability of occurring in Tangipahoa Parish as all of the adjacent parishes, the entire planning area for Tangipahoa Parish is equally at risk for drought. However, the major impact of drought in Tangipahoa Parish is on the agricultural community.

Previous Occurrences / Extent

The SHELDUS database reports only two drought events occurring within the boundaries of Tangipahoa Parish from the years 1960 -2019. Table 2-20 identifies the date of occurrence and estimated crop damage for the droughts that have occurred in Tangipahoa Parish.

Table 2-20: Drought events with crop damage totals for Tangipahoa Parish.
(Source: SHELDUS)

Date	Crop Damage
August 1998	$5,034,625
December 2000	$6,072,695

Frequency / Probability

One significant drought events has occurred within the boundaries of Tangipahoa since 1989. The annual chance of occurrence is calculated at 4% based on the records for the past 30 years (1989 – 2019).

Estimated Potential Losses

According to the SHELDUS database, there have been 2 droughts that have caused some level of crop damage. The total agricultural damage from these events is $11,107,320, with an average cost of $5,553,660 per drought event. When annualizing the total cost over the 59-year record, total annual losses based on drought is estimated to be $205,691. Table 2-21 presents an analysis of agricultural exposure that are susceptible to droughts by type for Tangipahoa Parish.

Table 2-21: Agricultural exposure by Type of Droughts in Tangipahoa Parish
(Source: LSU Ag Center 2017 Parish Totals)

Agricultural Exposure by Crop Type for Drought			
Blueberry	Strawberry	Figs	Tomatoes
$114,885	$12,011,440	$52,950	$480,000

There have been no reported injuries or deaths as a direct result to drought in Tangipahoa Parish.

Based on historical data, drought is determined not to pose a significant risk to the planning area within Tangipahoa Parish.

Expansive Soils

Soils and soft rock that tend to swell or shrink due to changes in moisture content are commonly known as expansive soils. Changes in soil volume present a hazard primarily to structures built on top of expansive soils. The most extensive damage occurs to highways and streets.

"Clay" is defined as a natural, earthy, fine-grained material that develops plasticity when mixed with a limited amount of water. Swelling clay is clay that is capable of absorbing large quantities of water, thus increasing greatly in volume.

Variations in moisture content and volume changes are greatest in clays found in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. It is in these regions, which include many of the southern, central, and western states, that swelling clays resulting from climate fluctuations cause the most severe engineering problems.

Location

The availability of data on expansive soils varies greatly. In or near metropolitan centers and at dam sites, abundant information on the amount of clay generally is available. However, for large areas of the

United States, little information is reported other than field observations of the physical characteristics of clay of a particular stratigraphic unit. Therefore, fixed criteria for determining the swelling potential have not been devised. However, one method that was devised in 1989 was based mostly on numerous published descriptions of the physical and mineralogical properties of clays. Using this classification system, one sees the southeastern portion of Louisiana, primarily along the Mississippi River from about East Baton Rouge Parish to the mouth of the Mississippi River, is abundant with high swelling potential clays. Areas within the planning area that are at risk to expansive soils are shown in Figure 2-18.

INSERT HERE Figure 2-17: Location of swelling clays in Louisiana (See page 2-43 in 2015 HM PLAN)

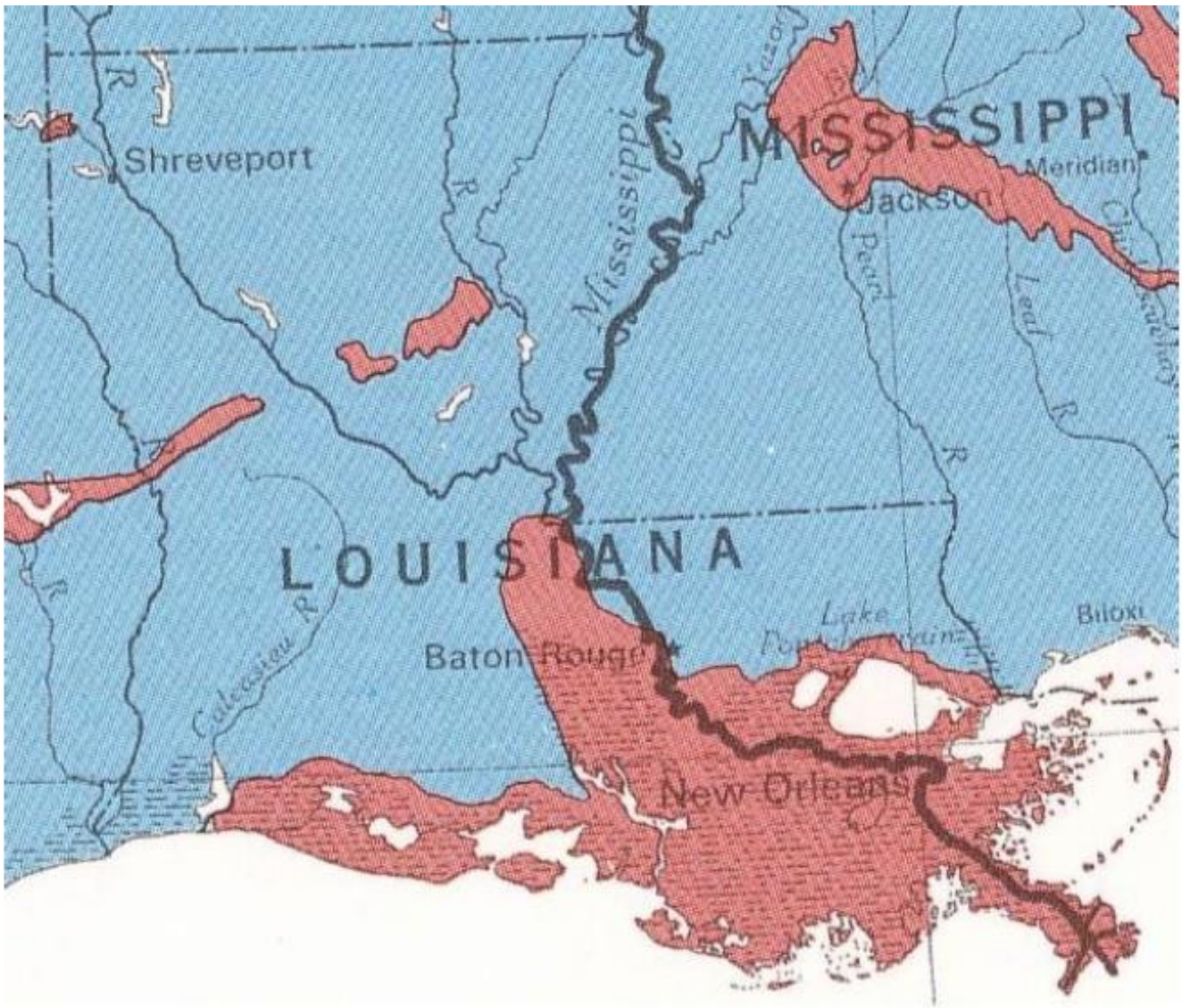


Figure 2-17: Location of swelling clays in Louisiana

(Source: "Swelling Clays Map Of The Conterminous United States," W.W. Olive, A.F. Chleborad, C.W. Frahme, Julius Schlocker, R.R. Schneider, and R.L Shuster; 1989)

INSERT HERE Figure 2-18: Location of swelling clays in Louisiana (See page 2-43 in 2015 HM PLAN)

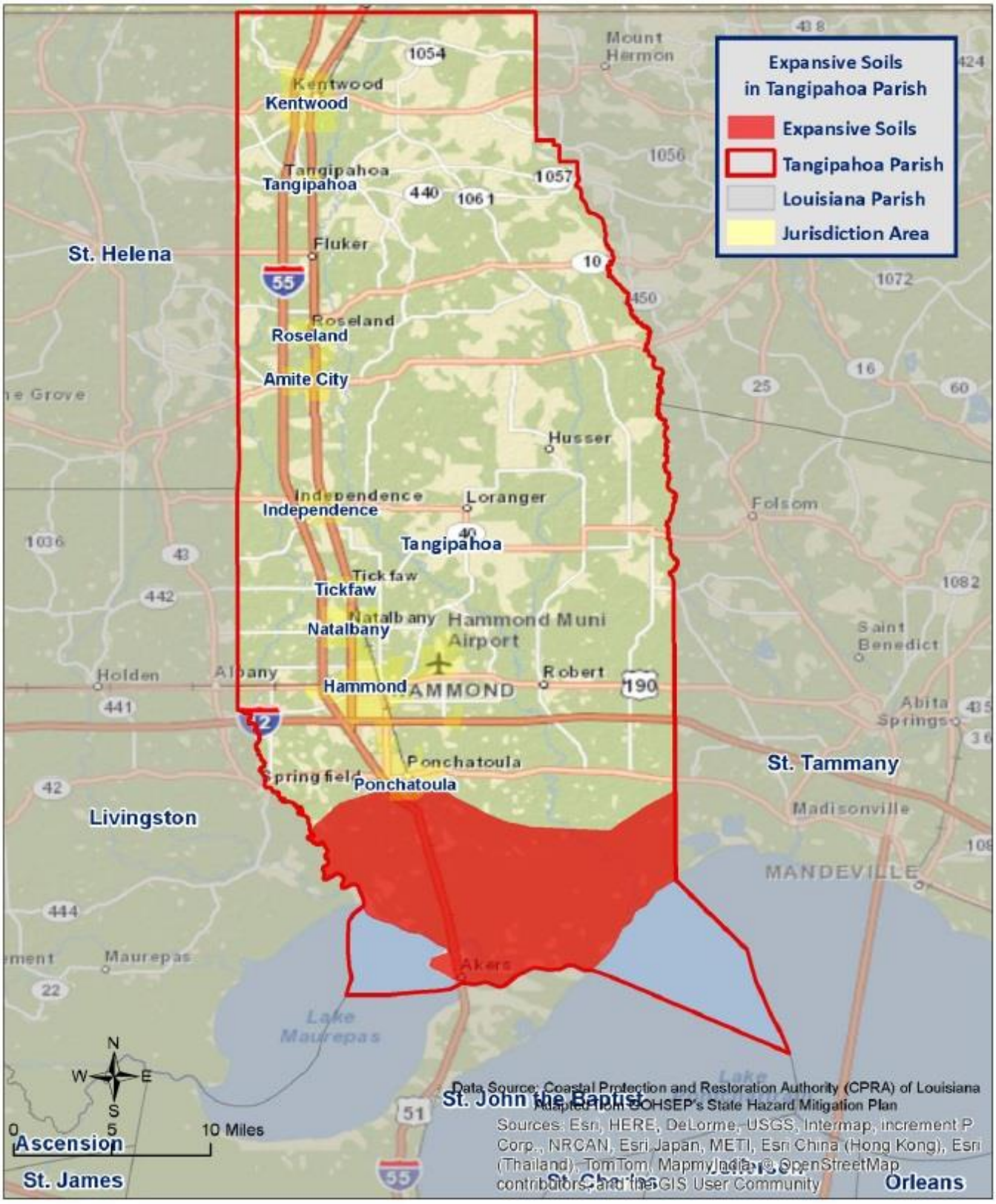


Figure 2-18: Location of swelling clays in Tangipahoa Parish
(Source: "Swelling Clays Map Of The Conterminous United States," W.W. Olive, A.F. Chleborad, C.W. Frahme, Julius Schlocker, R.R. Schneider, and R.L Shuster; 1989)

Based on the map in Figure 2-18, the primary risk of expansive soils is in the southern portion of unincorporated Tangipahoa Parish and southern Ponchatoula in primarily uninhabited marsh areas.

Previous Occurrences/Extent
Since the last plan update, no new information has been found, regarding previous occurrences in the planning area.

Frequency/Probability
The probability of expansive soils in the areas designated in figure 2-18 is 100%. However, because of the low population in the affected areas, expansive soil is considered a low impact hazard in the planning area.

Estimated potential Losses
Because of the low impact of expansive soils in the planning area, expansive soils dos not need to be addressed and is not carried forward into risk assessment.

Extreme Heat

There is no operational definition for defining heat or a heat wave. Heat waves are the consequence of the same weather pattern as drought, and therefore, both hazards often occur concurrently. A heat wave is an extended period of oppressive and above-normal temperatures over a given period of time. The World Metrological Organization recommends the declaration of a heat wave, when the daily maximum temperature exceeds the average maximum temperatures by 9°F and lasts for a period of at least 5 days.

However, temperature alone is insufficient to describe the stress placed on humans (as well as flora and fauna) in hot weather. It is crucial to consider the effect of relative humidity, since it is essential to the body's ability to perspire and cool. Once air temperature reaches 95°F, perspiration becomes a very significant biophysical mechanism to ensure heat loss. Perspiration is ineffective as a cooling mechanism, if the water cannot evaporate (i.e., sweating in high relative humidity is reduced, as compared to during dry conditions).

To communicate this relationship between temperature and humidity, the National Weather Service (NWS0 developed the Heat Index (HI), which provides a warning system, based on a combination of air temperature and relative humidity. The HI is presented in Figure 2-19. The NWS devised the index for shady, light wind conditions, and thus advises that the HI value can be increased by as much as 15°F, if a person is in direct sunlight, and that strong winds of hot, dry air can be extremely hazardous.

Most heat disorders (e.g., sunburn, heat cramps, heat exhaustion, and heat stroke) occur because the victim has been overexposed to heat or has over-exercised, considering age and physical condition. Other circumstances that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Seniors and children are most at risk from adverse heat effects. Extreme heat can also damage roads, bridges, pipelines, utilities, and railroads. High temperatures can be partially responsible for deflection of rails and related railroad accidents.

According to NOAA, extreme heat is the leading weather-related cause of death in the United States. And, while heat-related deaths in Louisiana are not common, due in part to the consistency and predictability of high seasonal temperatures, they do occur and are still very intense and dangerous.

Such deaths happen in a variety of circumstances, often in ways that are not easily categorized, because they are unexpected. For instance, although exposure to heat is higher at the beach than usual, NOAA does not track heat-related deaths there, because such deaths happen infrequently.

[insert here: Figure 2-19: Heat Index advisory…] See page 2-51 in 2015 HM plan doc]

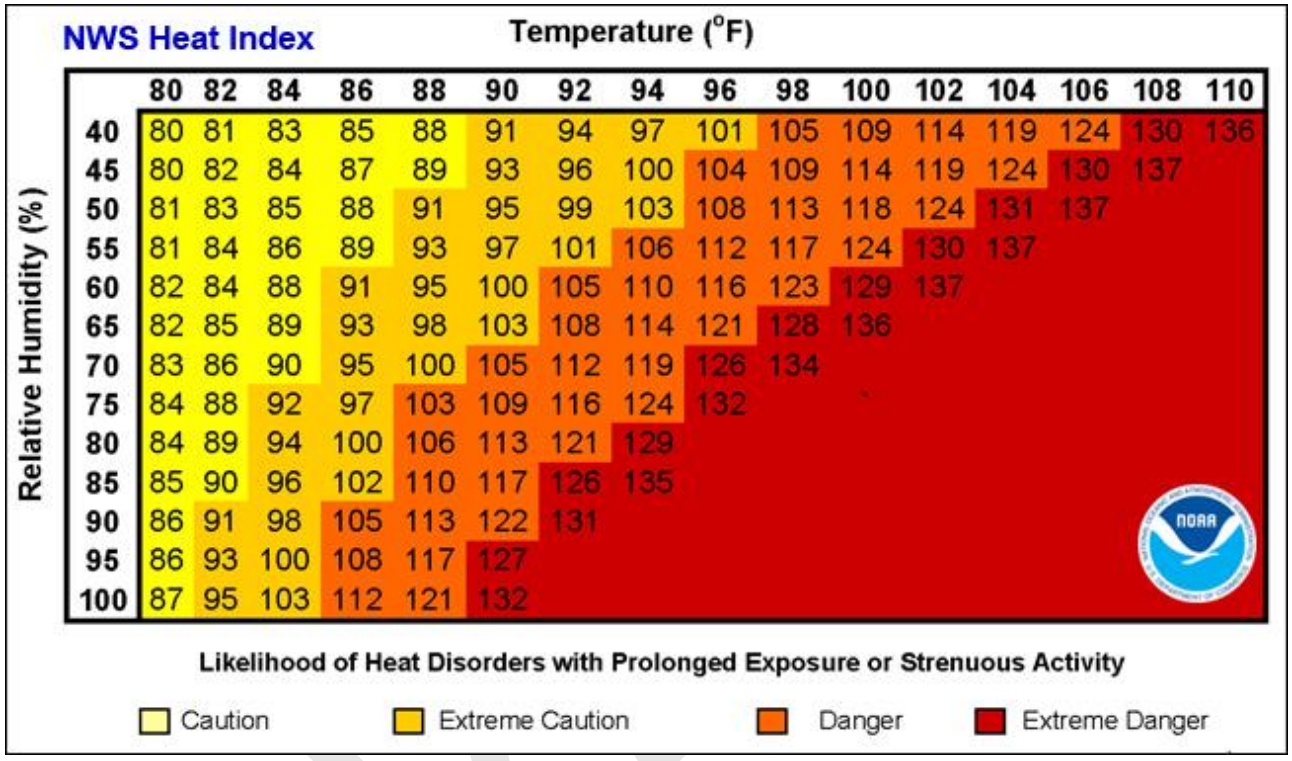


Figure 2-19: Heat Index advisory based on air temperature (F) and relative humidity
(Source: National Weather Service)

Location
Extreme heat typically impacts a region and not one specific parish or jurisdiction. Because extreme heat is a climatological-based hazard and has the same probability of occurring in Tangipahoa Parish as all of the adjacent parishes, the entire planning area for Tangipahoa Parish is equally at risk for extreme heat.

Previous Occurrences/Extent
The SHELDUS data base reports a total of 2 significant extreme heat events occurring within the boundaries of Tangipahoa Parish, between the years of 1960 – 2014. Table 2-22 provides an overview of extreme heat events that have impacted the Tangipahoa Parish planning area since 1960.

Table 2-22: Previous occurrences of extreme heat in Tangipahoa Parish
(Source: SHELDUS)

Date	Crop Damage
May 1960	$5,894,763
July 1980	$22,087

The State of Louisiana Hazard Mitigation Plan estimated the probability of occurrence of extreme heat at 100%. The probability was determined based on the geographical location of the State of Louisiana and Tangipahoa Parish.

Estimated Potential Losses
According to the SHELDUS database, crop damage due to extreme heat in Tangipahoa Parish have totaled approximately $616,850 between 1960 to 2014. A list of the crop damages by event can be found in Table 2-23. According to State of Louisiana 2019 Hazard Mitigation Plan, the annual estimated potential loss is $11,562 in Tangipahoa Parish. To access potential losses proportionally across the jurisdiction, the 2017 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. Based on the 2017 Census data, the following table provides an estimate of potential crop losses for Tangipahoa Parish:

Table 2-23: Estimated annual crop losses in Tangipahoa Parish from extreme heat.

Estimated Annual Potential Losses from Extreme Heat for Tangipahoa Parish								
Unincorporated Tangipahoa Parish (70.3% of Population)	Amite (3.4% of Population)	Hammond (15.5% of Population)	Independence (1.4% of Population)	Kentwood (1.8% of Population)	Ponchatoula (5.5% of Population)	Roseland (1.0% of Population)	Tangipahoa (0.6% of Population)	Tickfaw (0.6% of Population)
$8,128	$388	$1,787	$165	$210	$633	$110	$74	$67

The Parish suffered no deaths or injuries due to extreme heat from 1960-2019.

Based on historical data, extreme heat is determined not to pose a significant risk to the planning area within Tangipahoa Parish.

Flooding

A flood is the overflow of water onto land that is usually not inundated. The National Flood Insurance Program defines a flood as:

A general and temporary condition or partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties from overflow of inland or tidal waves, unusual and rapid accumulation or runoff of surface waters from any source, mudflow, or collapse or subsidence of land along the shore of a lake or similar body of water, as a result of erosion or undermining caused by waves or currents of water, exceeding anticipated cyclical levels that result in a flood as defined above.

Factors influencing the type and severity of flooding include natural variables, such as precipitation, topography, vegetation, soil texture, and seasonality, as well as anthropogenic factors, such as urbanized (extent of impervious surfaces), land use (e.g., agricultural and forestry tend to remove native vegetation and accelerate soil erosion), and the presence of flood-control structures, such as levees and dams.

Excess precipitation, produced from thunderstorms or hurricanes, is often the major initiating condition for flooding, and Louisiana can have high rainfall totals at any time of day or year. During the cooler months, slow-moving frontal weather systems produce heavy rainfalls, while the summer and autumn seasons produce major precipitation in isolated thunderstorm events (often on warm afternoons) that may lead to localized flooding. During these warmer seasons, floods are overwhelmingly of the flash flood variety, as opposed to the slower-developing river floods caused by heavy stream flow during the cooler months.

In cooler months, particularly in the spring, Louisiana is in peak season for severe thunderstorms. The fronts that cause these thunderstorms often stall while passing over the State, occasionally producing rainfall totals exceeding 10 inches within a period of a few days. Since soil tends to be nearly saturated at this time (due to relatively low overall evaporation rates), spring typically becomes the period of maximum stream flow across the State. Together these characteristics increase the potential for high water, and low-lying, poorly drained areas are particularly prone to flooding during these months.

In Louisiana, six specific types of floods are of main concern: riverine, flash, ponding, backwater, urban, and coastal.

- **Riverine flooding** (such as in 2016) occurs along a river or smaller stream. It is the result of a runoff from heavy rainfall or intensive snow or ice melt. The speed with which riverine flood levels rise and fall depends upon only on the amount of rainfall, but even more on the capacity of the river itself and the shape and land cover of its drainage basin. The smaller the river, the faster water levels rise and fall. Thus, the Mississippi River levels rise and fall slowly due to its large capacity. Generally, elongated and intensely-developed drainage basins will reach faster peak discharges and faster falls than circular-shaped and forested basins of the same area (such as in 2016).
- **Flash flooding** occurs when locally intense precipitation inundates an area in a short amount of time, resulting in local stream flow and drainage capacity being overwhelmed.
- **Ponding** occurs when concave areas (e.g., parking lots, roads, and clay-lined natural low areas) collect water and are unable to drain.
- **Backwater flooding** occurs when water slowly rises from a normally unexpected direction where protection has not been provided. A model example is the flooding that occurred in LaPlace during Hurricane Isaac in 2012. Although the town was protected by a levee on the side facing

the Mississippi, floodwaters from Lake Maurepas and Lake Pontchartrain crept not the community on the side of town opposite the Mississippi River.

- **Urban flooding** is similar to flash flooding but is specific to urbanized areas. It takes place when storm water drainage systems cannot keep pace with heavy precipitation, and water accumulates on the surface. Most urban flooding is caused by slow-moving thunderstorms or torrential rainfall.
- **Coastal flooding** can appear similar to any of the other flood types, depending on its cause. It occurs when normally dry coastal land is flooded by seawater, but may be caused by direct inundation (when the sea level exceeds the elevation of the land), overtopping of a natural or artificial barrier, or the breaching of a natural or artificial barrier (i.e., when the barrier is broken down by the sea water). Coastal flooding is typically caused by storm surge, tsunami, and gradual sea level rise.

In Tangipahoa Parish, all six types of flooding have historically been observed. For purposes of this assessment, ponding, flash flood and urban flooding are considered to be flooding as a result of storm water from heavy precipitation thunderstorms.

Based on stream gauge levels and precipitation forecasts, the National Weather Service (NWS) posts flood statements, watches and warnings. The NWS issues the following weather statements with regard to floods:

- **Flood Categories**
  - Minor Flooding: Minimal or no property damage, but possibly some public threat.
  - Moderate Flooding: Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations.
  - Major Flooding: Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
  - Record Flooding: Flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping.
- **Flood Warning**
  - Issued along larger streams when there is a serious threat to life or property.
- **Flood Watch**
  - Issued when current and developing hydrometeorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent.

Floods are measured mainly by probability of occurrence. A 10-year flood event, for example, is an event of small magnitude (in terms of stream flow or precipitation) but with a relatively high annual probability of recurrence (10%). A 100-year flood event is larger in magnitude, but it has smaller chance of recurrence (1%). A 500-year flood is significantly larger than both a 100-year event and a 10-year event, but it has a lower probability than both to occur in any given year (0.2%). It is important to understand that an x-year flood event does not mean an event of that magnitude occurs only once in x years. Instead, it just means that on average, we can expect a flood event of that magnitude to occur once every x years. Given that such statistical probability terms are inherently difficult for the lay population to understand, the Association of State Floodplain Managers (ASFPM) promotes the use of more tangible expressions of flood probability. As such, the ASFPM also expresses the 100-year flood event as having a 25% chance of occurring over the life of a 30-year mortgage.

It is essential to understand that the magnitude of an x-year flood event for a particular area depends on the source of flooding and the area's location. The size of a specific flood event is defined through

historic data of precipitation, flow, and discharge rates. Consequently, different 100-year flood events can have very different impacts. The 100-year flood events in two separate locations have the same likelihood to occur, but they do not necessarily have the same magnitude. For example, a 100-year event for the Mississippi River means something completely different in terms of discharge values (ft^3/s) than, for example, for the Amite River. Not only are the magnitudes of 100-year events different between rivers, they can be different along any given river. A 100-year event upstream is different from one downstream, since river characteristics (volume, discharge, and topography) change. As a result, the definition of what constitutes a 100-year flood event is specific to each location, river, and time, since floodplain and river characteristics change over time.

Finally, it is important to note that each flood event is unique. Two hypothetical events at the same location, given the same magnitude of stream flow, may still produce substantially different impacts, if there were different antecedent moisture characteristics, different times of the day of occurrence (which indicates the population's probable activities at the flood's onset), or other characteristic differences.

The 100-year event is of particular significance, since it is the regulatory standard that determines the obligation or lack thereof to purchase flood insurance. Flood insurance premiums are set depending on the flood zone, as modeled by National Flood Insurance (NFIP) Rate Maps. The NFIP and FEMA suggest insurance rates based on special flood hazard areas (SFHAs), as diagrammed in Figure 2-20.

[Insert here Figure 2-20: Schematic of 100-year floodplain…] see page 2-55 in 2015 HM plan doc

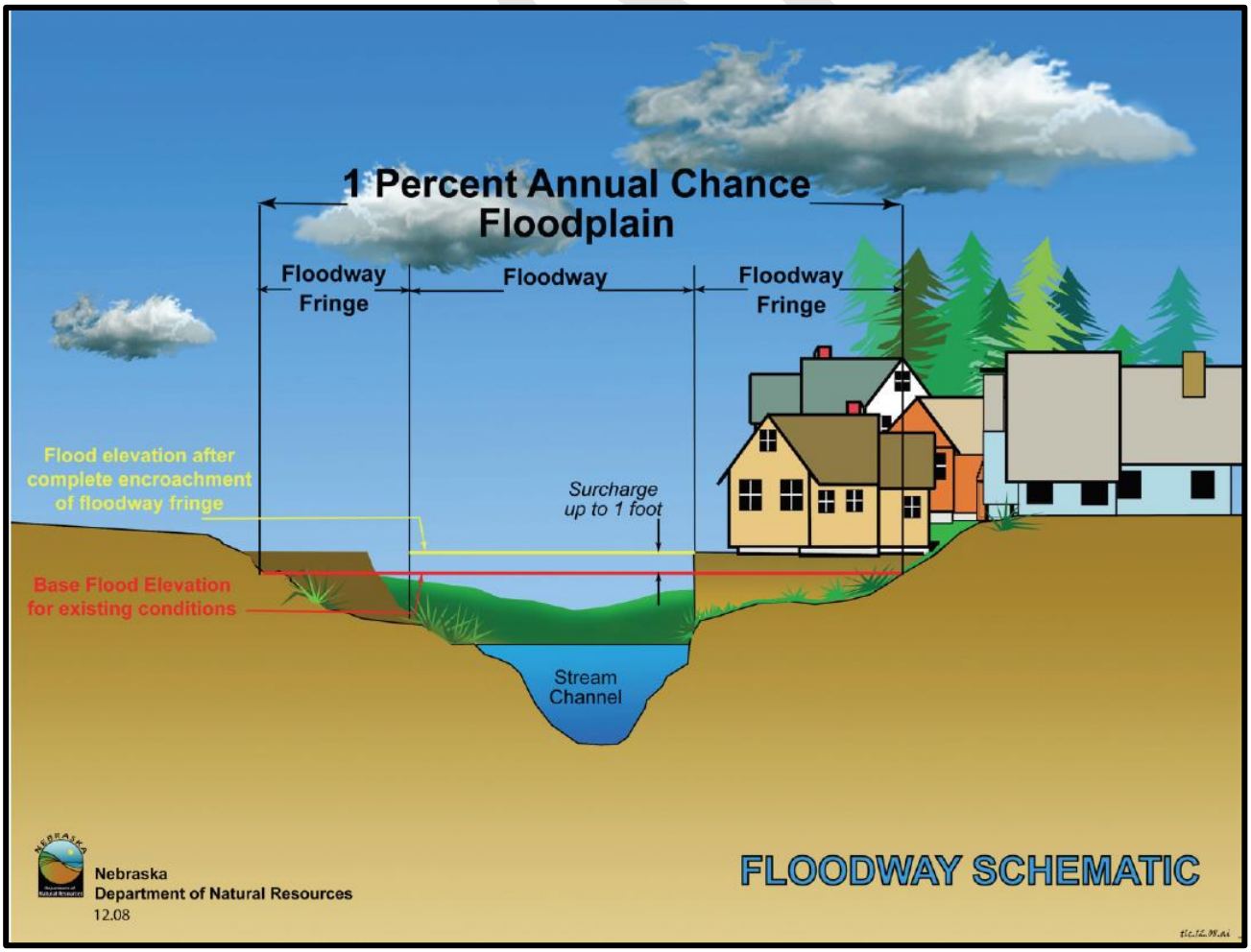


Figure 2-20: Schematic of 100 year floodplain. The special hazard area (SFHA) extends to the end of the floodway fringe.
(Source: Nebraska Department of Natural Resources)

A SFHA is the land area covered by floodwaters of the base flood (red line in Figure 2-20), where the NFIP's floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.

Property Damage

The depth and velocity of flood waters are the major variables in determining property damage. Flood velocity is important, because the faster water moves, the more pressure it puts on a structure and the more it will erode stream banks and scour the earth around a building's foundation. Structural damage can also be caused by the weight of standing water (hydrostatic pressure).

Another threat to property from a flood is called soaking. When soaked, many materials change their composition or shape. Wet wood will swell, and if dried too quickly, will crack, split, or warp. Plywood can come apart and gypsum wallboard has the potential to fall apart, if it is bumped before it has time to completely dry. The longer these materials are saturated, the more moisture, sediment, and pollutants they absorb.

Soaking can also cause extensive damage to household goods. Wooden furniture may become warped, making it unusable, while other furnishings such as books, carpeting, mattresses, and upholstery usually are not salvageable. Electrical appliances and gasoline engines will flood, making them worthless, until they are professionally dried and cleaned.

Many buildings that have succumbed to flood waters may look sound and unharmed after a flood, but water has the potential to cause sever property damage. Any structure that experiences a flood should be stripped, cleaned, and allowed to dry completely before being reconstructed. This is an extremely expensive and time-consuming effort.

Repetitive Loss Properties

Repetitive loss structures are structures covered by a contract for flood insurance made available under the NFIP that:

a. Has incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25% of the market value of the structure at the time of each flood event; and
b. At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

[someone needs to update this section]

Severe repetitive loss (SRL) is defined by the Flood Insurance Reform Act of 2004 and updated Biggert-Waters Flood Insurance Reform Act of 2012. For a property to be designated SRL, the following criteria must be met:

a. Is covered under a contract for flood insurance made available under the NFIP; and
b. Has incurred flood-related damage-
    1. For which 40 or more separate claims payments have been made under the flood insurance coverage with the amount of each claim exceeding $5,000 and with the cumulative amount of such claims payments exceeding $20,000; or
    2. For which at least 2 separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

Repetitive loss properties for Tangipahoa Parish are provided below:

Table 2-24: Repetitive Loss Structures for Tangipahoa Parish

Jurisdiction	Number of Structures	Residential	Commercial	Government	Total Claims	Total Claims Paid	Average Claim Paid
Tangipahoa Parish (not incorporated)							
Amite, Town of							
Hammond, City of							
Independence, Town of							
Kentwood, Town of							
Ponchatoula, City of							
Roseland, Town of							
Tangipahoa, Village of							
Tickfaw, Village of							
Tangipahoa Parish Total							

Of the 154 repetitive loss structures, 143 were able to be geocoded to provide an overview of where the repetitive loss structures are located throughout the Parish. Figure 2-21 shows the approximate location of the 143 structures, while Figure 2-22 shows where the highest concentration of repetitive loss structures are located. Through the density map it is clear that the primary concentrated area of repetitive loss structures is focused around the southern portion of the Parish, with Hammond and its immediate area serving as a focal point for these structures in Tangipahoa Parish.

[insert here Figure 2-21: Repetitive Loss Properties in Tangipahoa Parish] see page 2-58 in 2015 HM plan

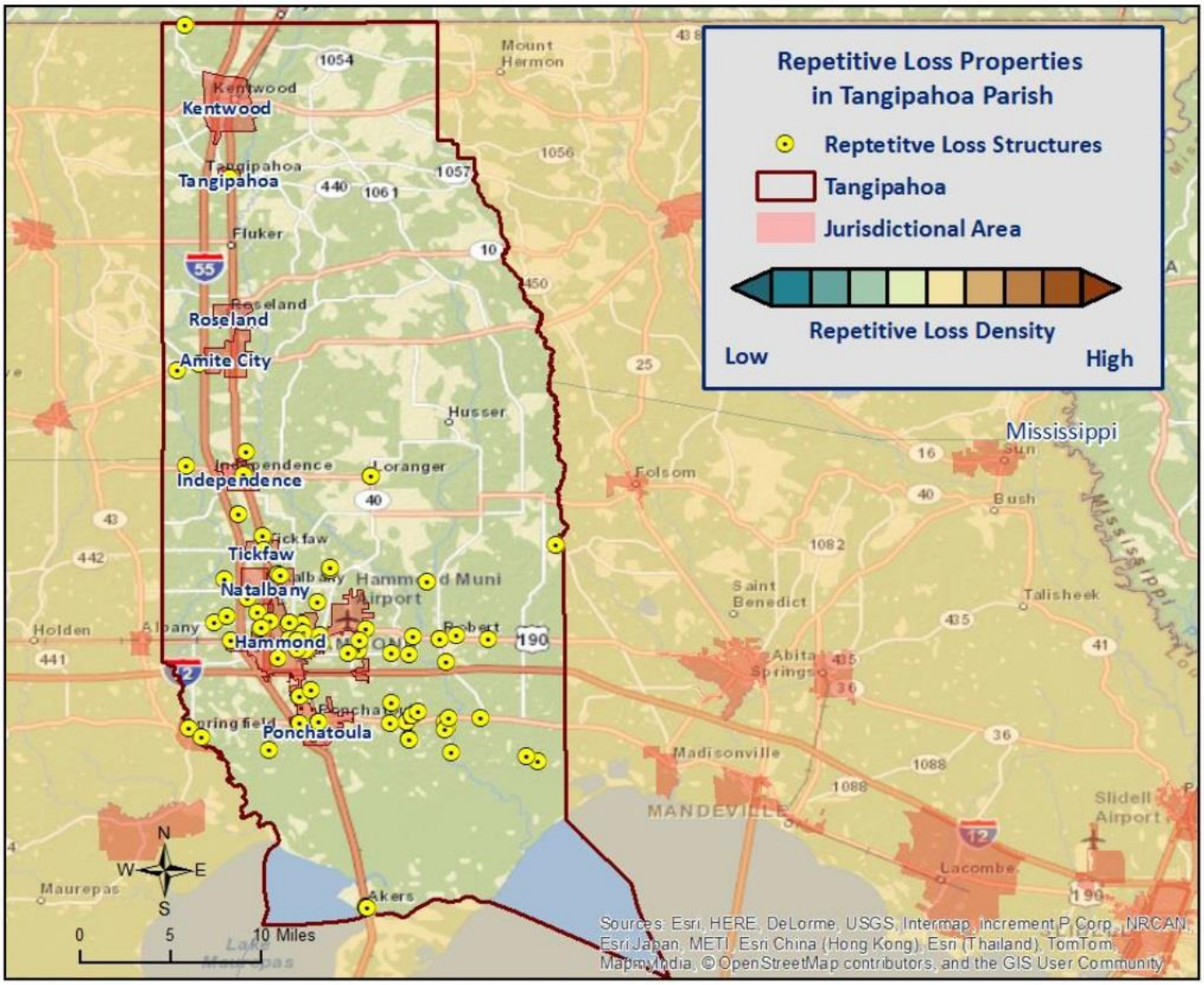


Figure 2-21: Repetitive Loss Properties in Tangipahoa Parish.

[Insert here Figure 2-22: Repetitive Loss Property Densities in Tangipahoa Parish] see 2015 HM Plan

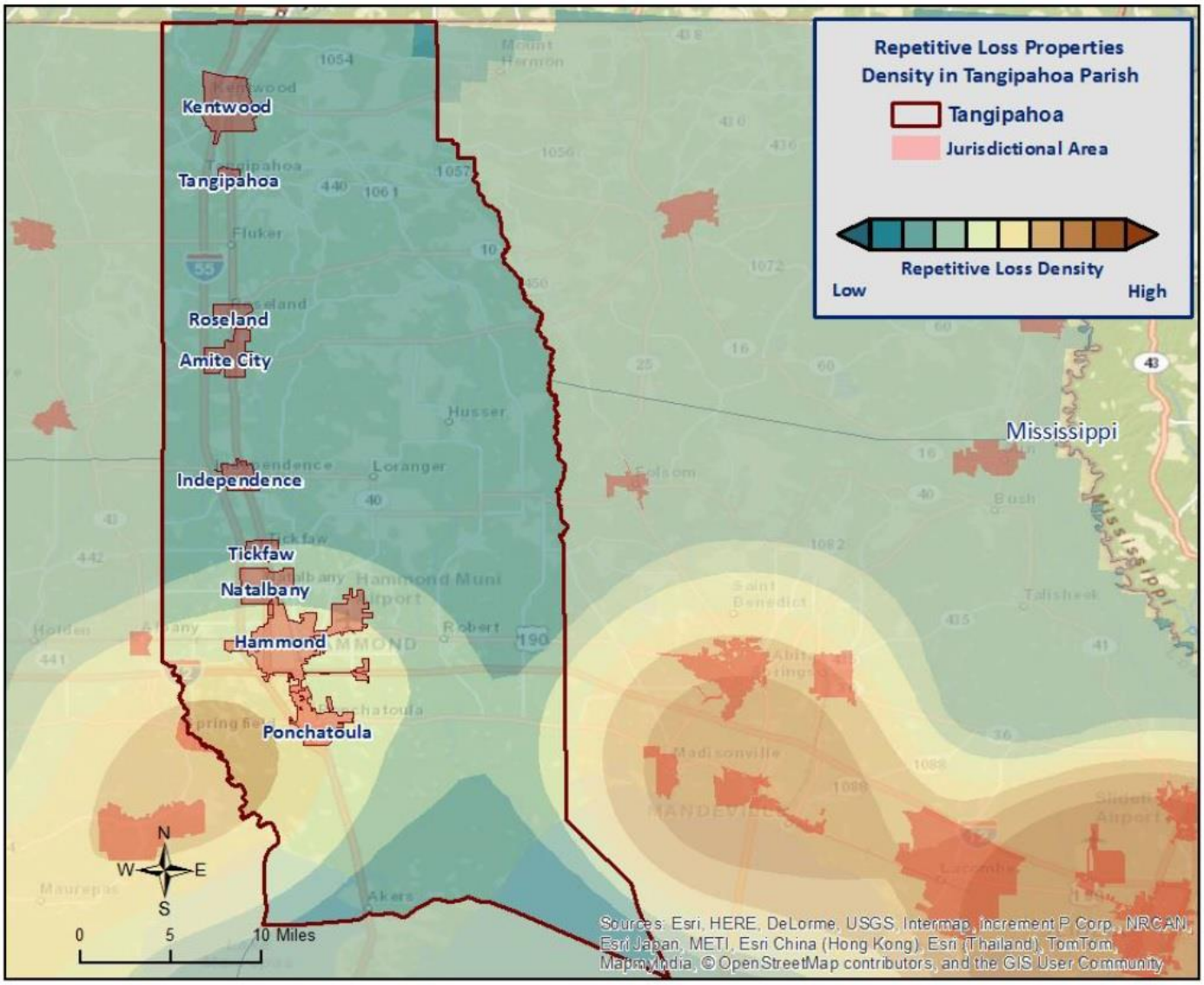


Figure 2-22: Repetitive Loss Property Densities in Tangipahoa Parish.

National Flood Insurance Program

Flood insurance statistics indicate that Tangipahoa Parish has over 10,000 flood insurance policies with the NFIP, with total annual premiums in excess of $6 million. Tangipahoa Parish, Amite, Hammond, Independence, Kentwood, Ponchatoula, Roseland, The Village of Tangipahoa, and Tickfaw are all participants in the NFIP. Flood insurance statistics and additional NFIP participation details for the unincorporated part of Tangipahoa Parish and incorporated municipalities are provided in the tables below.

Table 2-25: Summary of NFIP Policies for Tangipahoa Parish

Location	No. of Insured Structures	Total Insurance Coverage Value	Annual Premiums Paid	No. of Insurance Claims Filed	Total Loss of Payments
Tangipahoa (not incorporated)	7,705	$1,985,595,200	$4,155,631	2,679	$113,012,613
Amite, Town of	104	$31,882,600	$71,019	20	$770,910
Hammond, City of	1,425	$353,008,900	$1,348,499	332	$3,728,435
Independence, Town of	125	$24,427,500	$111,255	25	$933,829
Kentwood, Town of	39	$10,427,800	$32,417	3	$100,055
Ponchatoula, City of	551	$156,884,000	$237,082	62	$2,655,845
Roseland, Town of	13	$2,247,500	$15,324	4	$17,629
Tangipahoa, Village of	36	$3,526,600	$23,552	20	$232,483
Tickfaw, Village of	84	$13,057,200	$65,717	27	$422,261
Total	10,082	$2,581,057,300	$6,060,496	3,172	$121,874,060

Table 2-26: Summary of Community Flood Maps for Tangipahoa Parish

CID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Date Joined the NFIP	Tribal
225206	Tangipahoa Parish (not incorporated)	1/17/1975	2/2/1983	7/22/2010	2/2/1983	No
220207	Amite, Town of	12/7/1973	7/22/2010	7/22/2010	6/30/1976	No
220208	Hammond, City of	3/8/1974	12/15/1981	7/22/2010	12/15/1981	No
220209	Independence, Town of	7/17/1974	7/5/1977	7/22/2010 (M)	7/5/1977	No
220210	Kentwood, Town of	11/2/1973	4/15/1980	7/22/2010	4/15/1980	No
220211	Ponchatoula, City of	4/12/1974	4/17/2979	7/22/2010	4/17/1979	No
22012	Roseland, Town of	10/26/1973	9/1/1987	7/22/2010 (L)	9/1/1987	No
220213	Tangipahoa, Village of	8/30/1974	9/28/1979	7/22/2010	9/28/1979	No

CID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Date Joined the NFIP	Tribal
220214	Tickfaw, Village of	8/30/1974	6/28/1977	7/22/2010	6/28/1977	No

According to the Community Rating System (CRS) list of eligible communities dated May 1, 2019 , Tangipahoa Parish is the only jurisdiction with the Parish that is a participant in the Community Rating System (CRS). Table 2-27 provides details regarding CRS Participation for Tangipahoa Parish.

Table 2-27: Summary of the Community Rating System (CRS) Participation for Tangipahoa Parish

Community Number	Name	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA	Status
225206	Tangipahoa Parish	10/1/1996	10/1/1996	9	5%	5%	C

Threat to People

Just as with property damage, depth and velocity are major factors in determining the threat posed to people by flooding, it takes very little depth or velocity for flood waters to become dangerous. A car will float in less than 2 feet of moving water and can be swept downstream into deeper waters, trapping the passengers within the vehicle. Victims of floods have often put themselves in perilous situations by entering flood waters they believe are safe or by ignoring travel advisories.

Major health concerns are also associated with floods. Floodwaters can transport materials such as dirt, oil, animal waste, and chemicals (e.g., farm, lawn and industrial, that may cause illnesses of various degrees, when coming in contact with humans. Floodwaters can also infiltrate sewer lines and inundate wastewater treatment plants, causing sewage to backup and creating a breeding ground for dangerous bacteria. This infiltration may also cause water supplies to become contaminated and undrinkable.

Flooding in Tangipahoa Parish

Tangipahoa Parish is located in southeastern Louisiana, north of Lake Pontchartrain and is one of the Florida Parishes. Tangipahoa Parish is a predominantly rural Parish whose economic base is comprised of truck, dairy, fish farms and the timber industry. The Parish is approximately 51 miles long by 18 miles wide. The terrain of the Parish consists of gently rolling hills, with elevations that range from 370 feet along the northern State boundary, to 0 feet in the wetlands along Lakes Maurepas and Pontchartrain.

The Tangipahoa River, with a drainage area of 771 square miles at Lake Pontchartrain, flows from the northwestern to the southeastern part of the Parish. The Natalbany River, with a drainage area of 218 square miles at tis mouth, flows throughout the Parish in a southern direction near the western border of the Parish. The mean annual temperature of the area is 67°F. The mean monthly annual temperature ranges from a high of 83°F in July to a low of 41°F in January. The average rainfall is 62 inches.

Principal Flood Problems

Most flooding within the Parish occurs during the winter and spring months, however flooding can occur anytime during the year. During the late summer and fall, very heavy rainfall associated with hurricanes

can cause floods. Flooding along Lake Pontchartrain and Lake Maurepas can occur, as a result of either headwater floods, wind-driven wave action from hurricanes or from a combination of both.

[INSERT HERE FIGURE 2-23: Elevation throughout Tangipahoa Parish. See page 2-58 of 2015 HM PLAN]

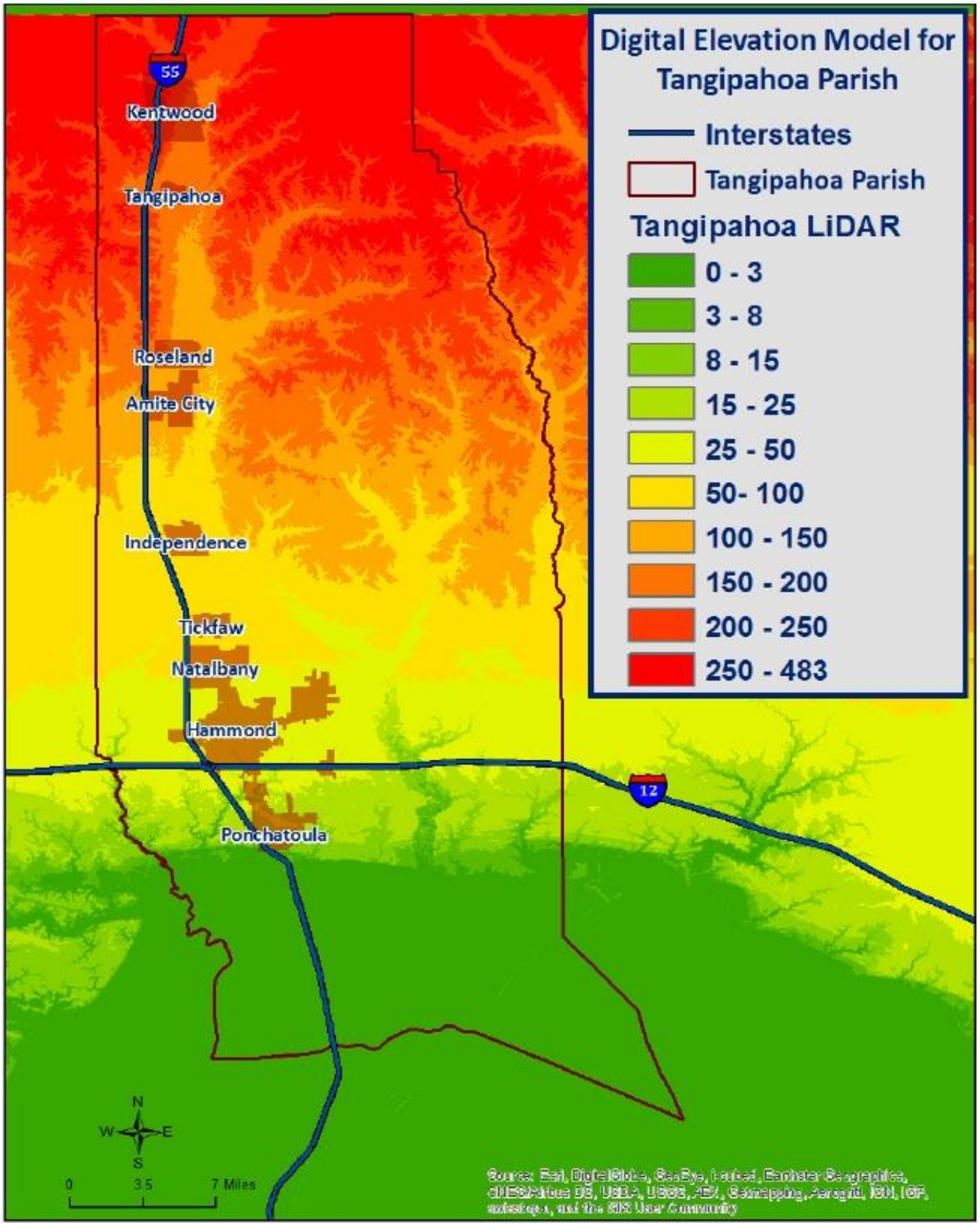


Figure 2-23: Elevation throughout Tangipahoa Parish.

Looking at the digital elevation model (DEM) in Figure 2-23 for Tangipahoa Parish is instructive in visualizing where the low lying and risk areas are for the Parish, primarily below Ponchatoula consists of wetlands and are bordered by Lake Maurepas and Lake Pontchartrain, which makes this area susceptible to storm surge. While the vast majority of the Parish's elevation is above 25 feet, it is still susceptible to flooding due to its proximities to major water ways, particularly the Tangipahoa River, which runs parallel to most of the villages, towns and cities located within Tangipahoa Parish.

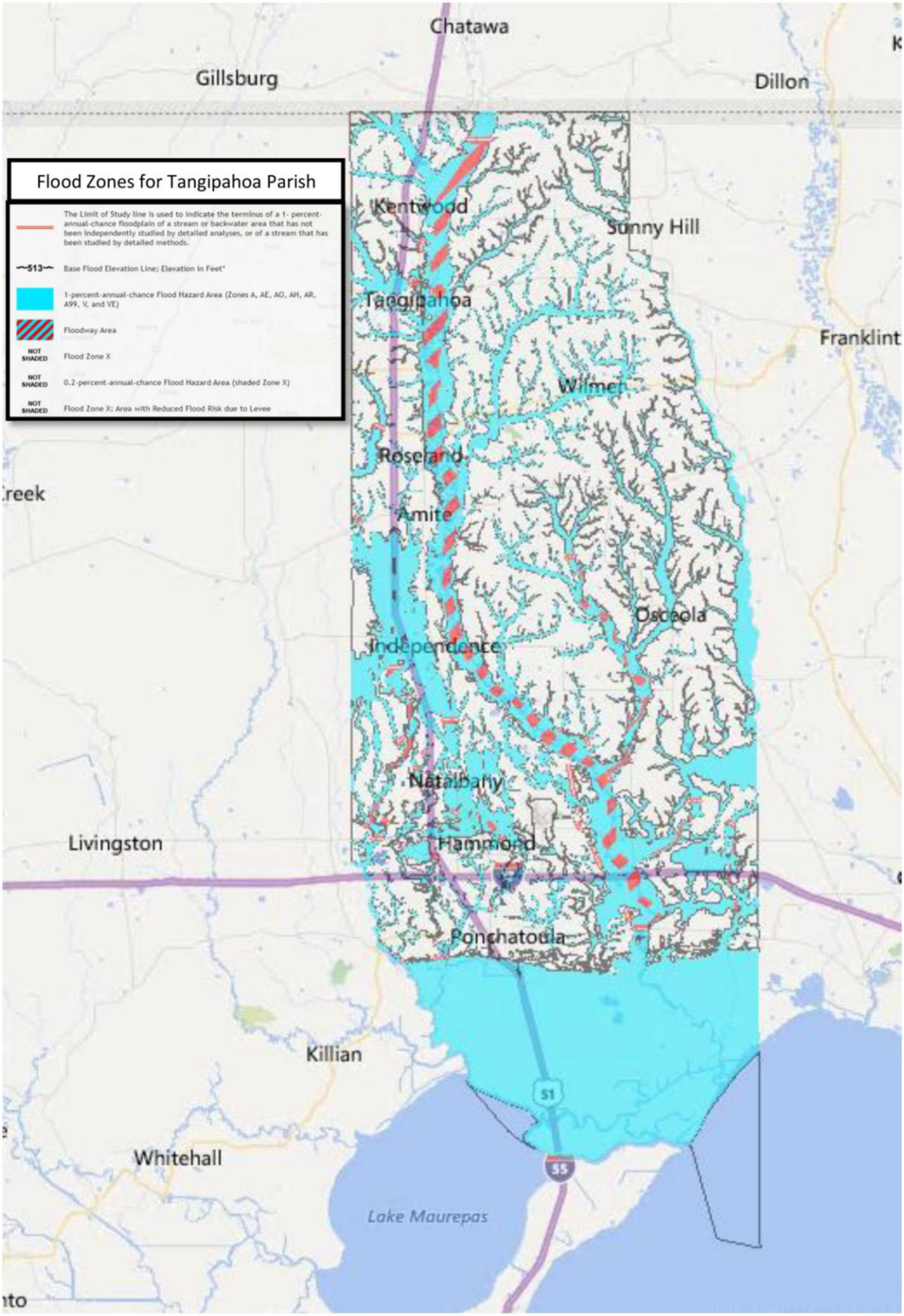


Figure 2-24: The 100 Year Floodplain for Tangipahoa Parish.
(Source: LSU AgCenter)

Location

Tangipahoa Parish has experienced significant flooding in its history and can expect more in the future. Approximately 11 percent of the Parish's total land area contains frequently flooded soils or floodplains. These areas generally run along with the Tangipahoa, Natalbany, Tchefuncte, and other creeks and rivers and are often flooded for long periods of time, usually between December and May. One-third of the Parish is either wetland or subject to flooding. These soils are swamps or other wetlands which have water depths of up to one foot most of the year. This area is located in the lower section of the Parish, the wetland and floodplain of Lake Pontchartrain, and accounts for approximately 14 percent of the Parish.

The following are areas that have been impacted in Tangipahoa Parish during flood events:

- Flooding along the drainage ways adjacent to the Natalbany and Tangipahoa Rivers and Ponchatoula Creek
- Flooding at major drainage laterals along Highway 51 that connects the majority of incorporated areas
- Flooding in low-lying areas in Manchac
- Flooding at the 62 repetitive loss structure locations.

[insert here Figure 2-25: Town of Amite areas within the Flood Zones.]
See page 2-62 2015 HM PLAN

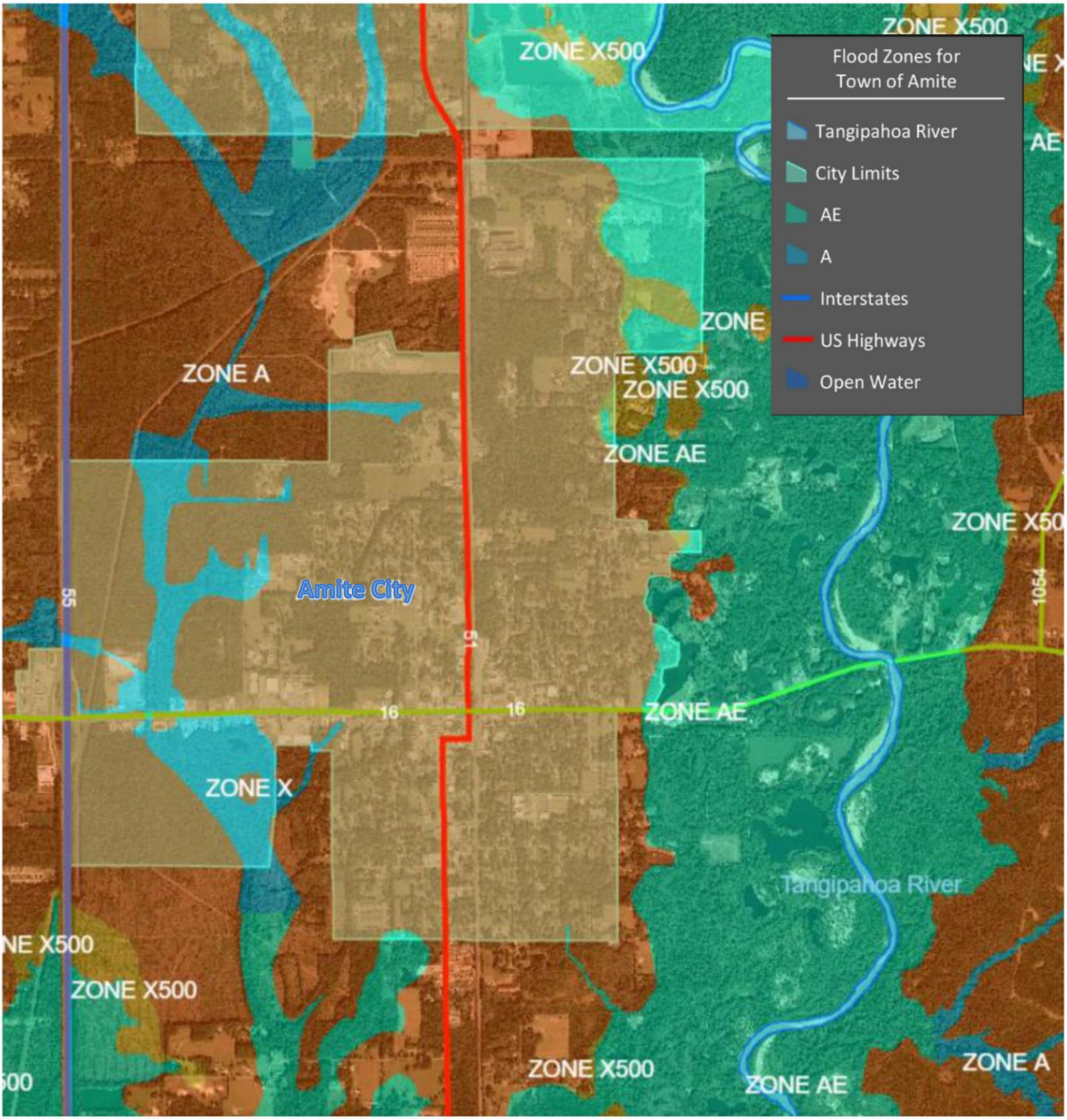


Figure 2-25: Town of Amite areas within Flood Zones.
(Source: TanGIS)

[INSERT FIGURE 2-26: City of Hammond areas within the Flood Zones.]
see page 2-63 in 2015 HM PLAN

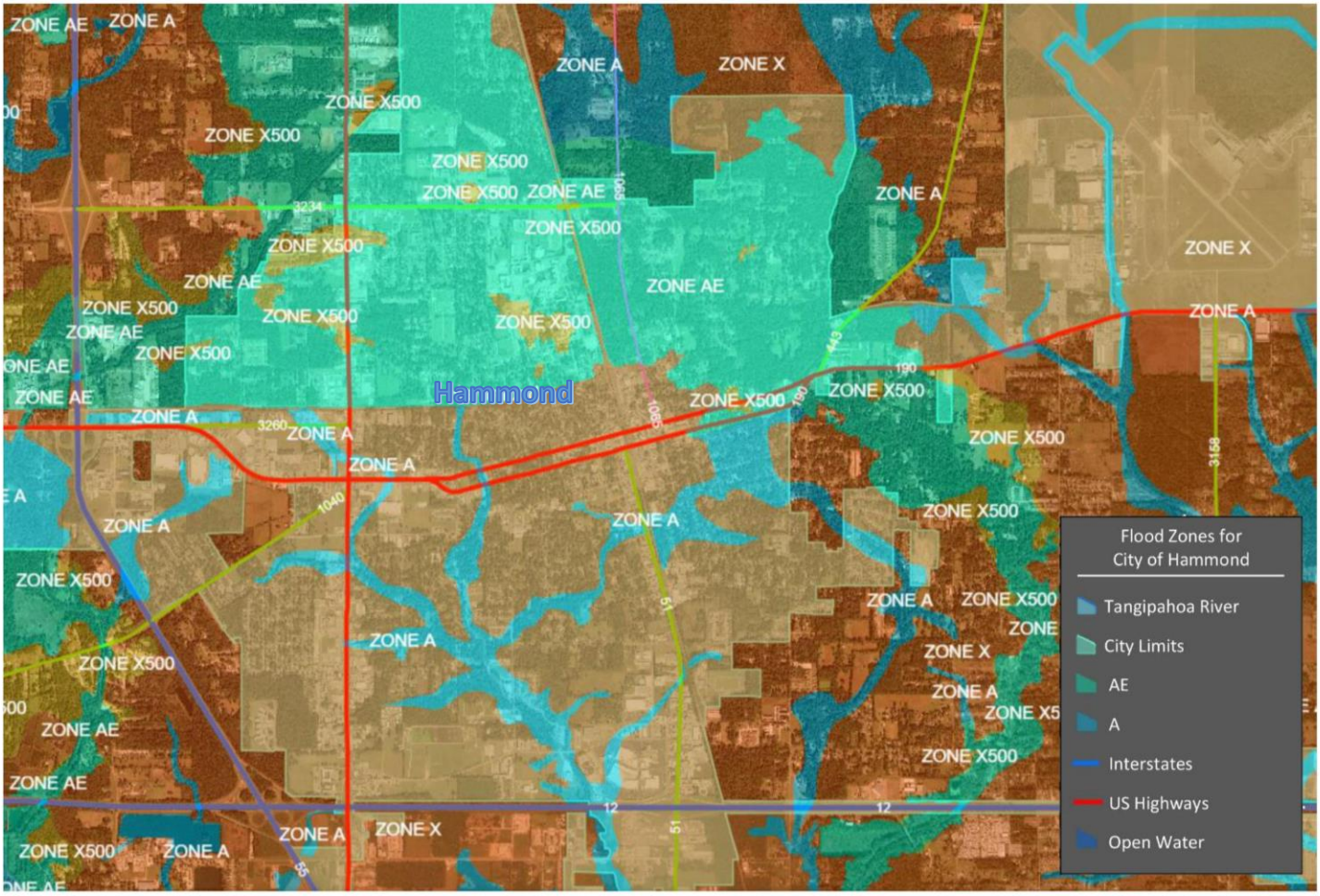


Figure 2-26: City of Hammond areas within Flood Zones.
(Source: TanGIS)

[Insert Figure 2-27: Town of Independence areas within the Flood Zones.]
see page 2-64 of 2015 HM PLAN

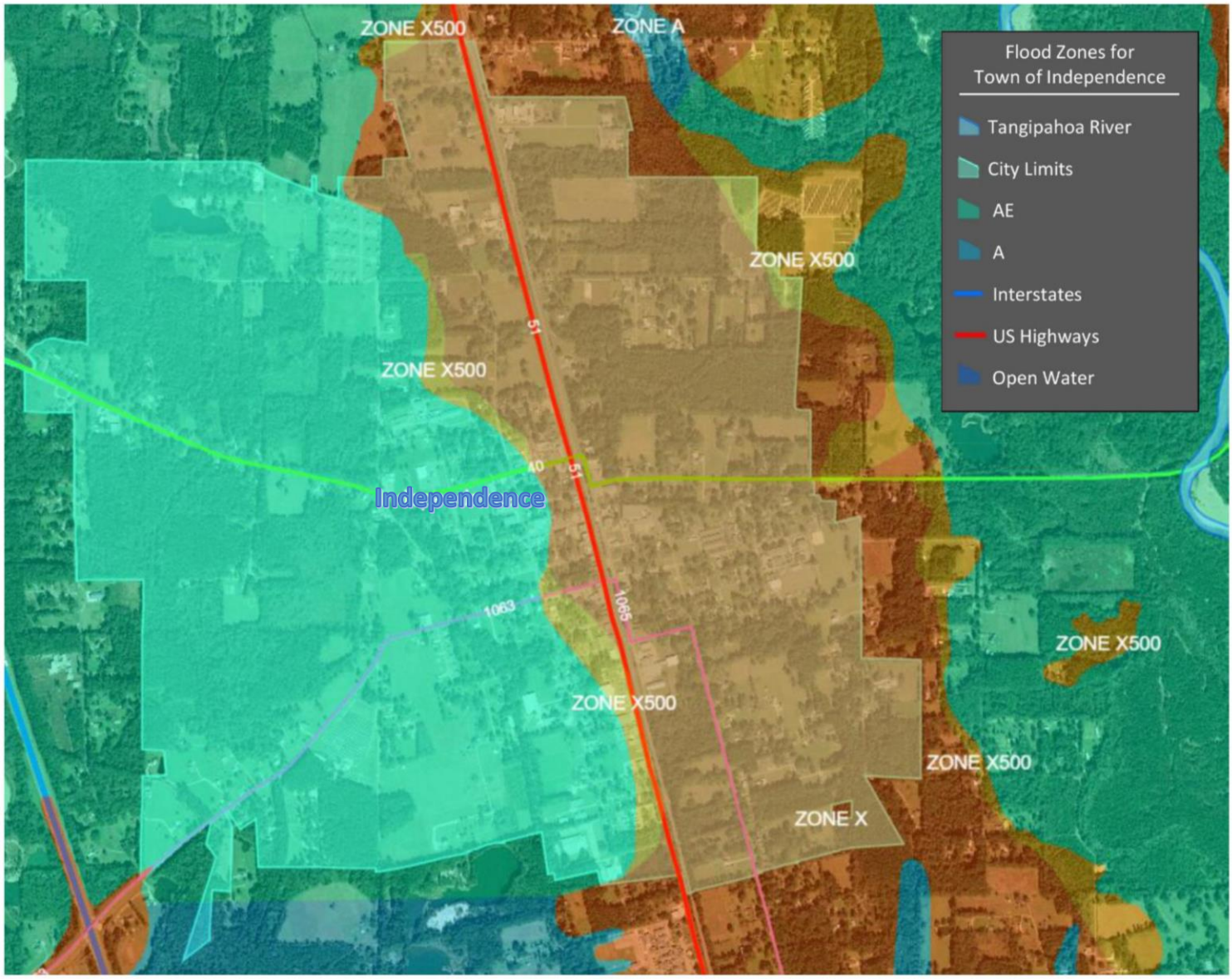


Figure 2-27: Town of Independence areas within Flood Zones.
(Source: TanGIS)

INSERT FIGURE 2-28: Town of Kentwood areas within the Flood Zones.]
see page 2-65 of 2015 HM PLAN

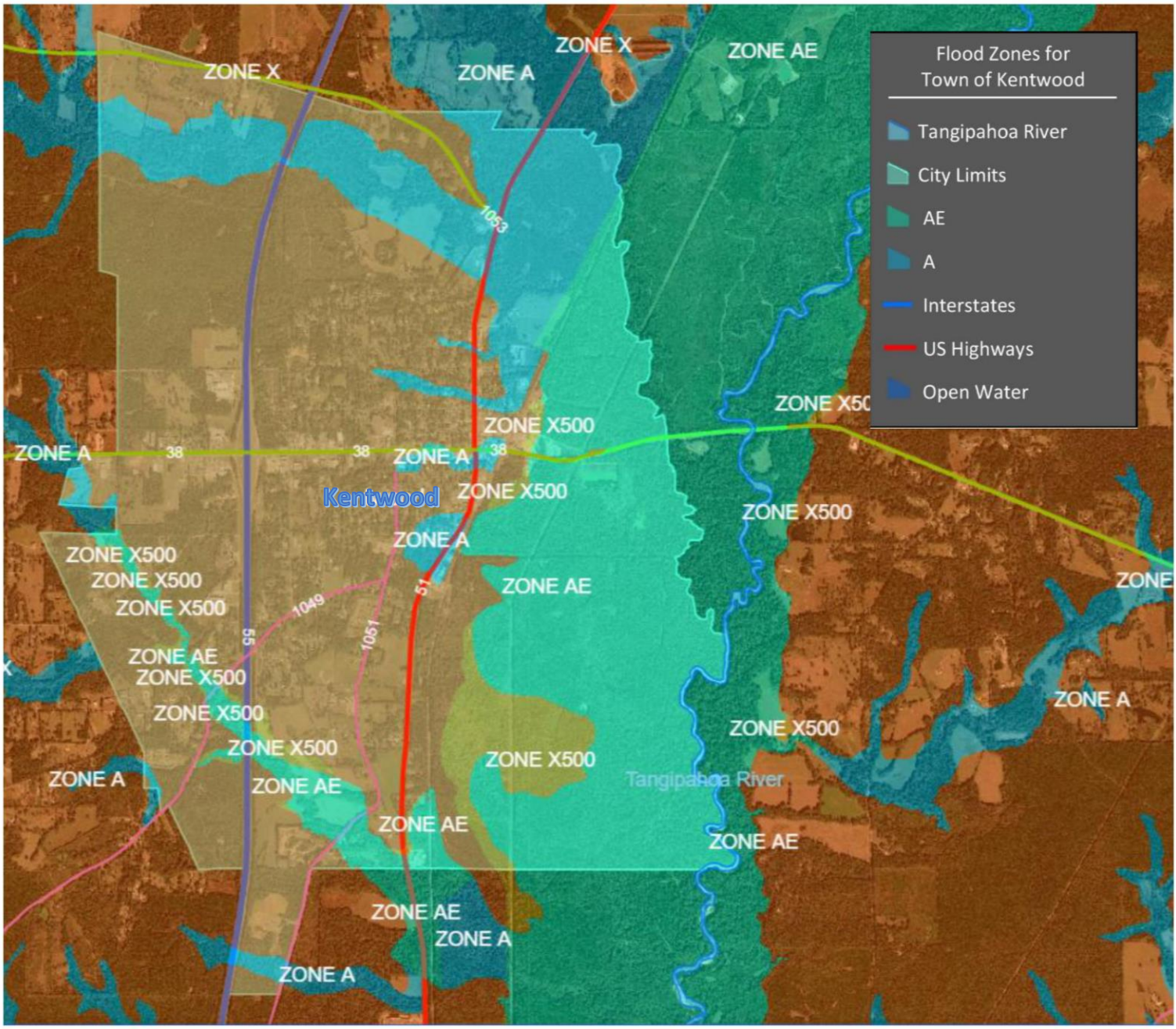


Figure 2-28: Town of Kentwood areas within Flood Zones.
(Source: TanGIS)

[INSERT HERE Figure 2-29: City of Ponchatoula areas within the Flood Zones]
See page 2-66 of 2015 HM PLAN

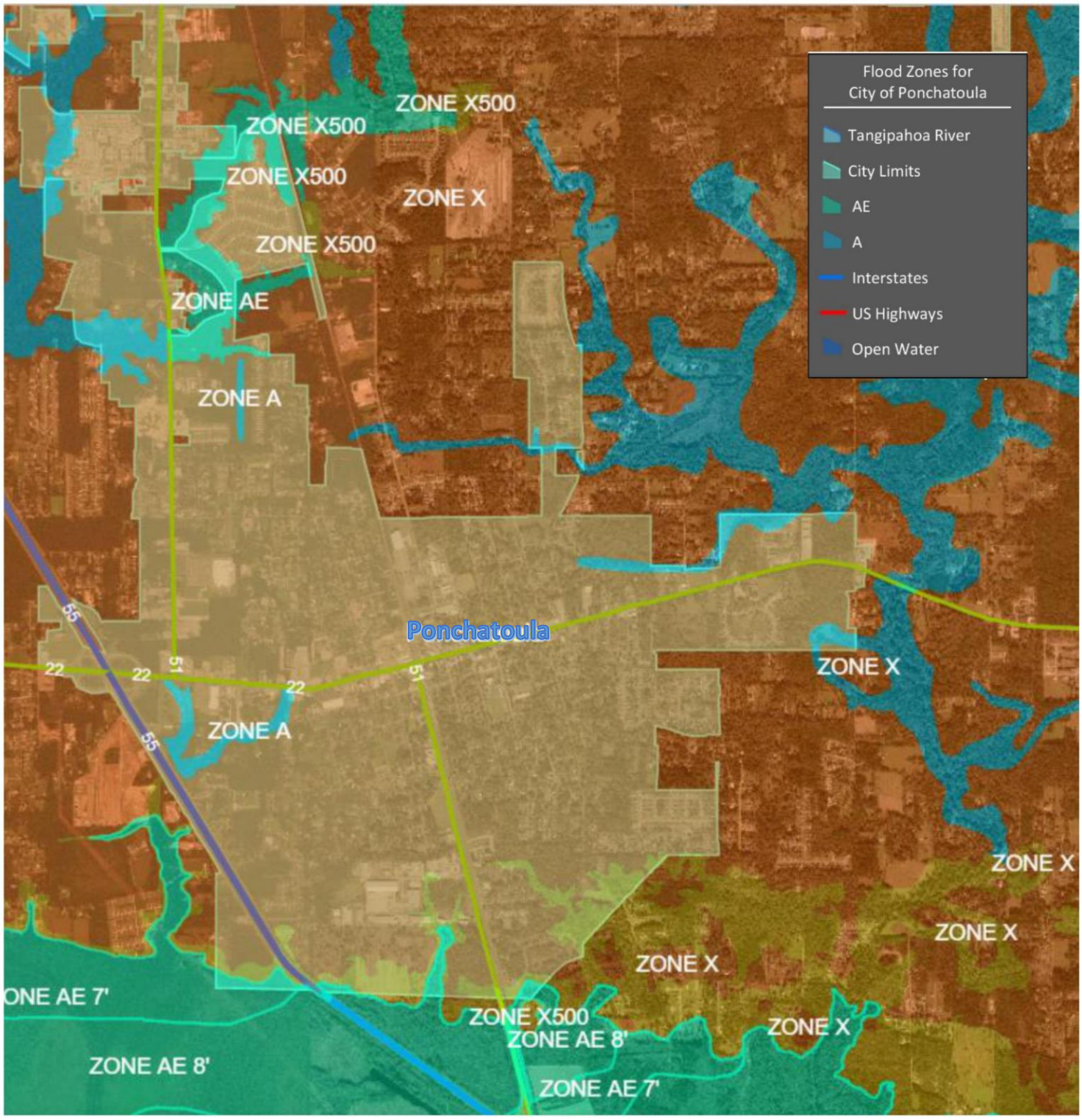


Figure 2-29: City of Ponchatoula areas within Flood Zones.
(Source: TanGIS)

[INSERT HERE FIGURE 2-30: Town of Roseland areas within the Flood Zones.]
see page 2-67 OF 2015 HM PLAN

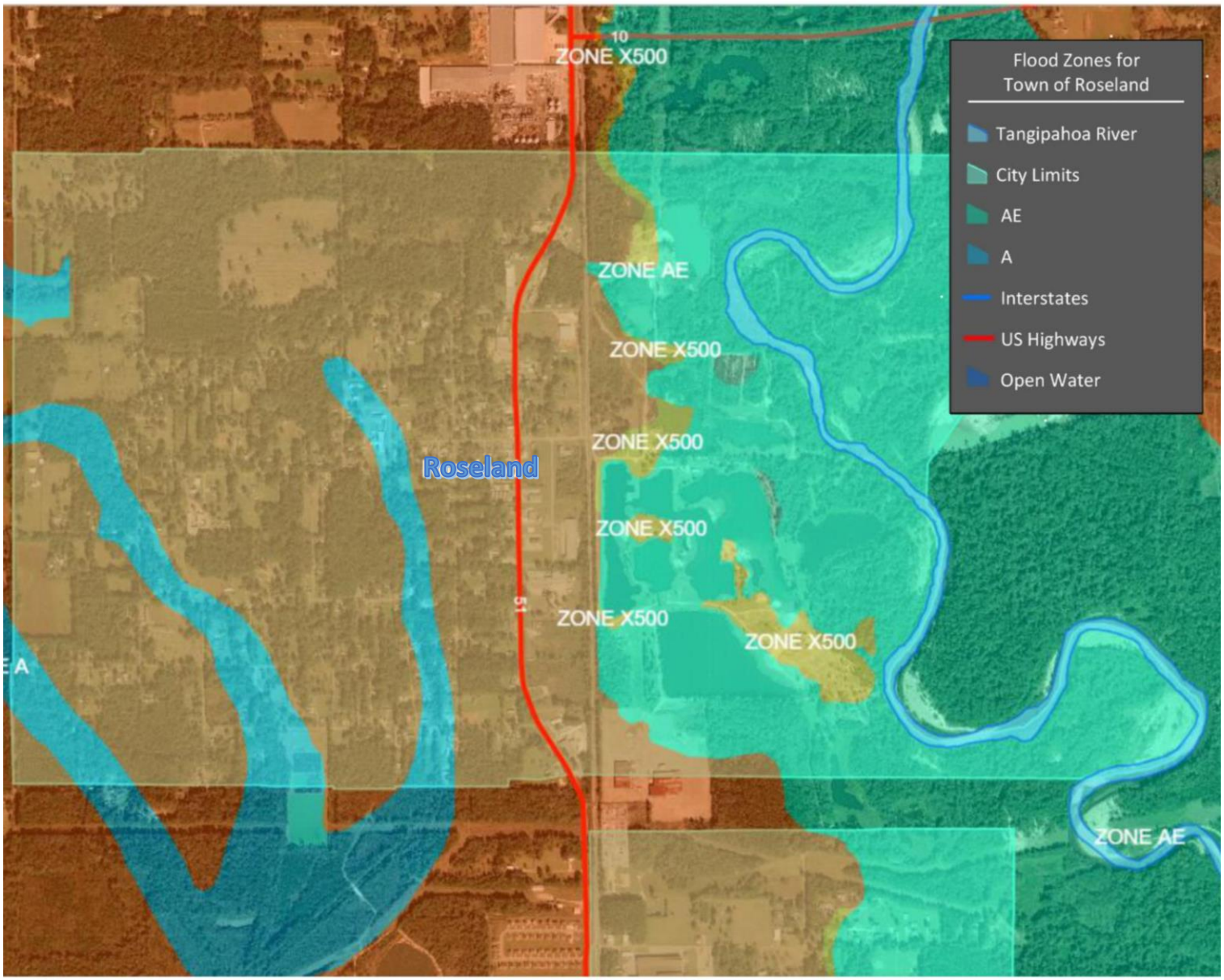


Figure 2-30: Town of Roseland areas within Flood Zones.
(Source: TanGIS)

[INSERT HERE: Figure 2-31: Village of Tangipahoa areas within Flood Zones.]
See page 2-68 of 2015 HM PLAN

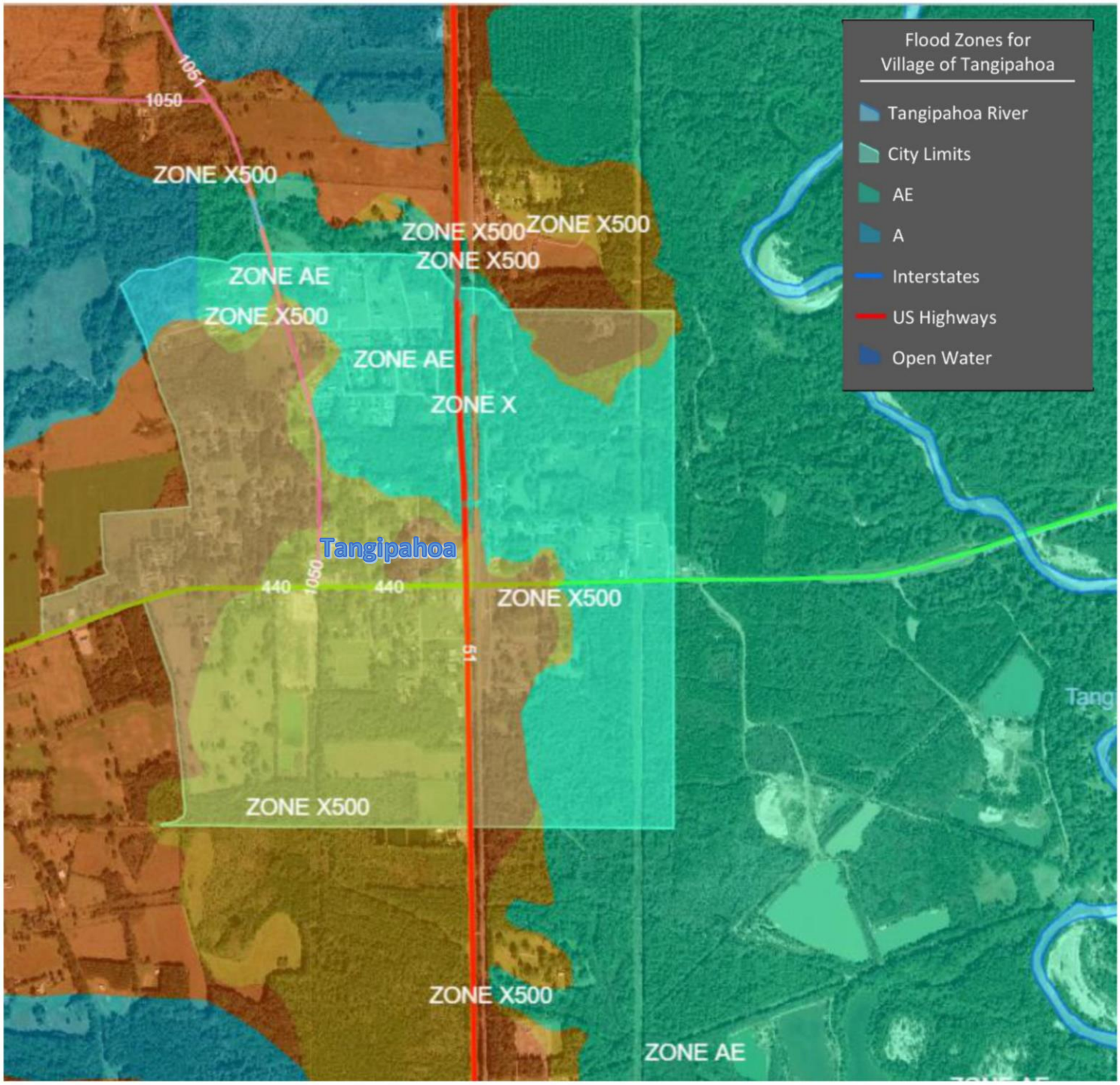


Figure 2-31: Village of Tangipahoa areas within Flood Zones.
(Source: TanGIS)

[INSERT FIGURE 2-32: Village of Tickfaw areas within the Flood Zones.]
see page 2-69 of 2015 HM PLAN

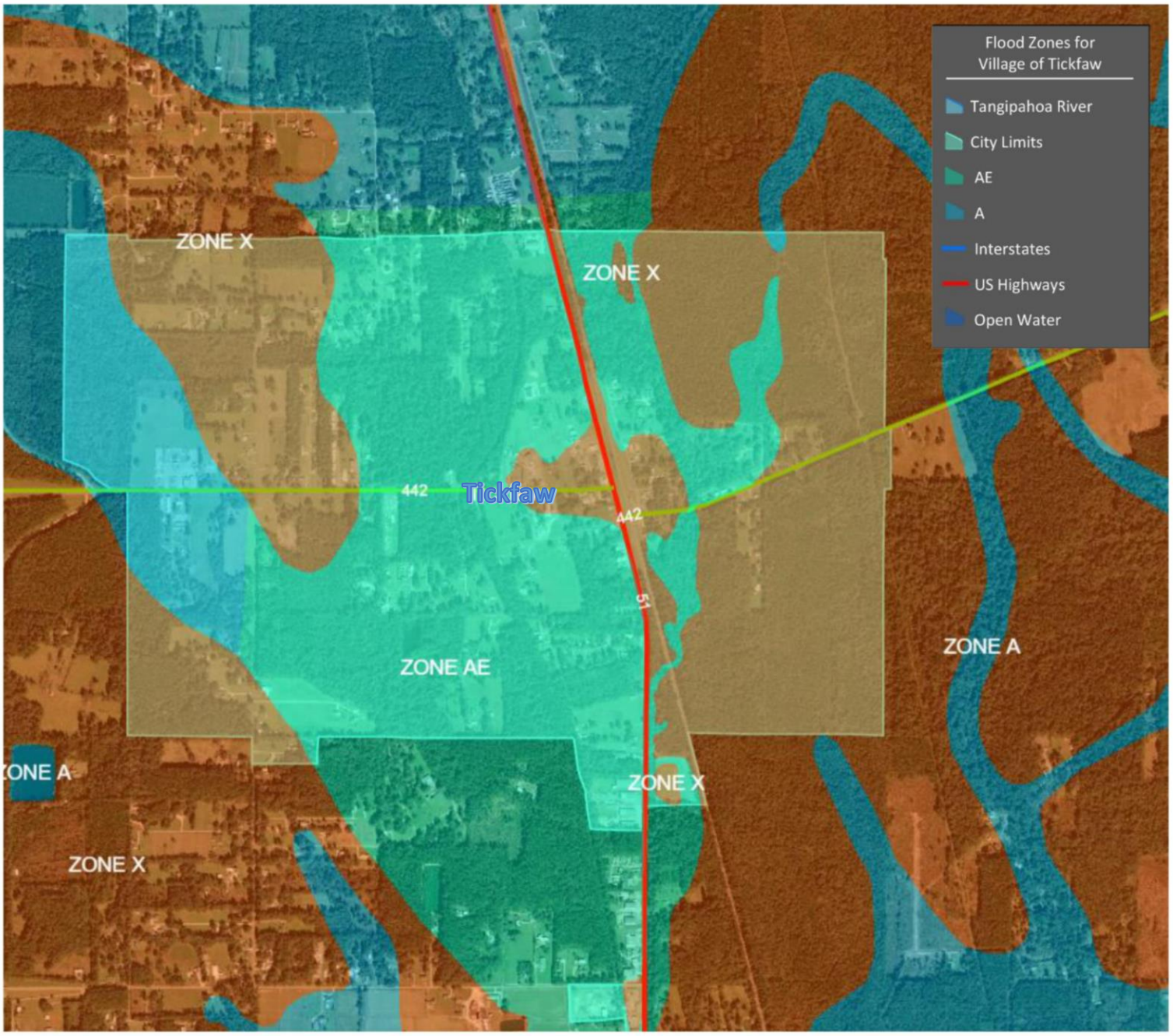


Figure 2-32: Village of Tickfaw areas within Flood Zones.
(Source: TanGIS)

Previous Occurrences and Extents

Historically, there have been 17 flood events that have created significant flooding in Tangipahoa Parish between 1989 to 2014. Below is a brief synopsis of the past 20 flooding events over the last 30 years, including each flooding event that has occurred since the Parish's last planning update. Municipalities of the Tangipahoa Planning areas largest threat to flooding are in areas that are adjacent the Tangipahoa River. Areas immediately adjacent can expect to see 5 to 7 feet of flooding. Areas outside the immediate area can expect to see 1 to 3 feet of flooding from heavy rains and backwater flooding from the Tangipahoa River and other primary waterways through the Parish.

Table 2-28: Historical floods in Tangipahoa Parish with locations from 1989-2019.
(Source: NCDC)

Date	Extents	Type of Flooding	Estimated Damages	Location
2/25/1997	Approximately 25 miles of roads, around rivers and low-lying areas near rivers, were flooded after heavy rain.	Flood	$0	Tangipahoa (unincorporated)
1/5/1998	Heavy rain of 3 to 5 inches occurred over portions of extreme southeast Louisiana. The heavy rain occurred within a few hours' time and overwhelmed drainage pumping capacity, resulting in widespread street flooding.	Flood	$0	Hammond
1/22/1998	Heavy rain of 2.5 inches caused extensive street flooding.	Flood	$0	Ponchatoula
6/6/2001 (Federal Declaration)	Estimated rainfall was over 20 inches. The Parish distributed over 3,000 sandbags. Approximately 30 roadways were flooded along with several houses.	Flash Flood	$100,000	Tangipahoa (Unincorporated)
4/7/2008	Three to 4 inches of rain fell in just a few hours causing flash flooding in areas of poor drainage. Several buildings and houses were flooded. A 12-year old boy playing in or trying to cross a creek with several other boys was swept away and drowned.	Flash Flood	$0	Tangipahoa (unincorporated)

6/30/2003	n/a	Flash Flood	$0	Tangipahoa (unincorporated)
5/2/2008	Louisiana Highway 40 and a number of other roads were closed due to flooding from 6-10 inches of rain. A woman had to be rescued from a vehicle stranded in high water in the Loranger area.	Flash Flood	$0	Independence
5/14/2008	Several inches of rain flooded numerous streets and a number of homes in Hammond area. Fourteen people had to be rescued from the high water.	Flash Flood	$0	Hammond
8/13/2010	Five inches of rain from the remnants of a Tropical Depression #5, flooding yards and approached homes hear Hammond High School east of Hammond.	Flash Flood	$0	Hammond
8/19/2010	Several inches of rain from thunderstorms produced street flooding in several areas of Hammond and surrounding portions of Tangipahoa Parish.	Flash Flood	$0	Hammond
3/4/2011	A few roads in eastern portions of Hammond, including Old Covington Highway and Highway 190 east had 2 to 8 inches of water across them. Several roads were flooded between the Hammond area and Ponchatoula. A few other roads were closed due to high water.	Flash Flood	$0	Tangipahoa (unincorporated)
3/8/2011	Moderate to major flooding developed on the lower portion of the Bogue Falaya and Tchefuncte Rivers in Tangipahoa Parish. The flooding was the result of heavy rain	Flash Flood	$100,000	Tangipahoa (unincorporated)

	caused by Tropical Storm Bill. Most rivers crested late on July 1. River flooding damaged some man-made structures and flooded and damaged some roadways.			
3/8/2011	Many roads were reported under water in Kentwood with 3 to 4 feet of flooding in some areas.	Flash Flood	$0	Kentwood
3/8/2011	The Kentwood Police Department reported water rescues as a result of 3 to 4 feet of water flooding along a creek in the Village of Tangipahoa.	Flood	$30,000	Village of Tangipahoa
9/2/2011	Flooding occurred in low-lying areas and roadways south of Ponchatoula as a result of Tropical Storm Lee.	Storm Surge/Tide	$35,000	Tangipahoa (unincorporated)
5/2/2012	Extensive and deep street flooding was reported in Amite. Water was reported up to 2 feet deep on some roads.	Flash Flood	$0	Amite Roseland
8/28/2012	Localized flooding resulting from Hurricane Isaac. The Tangipahoa River reached flood stage at 22.87 feet, causing some backflow flooding.	Storm Surge/Tide	$26,800,000	Tangipahoa (unincorporated)
3/11/2016	Major river flooding developed along the Tangipahoa River and other large streams. Many houses were flooded especially in the far southern sections of the parish south of Interstate 12.	Flood	$500,000	Loranger (unincorporated)
3/11/2016	Approximately 1,850 homes were flooded in the parish and 2,800 residents had to be evacuated from areas where their	Flash Flood	$1,500,000	Greenlaw (unincorporated)

	residences were either flooded or isolated in flood waters.			
8/13/2016	11,000 homes and businesses suffered various degrees of flooding throughout the parish. One person was found drowned.	Flood	$315,000,000	Greenlaw (unincorporated)

[This section needs to be updated with year 2016 flood information]

Frequency / Probability

While other parts of this plan, along with the State's Hazard Mitigation Plan have relied on the SHELDUS database to provide the annual probability, due to Tangipahoa Parish having multiple jurisdictions, it was necessary to assess the historical data found in the National Climate Data Center data for Tangipahoa Parish and its jurisdictions to properly determine probability for further flood events. The Table below shows the probability and return frequency for each jurisdiction.

Table 2-29: Flood annual probabilities for Tangipahoa Parish

Jurisdiction	Annual Probability	Return Frequency
Tangipahoa Parish	68%	1 – 2 years
Tangipahoa Parish (unincorporated)	28%	3 – 4 years
Amite	4%	25 years
Hammond	16%	6 years
Independence	4%	25 years
Independence	4%	25 years
Kentwood	4%	25 years
Ponchatoula	4%	25 years
Roseland	4%	25 years
Tangipahoa	4%	25 years
Tickfaw	4%	25 years

Based on the State's Hazard Mitigation Plan, the overall probability for the entire Tangipahoa Parish Planning area is 68% with 17 events taking place over a 25-year period. Based on the amount of significant flood events that have taken place throughout the Parish, the Tangipahoa Parish Planning area can anticipate having a significant flood event every 1 to 2 years. ~~While Tickfaw has not experienced a significant flood event in the last 25 years, its overall annual probability is assessed at 4% due to previous flooding before the last 25 years that were assessed for this Plan.~~

[INSERT HERE FIGURE 2-33: Flood Probability for Tangipahoa Parish MAP] (see page 2-73)

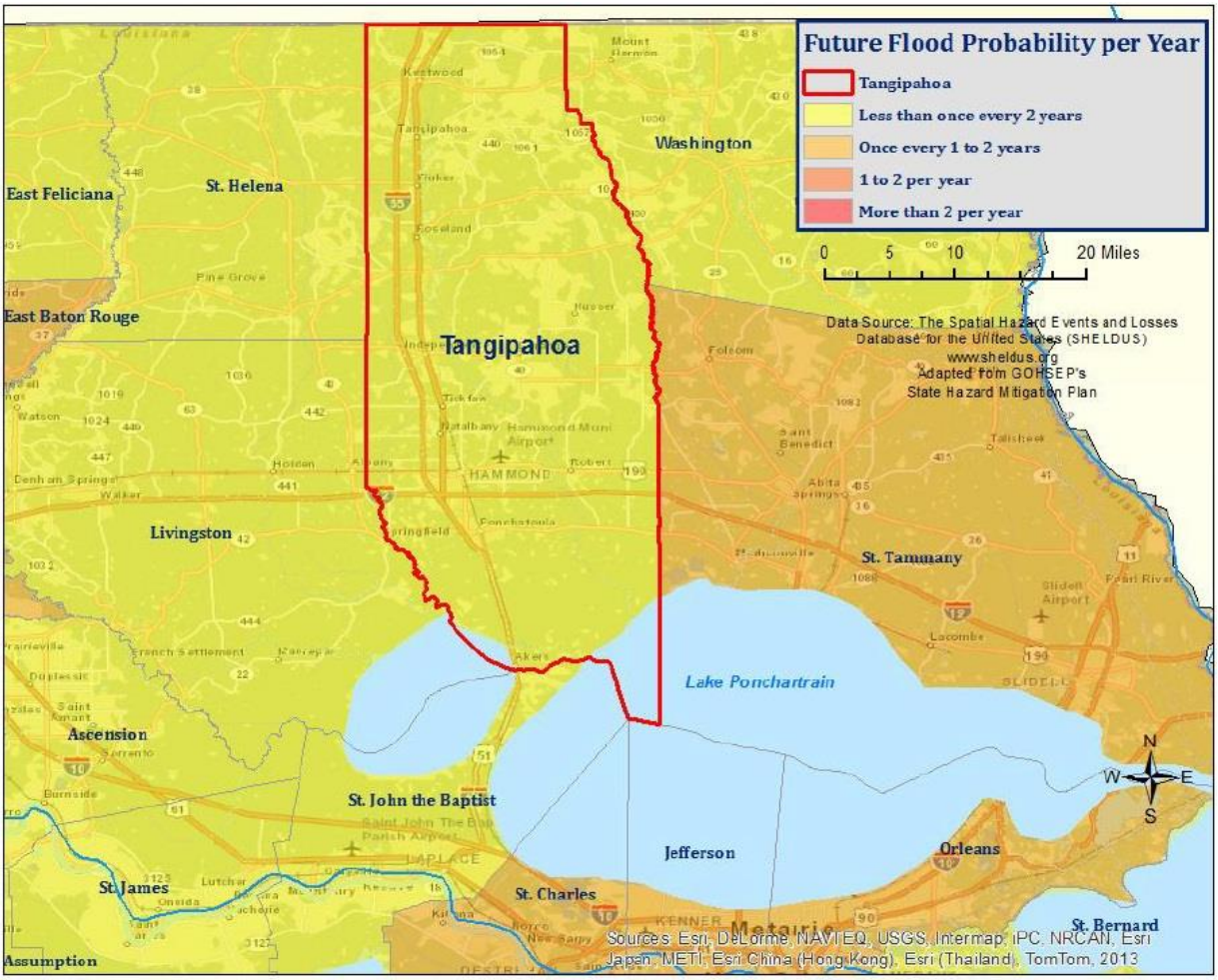


Figure 2-33: Flood Probability for Tangipahoa Parish.

Estimated Potential Losses

Using HAZUS-MH Flood Model, the 100-year flood scenario, along with the Parish DFIRM, was analyzed to determine losses from this worst-case scenario. Table 2-30 shows the total economic losses that would result from this occurrence.

Table 2-30: Estimated losses in Tangipahoa Parish from a 100-year flood event.

Jurisdiction	Estimated total losses from 100-Year Flood event
Tangipahoa Parish (unincorporated)	$1,334,525,000
Amite	$13,279,000
Hammond	$871,989,000
Independence	$48,343,000
Kentwood	$18,033,000
Ponchatoula	$8,112,000
Roseland	$8,053,000
Tangipahoa	$10,299,000
Tickfaw	$21,774,000
Total for the Parish	$2,334,407,000

The HAZUS-MH Flood Model also provides a breakdown by jurisdiction for 7 primary sectors (HAZUS-MH occupancy) throughout the Parish. The losses for each jurisdiction by sector are listed in the tables below.

Table 2-31: Estimated 100-year flood losses for unincorporated Tangipahoa Parish by sector. (Source: HAZUS-MH)

Tangipahoa Parish (unincorporated areas)	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$1,539,000
Commercial	$154,539,000
Government	$8,725,000
Industrial	$41,937,000
Religious / Non-Profit	$56,723,000
Residential	$1,034,895,000
Schools	$34,167,000
Totals	$1,334,525,000

Table 2-32: Estimated 100-year flood losses for Amite by sector. (Source: HAZUS-MH)

Amite	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$95,000
Commercial	$5,680,000
Government	$84,000
Industrial	$586,000
Religious / Non-Profit	$793,000
Residential	$5,112,000

Schools	$929,000
Totals	$13,279,000

Table 2-33: Estimated 100-year flood losses for Hammond by sector.
(Source: HAZUS-MH)

Hammond	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$392,000
Commercial	$117,793,000
Government	$5,669,000
Industrial	$11,920,000
Religious / Non-Profit	$42,664,000
Residential	$660,449,000
Schools	$33,102,000
Totals	$871,989,000

Table 2-34: Estimated 100-year flood losses for Independence by sector.
(HAZUS-MH)

Independence	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$0
Commercial	$6976,000
Government	$1,092,000
Industrial	$502,000
Religious / Non-Profit	$1,338,000
Residential	$34,036,000
Schools	$4,399,000
Totals	$48,343,000

Table 2-35: Estimated 100-year flood losses for Kentwood by Sector.
(Source: HAZUS-MH)

Kentwood	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$220,000
Commercial	$6,429,000
Government	$600,000
Industrial	$1,439,000
Religious / Non-Profit	$604,000
Residential	$8,541,000
Schools	$200,000
Totals	$18,033,000

Table 2-36: Estimated 100-year flood losses for Ponchatoula by sector.
(Source: HAZUS-MH)

Ponchatoula	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$2,000
Commercial	$1,027,000
Government	$0
Industrial	$52,000
Religious / Non-Profit	$236,000
Residential	$6,795,000
Schools	$0
Totals	$8,112,000

Table 2-37: Estimated 100-year flood losses for Roseland by sector.
(Source: HAZUS-MH)

Roseland	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$0
Commercial	$130,000
Government	$0
Industrial	$0
Religious / Non-Profit	$1,675,000
Residential	$6,248,000
Schools	$0
Totals	$8,053,000

Table 2-38: Estimated 100-year flood losses for Tangipahoa by sector.
(Source: HAZUS-MH)

Tangipahoa	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$0
Commercial	$104,000
Government	$130,000
Industrial	$0
Religious / Non-Profit	$952,000
Residential	$9,113,000
Schools	$0
Totals	$10,299,000

Table 2-39: Estimated 100-year flood losses for Tickfaw by sector.
(Source: HAZUS-MH)

Tickfaw	Estimated Total Losses from a 100-Year Flood Event
Agricultural	$0
Commercial	$1,769,000
Government	$0
Industrial	$284,000
Religious / Non-Profit	$580,000
Residential	$19,141,000
Schools	$0
Totals	$21,774,000

Threat to People
The total population within the Parish that is susceptible to a flood hazard are shown in the table below.
Table 2-40: Number of People potentially exposed to a 100-year flood event.
(Source: HAZUS-MH)

Number of People Exposed to Hurricane Hazards			
Location	# in Community	# in Hazard Area	% in Hazard Area
Parish (unincorporated)	83,950	75,452	90%
Amite	4,141	1,216	29%
Hammond	20,019	14,813	74%
Independence	1,665	1,106	66%
Kentwood	2,198	1,125	51%
Ponchatoula	6,559	1,542	24%
Roseland	1,123	877	78%
Tangipahoa	748	509	68%
Tickfaw	694	671	97%
Total	121,097	97,311	80%

The HAZUS-MH Flood Model was also extrapolated to provide an overview of vulnerable populations throughout the jurisdictions in the tables below:

Table 2-41: Vulnerable populations susceptible to a 100-year flood event in unincorporated Tangipahoa Parish. (Source: HAZUS-MH)

Tangipahoa Parish (unincorporated)		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	75,452	90%
Persons under 5 years	5,583	7.40%
Persons under 18 years	19,467	25.80%

Persons 65 years and over	8,300	11%
White	55,759	73.90%
Minority	19,693	26.10%

Table 2-42: Vulnerable populations susceptible to a 100-year flood event in Amite.
(Source: HAZUS-MH)

Amite		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	1,216	29%
Persons under 5 years	64	5.30%
Persons under 18 years	270	22.20%
Persons 65 years and over	154	12.70%
White	530	43.60%
Minority	686	56.40%

Table 2-43: Vulnerable populations susceptible to a 100-year flood event in Hammond.
(Source: HAZUS-MH)

Hammond		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	14,813	74%
Persons under 5 years	1,007	6.80%
Persons under 18 years	3,155	21.30%
Persons 65 years and over	1,718	11.60%
White	7,199	48.60%
Minority	7,614	51.40%

Table 2-44: Vulnerable populations susceptible to a 100-year flood event in Independence.
(Source: HAZUS-MH)

Independence		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	1,106	66%
Persons under 5 years	91	8.20%
Persons under 18 years	299	27%
Persons 65 years and over	169	15.30%
White	604	54.60%
Minority	502	45.40%

Table 2-45: Vulnerable populations susceptible to a 100-year flood event in Kentwood.
(Source: HAZUS-MH)

Kentwood		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	1,125	51%
Persons under 5 years	74	6.60%
Persons under 18 years	302	26.80%

Persons 65 years and over	152	13.50%
White	304	27%
Minority	821	73%

Table 2-46: Vulnerable populations susceptible to a 100-year flood event in Ponchatoula.
(Source: HAZUS-MH)

Ponchatoula		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	1,542	24%
Persons under 5 years	116	7.50%
Persons under 18 years	415	7.50%
Persons 65 years and over	205	13.30%
White	976	63.30%
Minority	566	36.70%

Table 2-47: Vulnerable populations susceptible to a 100-year flood event in Roseland.
(Source: HAZUS-MH)

Roseland		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	877	78%
Persons under 5 years	61	6.90%
Persons under 18 years	242	27.60%
Persons 65 years and over	109	12.40%
White	281	32%
Minority	596	68%

Table 2-48: Vulnerable populations susceptible to a 100-year flood event in Tangipahoa.
(Source: HAZUS-MH)

Tangipahoa		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	509	68%
Persons under 5 years	50	9.80%
Persons under 18 years	187	36.80%
Persons 65 years and over	34	6.70%
White	40	7.80%
Minority	469	92.20%

Table 2-49: Vulnerable populations susceptible to a 100-year flood event in Tickfaw.
(Source: HAZUS-MH)

Tickfaw		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	671	97%
Persons under 5 years	39	5.80%
Persons under 18 years	164	24.40%
Persons 65 years and over	91	13.50%
White	505	75.20%

Minority	166	24.80%

Thunderstorms

The term "thunderstorm" is usually used as a catch-all term for several kinds of storms. Here "thunderstorm" is defined to include any precipitation event in which thunder is heard or lightning is seen. Thunderstorms are often accompanied by heavy rain and strong winds and, depending on conditions, occasionally by hail or snow. Thunderstorms form when humid air masses are heated, which causes them to become convectively unstable and therefor rise. Upon rising, the air masses' water vapor condenses into liquid water and/or deposits directly into ice, when they rise sufficiently to cool to the dew-point temperature.

Thunderstorms are classified into four main types (single-cell, multi-cell, squall line, and super-cello), depending on the degree of atmospheric instability, the change in wind speed with height (called wind shear), and the degree to which the storm's internal dynamics are coordinated with those adjacent storms. There is no such interaction for single-cell thunderstorms, but there is significant interaction with clusters of adjacent thunderstorms in multi-cell thunderstorms and with a linear "chain" of adjacent storms in squall line thunderstorms. Though super-cell storms have no significant interactions with other storms, they have very well-organized and self-sustaining internal dynamics, which allows them to be the longest-lived and most severe of all thunderstorms.

The life of a thunderstorm proceeds through 3 stages: the developing (or cumulus) stage, the mature stage, and the dissipation stage. During the developing stage, the unstable air mass is lifted as an updraft into the atmosphere. This sudden lift rapidly cools the moisture in the air mass, releasing latent heat as condensation and/or deposition occurs, and warming the surrounding environment, thus making it less dense than the surrounding air. This process intensifies the updraft and creates a localized lateral rush of air from all directions into the area beneath the thunderstorm to feed continued updrafts. At the mature stage, the rising air is accompanied by downdrafts caused by the shear of falling rain (if melted completely), or hail, freezing rain, sleet, or snow (if not melted completely). The dissipation stage is characterized by the dominating presence of the down draft as the hot surface that gave the updrafts their buoyancy is cooled by precipitation. During the dissipation stage, the moisture in the air mass largely empties out.

The Storm Prediction Center in conjunction with the National Weather Service (NWS) have the ability to issue advisory messages based on forecasts and observations. The following are the advisory messages that may be issued with definitions of each:

• Severe Thunderstorm Watch:	Issued to alert people to the possibility of a severe thunderstorm developing in the area. Expected time frame for these storms is 3 to 6 hours.
• Severe Thunderstorm Warning:	Issued when severe thunderstorms are imminent. This warning is highly localized and covers parts of one to several counties (parishes).

A variety of hazards might be produced by thunderstorms, including lightning, hail, tornadoes or waterspouts, flash floods, and high-speed winds called downbursts. Nevertheless, given all of these

criteria, the National Oceanic and Atmospheric Administration (NOAA) characterizes a thunderstorm as severe when it produces one or more of the following:

- Hail of 1 inch in diameter or larger
- Wind gusts to 58 mph or greater
- One or more tornadoes

Tornadoes and flooding hazards have been profiled within this report; therefore, for the purpose of thunderstorms, the sub hazards of hail, high winds, and lightning will be profiled.

Thunderstorms occur throughout Louisiana at all times of the year, although the types and severity of those storms vary greatly, depending on a wide variety of atmospheric conditions. Thunderstorms generally occur more frequently during the late spring and early summer when extreme variations exist between ground surface temperatures and upper atmospheric temperatures.

Hazard Description

Hailstorms are severe thunderstorms in which balls or chunks of ice fall along with rain. Hail develops in the upper atmosphere initially as ice crystals that are bounced about by high-velocity updraft winds. The ice crystals grow through deposition of water vapor onto their surface, fall partially to a level in the cloud where the temperature exceeds the freezing point, melt partially, get caught in another updraft, whereupon re-freezing and deposition grows another concentric layer of ice, and fall after developing enough weight, sometimes after several trips up and down the cloud. The size of hailstones varies, depending on the severity and size of the thunderstorm. Higher surface temperatures generally mean stronger updrafts, which allows more massive hailstones to be supported by updrafts, leaving them suspended longer. This longer time means larger hailstone sizes. The tables on the following page display the TORRO Hailstorm Intensity Scale, along with a spectrum of hailstone diameters and their everyday equivalents.

Table 2-50: TORRO Hailstorm Intensity Scale

Intensity Category		Hail Diameter (mm)	Probable Kinetic Energy	Typical Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plant, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle body work
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage, vehicle body work
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries

H8	Destructive	60-90		Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Table 2-51: Spectrum of hailstone diameters and their everyday description
(Source: National Weather Service)

Spectrum of Hailstone Diameters	
Hail Diameter Size	Description
¼"	Pea
½"	Plain M&M
¾"	Penny
7/8"	Nickle
1" (severe)	Quarter
1 ¼"	Half-dollar
1 ½"	Ping Pong Ball / Walnut
1 ¾"	Golf Ball
2"	Hen Egg /Lime
2 ½"	Tennis Ball
2 ¾"	Baseball
3"	Teacup / Large Apple
4"	Softball
4 ½"	Grapefruit
4 ¾" – 5"	Computer CD-DVD

Hailstorms can cause widespread damage to homes and other structures, automobiles, and crops. While the damage to individual structures or vehicles is often minor, the cumulative cost to communities, especially across large metropolitan areas, can be quite significant. Hailstorms can also be devastating to crops. Thus, the severity of hailstorms depends on the size of the hailstones, the length of time the storm lasts, and where it occurs.

Hail rarely causes loss of life, although large hailstones can cause bodily injury.

High Winds

In general, high winds can occur in a number of different ways, within and without thunderstorms. The Federal Emergency Management Agency (FEMA) distinguishes these as shown in Table 2-52.

Table 2-52: High winds categorized by source, frequency, and duration.
(Source: Making Critical Facilities Safe from High Wind, FEMA)

High Winds Categories			
High Wind Type	Description	Relative Frequency in Louisiana	Relative Maximum Duration in Louisiana
Straight-line Winds	Wind blowing in straight line; usually associated with intense low-pressure area	High	Few minute – 1 day
Downslope Winds	Wind blowing down the slope of a mountain; associated with temperature and pressure gradients	N/A	N/A
Thunderstorm Winds	Wind blowing due to thunderstorms, and thus associated with temperature and pressure gradients	High (especially in the spring and summer)	~Few minutes – several hours
Downbursts	Sudden wind blowing down due to downdraft in a thunderstorm; spreads out horizontally at the ground, possibly forming horizontal vortex rings around the downdraft	Medium-to-High (% of all thunderstorms)	~15-20 minutes
Northeaster (nor'easter) Winds	Wind blowing due to cyclonic storm off the east coast of North America; associated with temperature and pressure gradients between the Atlantic and land	N/A	N/A
Hurricane Winds	Wind blowing in spirals, converging with increasing speed toward eye; associated with temperature and pressure gradients between the Atlantic and Gulf and land	Low-to-Medium	Several days
Tornado Winds	Violently rotating column of air from base of a thunderstorm to the ground with rapidly decreasing winds at greater distances from center; associate with extreme temperature gradient.		

The only high winds of present concern are thunderstorm winds and downbursts. Straight-line winds are common but are a relatively insignificant hazard (on land) compared to other high winds. Downslope winds are common but relative insignificant in the mountainous areas of Louisiana where they occur. Nor'easters are cyclonic events that have at most a peripheral effect on Louisiana, and none associated with height winds. Winds associated with hurricanes and tornadoes will be considered in their respective sections.

Table 2-53 presents the Beaufort Wind Scale, first developed in 1805 by Sir Francis Beaufort, which aids in determining relative force and wind speed based on the appearance of wind effects.

Table 2-53: Beaufort Wind Scale
(Source: NOAA's SPC)

Beaufort Wind Scale			
Force	Wind	WMO Classification	Appearance of Wind Effects on Land
1	1-3	Light Air	Calm, smoke rises vertically; Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Wind felt on face, eaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-17	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	18-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-30	Strong Breeze	Larger tree branches moving, whistling in wires
7	31-38	Near Gale	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Twigs Breaking off trees, generally impedes progress
9	47-54	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Seldom experienced on land, trees broken or uprooted, considerable structural damage
11	54-73	Violent Storm	
12	74+	Hurricane	

Major damage directly caused by thunderstorm winds is relatively rare, while minor damage is common and pervasive, and most noticeable when it contributes to power outages. These power outages can have major negative impacts, such as increased tendency for traffic accidents, loss of revenue for businesses, increased vulnerability to fire, food spoilage, and other losses that might be sustained by a loss of power.

Power outages may pose a health risk for those requiring electric medical equipment and/or air conditioning.

Lightning

Lightning is a natural electrical discharge in the atmosphere that is a by-product of thunderstorms. Every thunderstorm produces lightning. There are 3 primary types of lightning: intra-cloud, cloud-to-ground, and cloud-to-cloud. Cloud-to-ground lightning has the potential to cause the most damage to property and crops, while also posing as a health risk to the populace in the area of the strike.

Damage caused by lightning is usually to homes or businesses. These strikes have the ability to damage electrical equipment inside the home or business and can also ignite a fire that could destroy homes or crops.

Lightning continues to be one of the top three storm-related killers in the United States per FEMA, but it also has the ability to cause negative long-term health effects to the individual who is struck. The following table outlines the lightning activity level that is a measurement of lightning activity.

Table 2-54: Lightning Activity Level (LAL) Grids

LAL	Cloud and Storm Development	Lightning Strikes/15 Min
1	No thunderstorms	-
2	Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two or three must occur within the observation area. Light-to-moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common and lightning is frequent.	16-25
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy and lightning is frequent.	>25
6	Similar to LAL 3, except thunderstorms are dry.	

Hazard Profile

Hailstorms

Location

Because hailstorms is a climatological-based hazard and has the same probability of occurring in Tangipahoa Parish as all of its jurisdictions, the entire planning area for Tangipahoa Parish is equally at risk for hailstorms.

Previous Occurrences / Extents

The SHELDUS database reports a total of 4 significant hailstorms occurring within the boundaries of Tangipahoa Parish between the years of 1989-2014. The hailstorm diameters experienced in Tangipahoa Parish have ranged from 0.75 inches to 2.75 inches, according to the National Climatic Data Center over a 30-year period. The most frequently recorded hail size has been 1-inch diameters. Figure 2-34 displays the density of hailstorms in Tangipahoa Parish and adjacent parishes. Table 2-55 provides an overview of hailstorms that have impacted the Tangipahoa Parish Planning Area since 2009. Of these 24 events, only on event on September 28, 2011 in the City of Hammond resulted in property damage, and no events resulted in injuries or fatalities. The event that occurred on September 28, 2011 resulted in approximately $5,000 in damage, when golf ball size hail broke several car windows in the City of Hammond. There have not been any recorded hail events that have impacted the Town of Roseland or the Village of Tangipahoa since the last plan update. It is expected that the Tangipahoa Parish Planning

Area will continue to experience hailstorms with the most prevalent size of hail being 1.00 inches. ~~However, as a worst case, Tangipahoa Parish can potentially experience hail up to 2 inches in diameter.~~

Table 2-55: Previous Occurrences of Hailstorms in Tangipahoa Parish
(Source: NCDC)

Date	Recorded Hail Size	Location
May 11, 2009	0.75 in	Wilmer (Unincorporated Tangipahoa Parish)
May 16, 2009	1.00 in	Husser (Unincorporated Tangipahoa Parish)
January 20, 2010	1.75 in	Independence
January 20, 2010	1.75 in	Loranger (Unincorporated Tangipahoa Parish)
April 24, 2010	1.00 in	Tickfaw
April 24, 2010	1.75 in	Tickfaw
March 29, 2011	1.00 in	Amite
March 29, 2011	1.75 in	Amite
April 15, 2011	1.00 in	Kentwood
April 15, 2011	1.75 in	Kentwood
June 6, 2011	1.00 in	Ponchatoula
September 28, 2011	1.75 in	Hammond
April 3, 2012	1.00 in	Ponchatoula
April 5, 2012	1.00 in	Tickfaw
April 11, 2012	1.00 in	Robert (Unincorporated Tangipahoa Parish)
May 31, 2012	1.00 in	Hammond
April 8, 2014	1.00 in	Ponchatoula
April 4, 2015	1.75 in	Kentwood
January 21, 2016	1.75 in	Amite
January 21, 2016	2.00 in	Holton (Unincorporated Tangipahoa Parish)
January 21, 2016	2.75 in	Wilmer (Unincorporated Tangipahoa Parish)
January 21, 2016	1.00 in	Springcreek (Unincorporated Tangipahoa Parish)
May 12, 2017	1.00 in	Baptist (Unincorporated Tangipahoa Parish)
May 18, 2018	0.88 in	Campbell (Unincorporated Tangipahoa Parish)

[INSERT FIGURE 2-34: Density of hailstorms by diameter from 1950-1964] see page 2-88

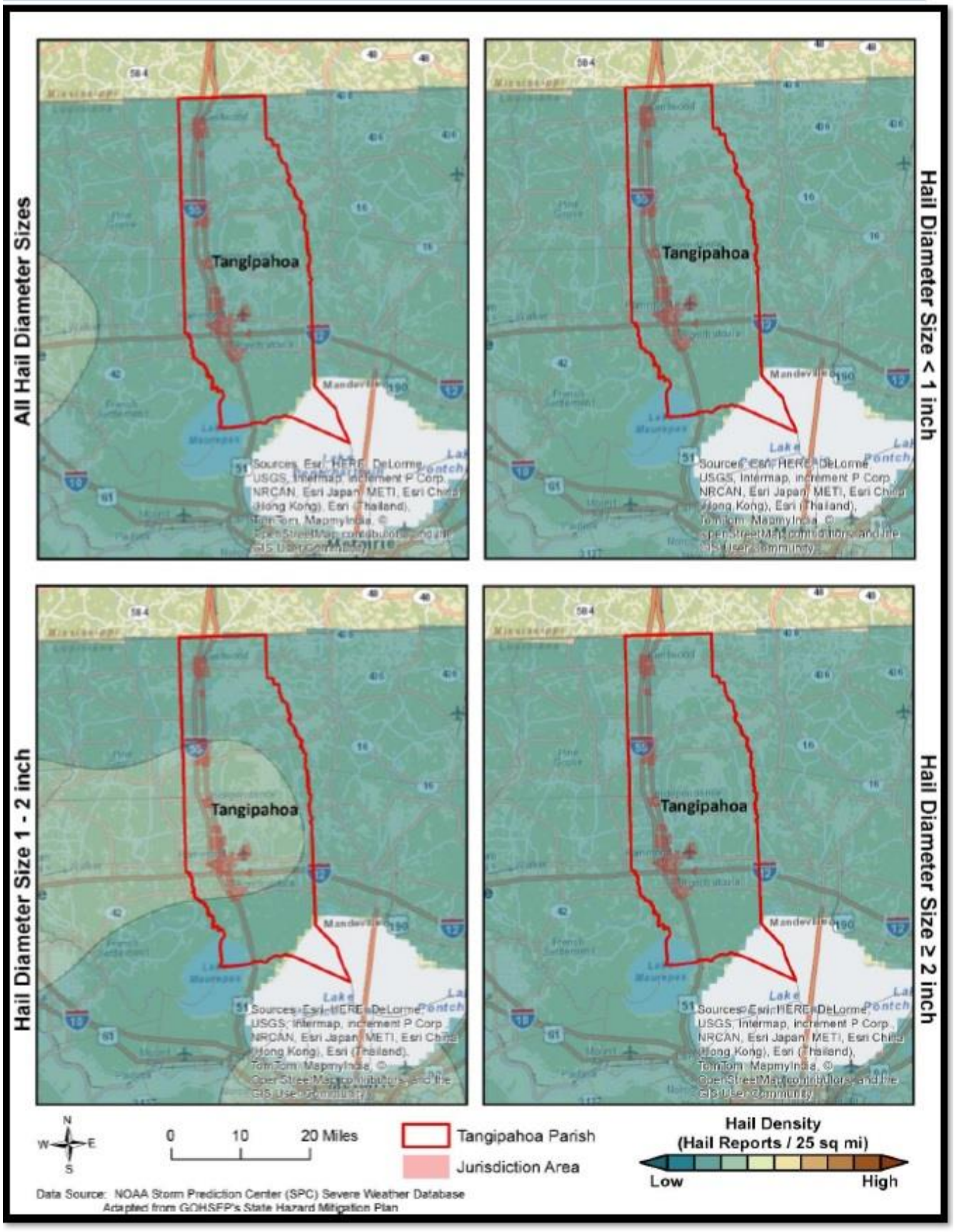


Figure 2-34: Density of hailstorms by by diameter from 1950-1964

Frequency

The State of Louisiana Hazard Mitigation Plan estimated the probability of occurrence of 2.1 to 4.0 hail days per year experiencing events with hailstones 3/4" diameter or larger within 25 miles in Tangipahoa Parish. ~~The probability was determined based on a review of significant hail data that has caused damages in the last 25 years, in which Tangipahoa Parish has had seven recorded events (Figure 2-35).~~

[INSERT FIGURE 2-35: Probability of hailstorm events in Tangipahoa Parish from 1987-2012]
(see page 2-89)

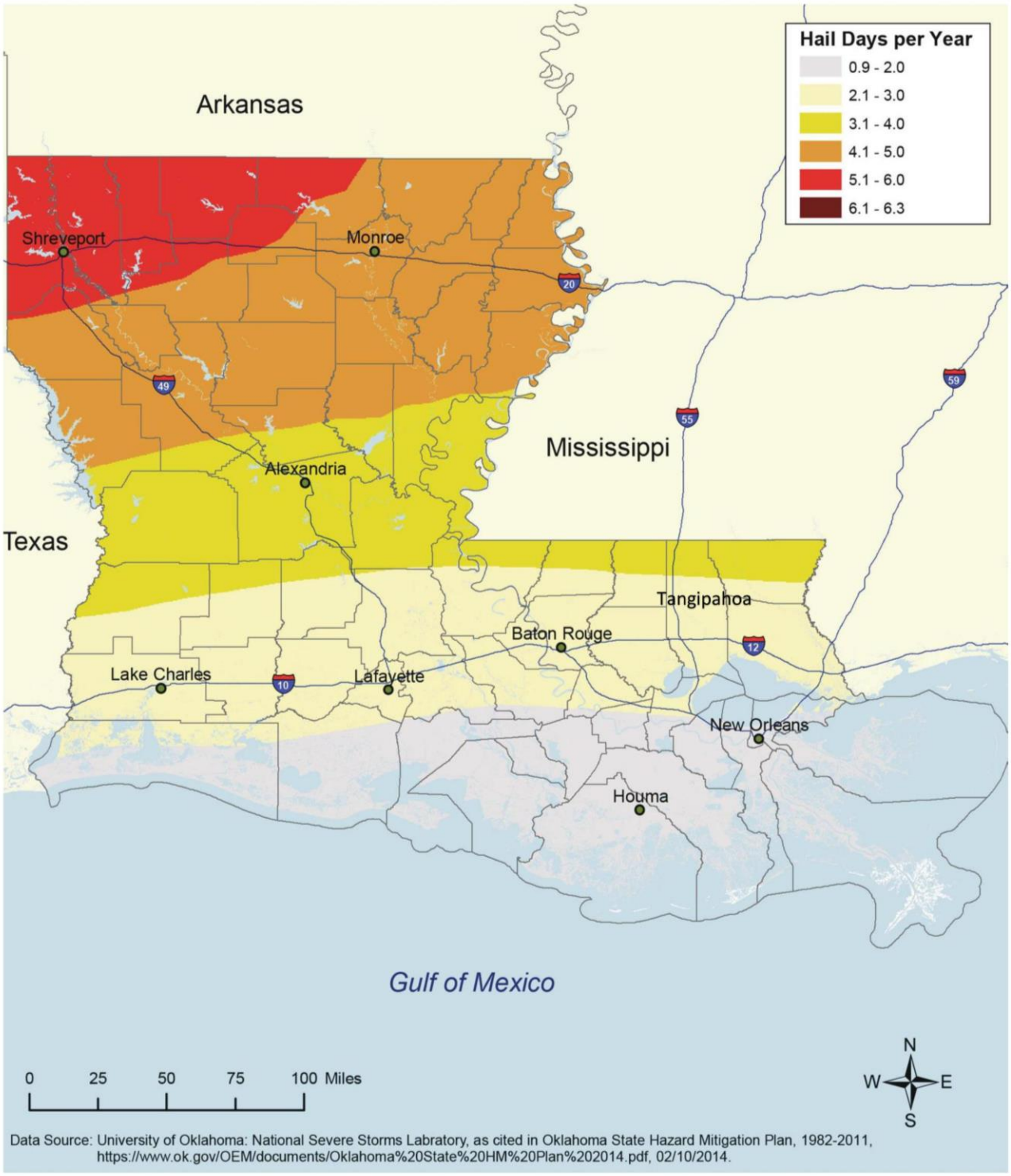


Figure 2-35: Probability of hailstorm events in Louisiana.

(Source: State of Louisiana Hazard Mitigation Plan 2019)

Estimated Potential Losses

According to the SHELDUS database, property damage due to hailstorms in Tangipahoa Parish have totaled approximately $434,441 between 1960 to 2014. A list of total damages by event can be found in Table 2-56. According to State of Louisiana 2019Hazard Mitigation Plan, the annual estimated potential loss caused by hailstorm is $63,977 in Tangipahoa Parish. To access potential losses to the participating jurisdictions, the 2017 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. Based on the 2017 Census data, table 2-57 provides an estimated of potential property losses for Tangipahoa Parish:

Table 2-56: Property damage caused by hailstorms in Tangipahoa Parish
(Source: SHELDUS)

Date	Property Damage
April 1960	$39,350
April 1962	$3,013
July 1963	$1,982
April 1964	$202,545
June 1967	$1,816
July 1967	$1,362
May 1968	$17
March 1971	$11,234
March 1972	$142,824
November 1972	$1,088
May 1974	$315
May 1975	$11,276
May 1976	$6,823
May 1985	$1,546
February 1993	$268
March 1993	$2,686
May 1999	$1,118
September 2011	$5,178

Table 2-57: Estimated annual property losses in Tangipahoa Parish from hailstorms.

Estimated Annual Potential Property Losses from Hailstorms for Tangipahoa Parish								
Unincorporated Tangipahoa Parish (70.3% of Population)	Amite (3.4% of Population)	Hammond (15.5% of Population)	Independence (1.4% of Population)	Kentwood (1.8% of Population)	Ponchatoula (5.5% of Population)	Roseland (1.0% of Population)	Tangipahoa (0.6% of Population)	Tickfaw (0.6% of Population)
$44,974	$2,145	$9,889	$913	$1,161	$3,508	$608	$408	$372

The Parish has suffered no deaths or injuries due to hailstorms from 1960-2019.

Vulnerability

See Appendix C for Parish and municipality buildings that are susceptible to hailstorms.

High Winds

Location

Because high winds are a climatological-based hazard and have the same probability of occurring in Tangipahoa Parish as all of its jurisdictions, the entire planning area for Tangipahoa Parish is equally at risk for high winds.

Previous Occurrences / Extents

The NDCD database reports a total of 191 thunderstorm wind events occurring within the boundaries of Tangipahoa parish between the years of 1989-2019. The significant thunderstorm wind events experienced in Tangipahoa Parish have ranged from a wind speed of 58 mph to 80 mph. ~~Since the hazard mitigation plan was last updated, there have not been any observed significant thunderstorm winds in the Town of Roseland, Village of Tangipahoa, and Village of Tickfaw.~~ It is expected that the Tangipahoa Parish Planning Area will continue to experience wind speeds at the ~~70~~ mph level and below.

Table 2-58: Previous Occurrences for Thunderstorm High Wind Events
(Source: NCDC)

Location	Date	Recorded Wind Speeds	Property damage	Crop Damage
Loranger	March 26, 2009	58 mph	$200	$0
Independence	January 20, 2010	60 mph	$5,000	$0
Hammond	August 4, 2010	69 mph	$10,000	$0
Kentwood	February 1, 2011	69 mph	$2,000	$0
Amite	April 4, 2011	69 mph	$5,000	$0
Hammond	April 4, 2011	69 mph	$5,000	$0
Kentwood	April 15, 2011	69 mph	$3,000	$0
Kentwood	April 15, 2011	69 mph	$5,000	$0
Ponchatoula	April 26, 2011	59 mph	$1,000	$0
Hammond	September 28, 2011	67 mph	$0	$0
Independence	December 22, 2011	60 mph	$3,000	$0
Ponchatoula	February 18, 2012	60 mph	$5,000	$0
Robert	February 18, 2012	60 mph	$5,000	$0
Ponchatoula	December 20, 2012	69 mph	$0	$0
Ponchatoula	December 20, 2012	70 mph	$2,000	$0
Ponchatoula	February 18, 2013	69 mph	$15,000	$0
Wilmer	April 6, 2014	63 mph	$1,000	$0
Natalbany	April 7, 2014	70 mph	$0	$0
Kentwood	June 24, 2014	60 mph	$20,000	$0
Independence	May 11, 2015	63 mph	$0	$0
Hammond	May 15, 2015	63 mph	$0	$0
Tickfaw	May 26, 2015	63 mph	$0	$0
Independence	July 4, 2015	63 mph	$0	$0
Hammond	July 30, 2015	59 mph	$0	$0
Independence	July 30, 2015	60 mph	$0	$0
Natalbany	March 17, 2016	58 mph	$0	$0

Tangipahoa	March 31, 2016	69 mph	$0	$0
Campbell	December 5, 2016	52 mph	$1,000	$0
Kentwood	January 2, 2017	75 mph	$0	$0
Robert	April 3, 2017	63 mph	$0	$0
Hammond	May 12, 2017	63 mph	$0	$0
Accola	April 14, 2018	69 mph	$0	$0
Robert	November 1, 2018	63 mph	$0	$0
Roseland	April 18, 2019	80 mph	$0	$0
Holton	April 18, 2019	63 mph	$0	$0
Coburn	June 25, 2019	63 mph	$0	$0
Husser	June 25, 2019	63 mph	$0	$0

Frequency

High winds are a fairly common occurrence within Tangipahoa Parish, with an annual chance of occurrence calculated at 100%. According to the State Hazard Mitigation Plan, Tangipahoa Parish has a future probability of experiencing more than 4 wind events annually, as seen in Figure 2-36.

INSERT FIGURE 2-36: Probability of high wind events in Tangipahoa Parish and adjacent parishes. (Source: State of Louisiana 2014 Hazard Mitigation Plan)

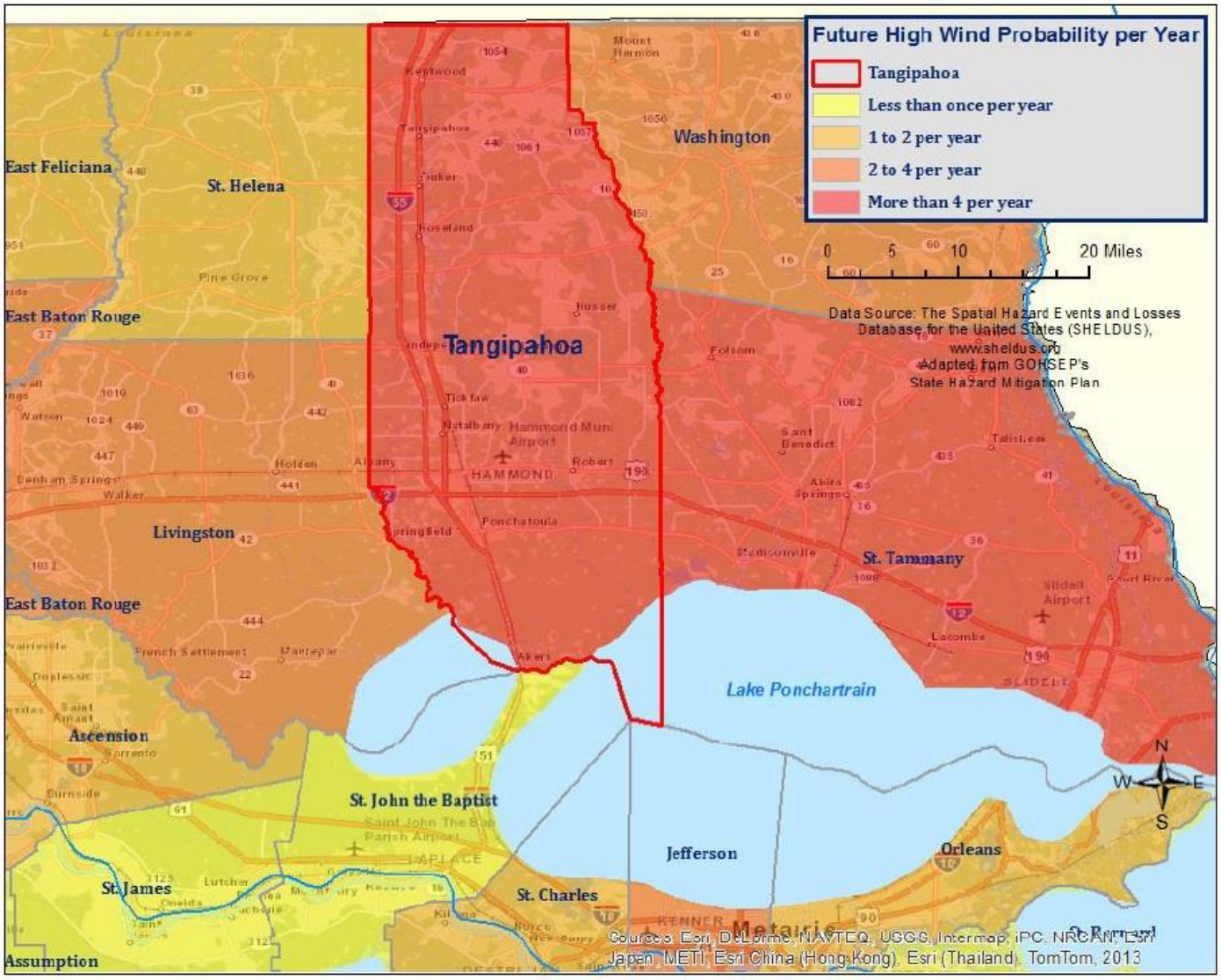


Figure 2-36: Probability of high wind events in Tangipahoa and adjacent parishes. (Source: State of Louisiana 2014 Hazard Mitigation Plan)

Estimated Potential Losses

Between 1960 to 2014, there have been 167 significant wind events that have resulted in property damages, according to the SHELDUS database. The total property damages associated with those storms have totaled $1,759,282. According to State of Louisiana 2019 Hazard Mitigation Plan, the annual estimated potential wind loss is $7,148,748 in Tangipahoa Parish. To access potential losses for the participating jurisdictions, the 2017 Census population was used to assign the estimated potential wind losses proportionally across the jurisdictions. Based on the 2017 Census data, the table on the following page provides an estimate of potential wind property losses for Tangipahoa Parish.

Table 2-59: Estimated Annual property losses in Tangipahoa Parish resulting from wind damage.

Estimated Annual Potential Property Losses from Winds for Tangipahoa Parish								
Unincorporated Tangipahoa Parish (70.3% of Population)	Amite (3.4% of Population)	Hammond (15.5% of Population)	Independence (1.4% of Population)	Kentwood (1.8% of Population)	Ponchatoula (5.5% of Population)	Roseland (1.0% of Population)	Tangipahoa (0.6% of Population)	Tickfaw (0.6% of Population)
$5,025,333	$239,664	$1,104,979	$102,027	$129,706	$391,976	$67,928	$45,537	$41,599

There have been 1 reported injury and 0 fatalities, as a result of a wind event over the 54-year record.

Vulnerability

See Appendix C for Parish and municipality buildings that are susceptible to high winds.

Lightning

Location

Like hail and high winds, lightning is a climatological-based hazard and has the same probability of occurring throughout the entire planning area for Tangipahoa Parish, making all jurisdictions equally at risk for lightning.

Previous Occurrences / Extent

The SHELDUS database reports a total of 40 lightning events occurring within the boundaries of Tangipahoa Parish, between the years of 1960 to 2014. The SHELDUS database only records lightning events that cause death, injuries, crop damage, and/or property damage, so these numbers do not accurately reflect the number of lightning events in Tangipahoa Parish which occur on a nearly monthly basis. The table below provides an overview of significant lightning strikes over the last 10 years. No significant lightning strikes between 2015 to 2019.

Table 2-60: Previous occurrences of significant lightning strikes in Tangipahoa Parish from 2009 – 2019 (Source: NCDC & SHELDUS)

Location	Date	Summary	Property Damage
Hammond	August 16, 2010	Lightning downed several trees and triggered power outages in Hammond and in areas between	$10,683

		Tickfaw and Independence	
Wadesboro (Unincorporated Tangipahoa Parish)	April 11, 2012	Two fisherman fatalities, lost their lives when a small tin structure they were sheltering in along the Natalbany River was struck by lightning.	$0
Loranger	February 22, 2013	A lightning strike damaged 1 home in the area.	$5,000

Frequency

Lightning can strike anywhere and is produced by every thunderstorm, so the chance of lightning occurring in Tangipahoa Parish is high. However, lightning that meets the definition that is used by SHELDUS and the NCDC that actual results in damages to property and injury or death to people is a less likely event. The probability of a significant lightning strike in Tangipahoa Parish is 60%. According to the State Hazard Mitigation Plan, a significant lightning strike in Tangipahoa Parish is likely to occur once every 1 to 4 years as depicted in Figure 2-37.

INSERT FIGURE 2-37: Probability of lightning events in Tangipahoa Parish and adjacent parishes

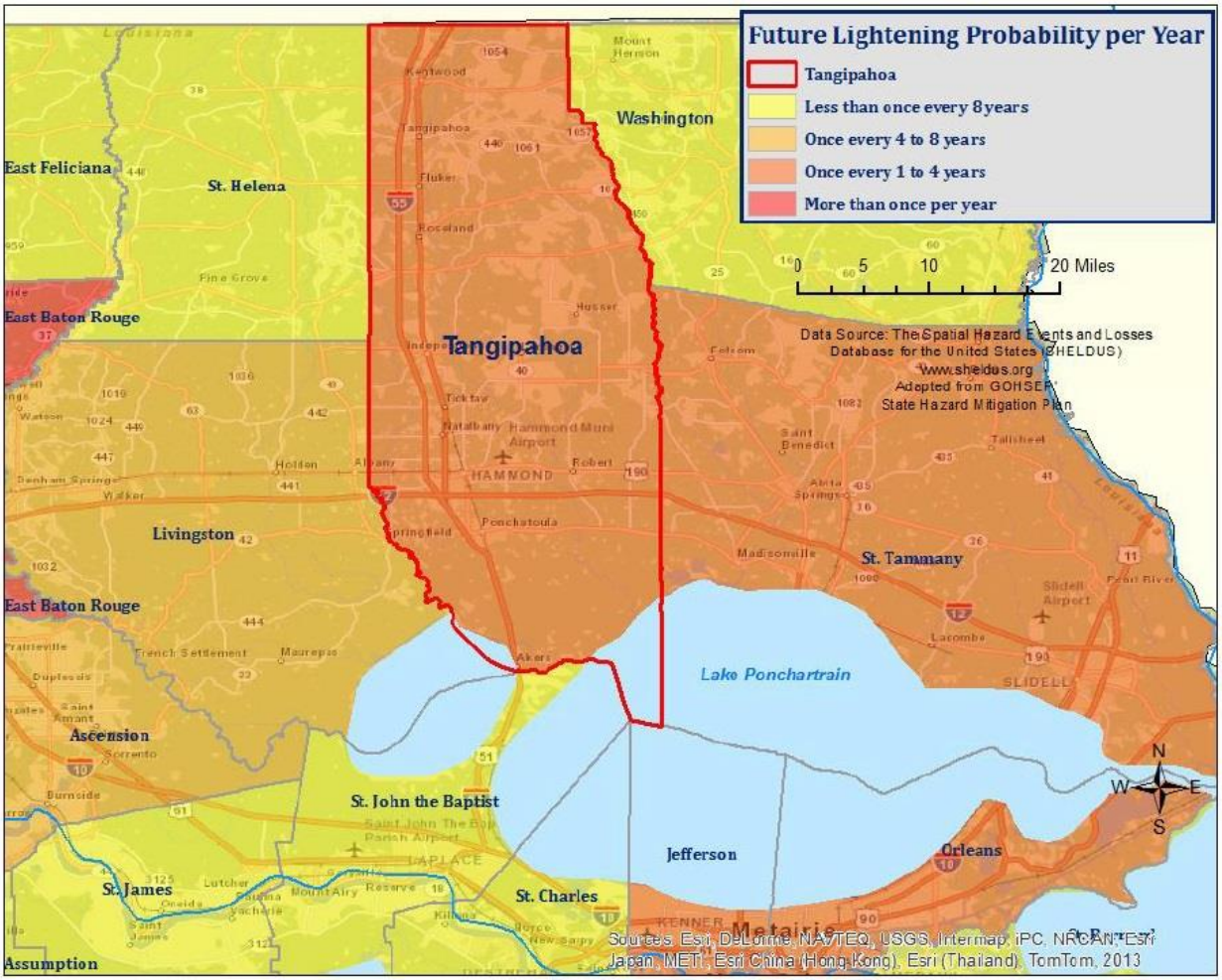


Figure 2-37: Probability of lightning events in Tangipahoa and adjacent parishes. (Source: State of Louisiana Hazard Mitigation Plan)

Estimated Potential Losses

Between 1960 to 2014, there have been 40 significant lightning strikes with 32 of those strikes resulting in property damages, according to the SHELDUS database. The total property damages associated with those events have totaled $1,921,106. According to State of Louisiana 2019 Hazard Mitigation plan, the annual estimated potential loss is $107,985 in Tangipahoa Parish. To access the estimated potential losses proportionally across the jurisdictions, the 2017 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. Based on the 2017 Census data, the table on the following page profiles an estimate of potential property losses for Tangipahoa Parish.

Table 2-61: Estimated annual property losses in Tangipahoa Parish from lightning

Estimated Annual Potential Property Losses from Lightning for Tangipahoa Parish								
Unincorporated Tangipahoa Parish (70.3% of Population)	Amite (3.4% of Population)	Hammond (15.5% of Population)	Independence (1.4% of Population)	Kentwood (1.8% of Population)	Ponchatoula (5.5% of Population)	Roseland (1.0% of Population)	Tangipahoa (0.6% of Population)	Tickfaw (0.6% of Population)
$75,910	$3,620	$16,691	$1,541	$1,959	$5,921	$1,026	$688	$628

There have been 7 reported injuries and 7 fatalities, as a result of lightning strikes over the 59-year record.

Vulnerability

See Appendix C for Parish and municipality building exposure to lightning hazards.

Tornadoes

Tornadoes (also called twisters and cyclones) are rapidly rotating funnels of wind extending between storm clouds and the ground. For their size, tornadoes are the most severe storms, and 70% of the world's reported tornadoes occur within the continental United States, making them one of the most significant hazards Americans face. Tornadoes and waterspouts form during severe weather events, such as thunderstorms and hurricanes, when cold air overrides a layer of ward air, causing the warm air to rise rapidly, which usually occurs in a counterclockwise direction in the northern hemisphere. The updraft of air in tornadoes always rotates because of wind shear (differing speeds of moving air at various heights), and it can rotate in either a clockwise or counterclockwise direction; clockwise rotations (in the northern hemisphere) will sustain the system, at least until other forces cause it to die second to minutes later.

Since February 1, 2007, the Enhanced Fujita (EF) Scale has been used to classify tornado intensity. The EF Scale classifies tornadoes based on their damage pattern rather than wind speed; wind speed is then derived and estimated. This contrasts with the Saffir-Simpson Scale in comparison with the old Fujita (F) Scale, which was used prior to February 1, 2007. When discussing past tornadoes, the scale used at the time of the hazard is used. Damage adjustment between scales can be made using the following tables.

Table 2-62: Comparison of the Enhanced Fujita (EF) Scale to the Fujita (F) Scale

Wind speed (mph)	Enhanced Fujita Scale					
	EF0	EF1	EF2	EF3	EF4	EF5

	65-85	86-110	111-135	136-165	166-200	>200
	Fujita Scale					
	F0	F1	F2	F3	F4	45
	73	73-112	113-157	158-206	207-260	>261

Table 2-63: Fujita and Enhanced Fujita Tornado Damage Scale

Scale	Typical Damage
F0/EF0	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged
F1/EF1	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2/EF2	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; light-object missiles generated; cars lifted off ground.
F3/EF3	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4/EF4	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
F5/EF5	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

The National Weather Service (NWS) has the ability to issue advisory messages based on forecasts and observations. The following are the advisory messages that may be issued with definitions of each:

• Tornado Watch:	Issued to alert people to the possibility of a tornado developing in the area. A tornado has not been spotted but the conditions are favorable for tornadoes to occur.
• Tornado Warning:	Issued when a tornado has been spotted or when Doppler radar identifies a distinctive “hook-shaped” area within a thunderstorm line.

Structures within the direct path of a tornado vortex are often reduced to rubble. Structures adjacent to the tornado’s path are often severely damaged by high winds flowing into the tornado vortex, known as inflow winds. It is here, adjacent to the tornado’s path, that the building type and construction techniques are critical to the structure’s survival. Although tornadoes strike at random, making all buildings vulnerable, mobile homes, homes crawl spaces, and buildings with large spans are more likely to suffer damage.

The major health hazard from tornadoes is physical injury from flying debris or being in a collapsed building or mobile home. Within a building, flying debris or missiles are generally stopped by interior walls. However, if a building has no partitions, any glass, brick, or other debris blown into the interior is

life threatening. Following a tornado, damaged buildings are a potential health hazard due to instability, electrical system damage, and gas leaks. Sewage and water lines may also be damaged.

Peak tornado activity in Louisiana occurs during the spring, as it does in the rest of the United States. Nearly one-third of observed tornadoes in the United States occur during April. About half of those in Louisiana, including many of the strongest, occur between March and June. Fall and winter tornadoes are less frequent, but the distribution of tornadoes throughout the year is more uniform in Louisiana than locations farther north.

Location While there is significant tornado record in Tangipahoa Parish with actual locations, tornadoes in general are a climatological-based hazard and have the same approximate probability of occurring in Tangipahoa Parish as all of its jurisdictions. Because a tornado has a similar probability of striking anywhere within the planning area for Tangipahoa Parish, all jurisdictions are equally at risk for tornadoes.

Previous Occurrences / Extent
Tangipahoa Parish has not experienced any federally declared disasters due to a tornado alone. SHELDUS reports a total of 15 tornadoes or waterspouts occurring within the boundaries of Tangipahoa Parish between the years of 1989 – 2014. The tornadoes experienced in Tangipahoa Parish have been EF1s on the EF scale and have ranged from F0 to F3 on the F scale.

The tornado that caused most damage to property and resulted in the most injuries was a F2 that occurred on February 15, 1992. The tornado touched down near Woodhaven Road, 4 miles northwest of Natalbany, causing $2,490,630 in property damage and 10 injuries. Based on previous occurrences, Tangipahoa Parish is most likely to experience a tornado of the EF1 magnitude; however, as a worst-case scenario, Tangipahoa Parish should prepare for a tornado of the EF3 magnitude.

Table 2-64: Historical Tornadoes in Tangipahoa Parish with locations from 1989-2019 (Source: NCDC)

Date	Impacts	Property Damage	Location	Magnitude
June 8, 1989	2.5 mile path with a width of 40 yards	$93,934	Unincorporated area of Parish	F1
February 15, 1992	0.8 mile path with a width of 527 yards. Destroyed 8 single-family homes and 7 mobile homes. Severe damage to 9 homes and minor damage to 26 homes; 10 people injured	$2,490,630	Natalbany	F2
August 26, 1992	7 mile path with a width of 20 yards; spawned from Hurricane Andrew	$83,021	Tickfaw and Loranger	F1
March 9, 1994	0.3 mile path with a width of 30 yards	$7,859	Loranger	F1
March 7, 1995	0.5 mile path with a width of 20 yards; 1 mobile home destroyed and a roof blown off home	$45,857	Independence	F1

November 10, 1998	0.5 mile path with a width of 50 yards; destroyed 1 house and downed several trees	$71,459	Kentwood	F1
January 29, 2001	0.2 mile path with a width of 25 yards; damaged a wall of a movie theatre and canopy of a gas station	$23,677	Amite	F0
March 12, 2001	0.3 mile path with a width of 20 yards; knocked down several trees and power lines; damaged the roofs of several homes	$39,461	Kentwood	F0
April 6, 2005	0.2 mile path with a width of 20 yards; destroyed 5 sheds, minor damage to a home and uprooted 3 trees	$2,385	Kentwood	F0
October 27, 2006	2.47 mile path with a width of 75 yards. Several buildings had roofs damaged; downed several trees and power lines.	$231,108	Tangipahoa	F1
November 15, 2006	2.66 mile path with a width of 75 yards; 2 homes destroyed and 4 structures sustained heavy damage	$288,885	Arcola	F1
February 12, 2008	0.77 mile path with a width of 20 yards; overturned a mobile home and broke several car windows; 1 fatality occurred when a 51-year old woman was thrown into a vehicle	$27,266	Independence	EF1
February 17, 2008	2.04 mile path with a width of 15 yards; the roof of a home damaged and a camper trailer overturned	$16,013	Roseland	EF1
March 26, 2009	0.75 mile path with a width of 50 yards; 7 homes damaged and 1 mobile home destroyed with another taking heavy damage	$65,151	Independence	EF1
January 20, 2010	1.66 mile path with a width of 150 yards; 1 home damaged and 1 barn destroyed and an outbuilding damaged	$106,833	Holton	EF1
December 23, 2014	4.62 mile path with a width of 150 yards; a few homes sustained significant roof damage	$400,000	Amite	EF2
May 17, 2015	1.56 mile path with a width of 50 yards; two houses with roof	$100,000	Tickfaw	EF1

	damage, several trees were uprooted.			
December 31, 2015	4.81 mile path with a width of 50 yards; multiple metal sheds were destroyed, power lines were knocked down.		Hammond	EF0
November 1, 2018	0.61 mile path with a width of 50 yards; multiple trees were snapped and uprooted, minor structural damage to a few residences		Kentwood	EF1
January 19, 2019	0.25 mile path with a width of 40 yards; multiple trees were knocked down and roof damaged was reported to several houses.		Wilmer (unincorporated)	EF1

Since 2015, the year the last update to this hazard mitigation plan was written, Tangipahoa Parish has had 4 tornado touch down. The following is a brief synopsis of the last event:

~~January 20, 2010 – EF1 Tornado in Holton~~

~~Isolated severe thunderstorms developed ahead of a cold front that moved through the area. A tornado touched down in the Holton area, approximately 2 miles north of Loranger toppling 10 to 15 trees, destroying 1 barn, and severely damaging an outbuilding and a house. The estimated wind speed with this tornado was approximately 60 mph.~~

January 19, 2019 – EF1 Tornado in Wilmer

A strong cold front moving through Louisiana produced a line of showers and thunderstorms in advance of the front during the morning hours. A few storms became severe with a tornado reported over Tangipahoa and Washington Parishes during the morning.

Frequency / Probability

Tornadoes are a sporadic occurrence within Tangipahoa Parish, with an annual chance of occurrence calculated at 60%, based on the records for the past 25 years (1989-2014). Figure 2-38 displays the density of tornado touchdowns in Tangipahoa Parish and neighboring parishes. Based on the State Hazard Mitigation Plan, the overall probability of a tornado touching down in Tangipahoa Parish is once every 1 to 2 years.

[INSERT FIGURE : Location and density of tornadoes to touch down in Tangipahoa Parish] See Pg 2-102
(Source: NOAA/SPC Severe Weather Database)

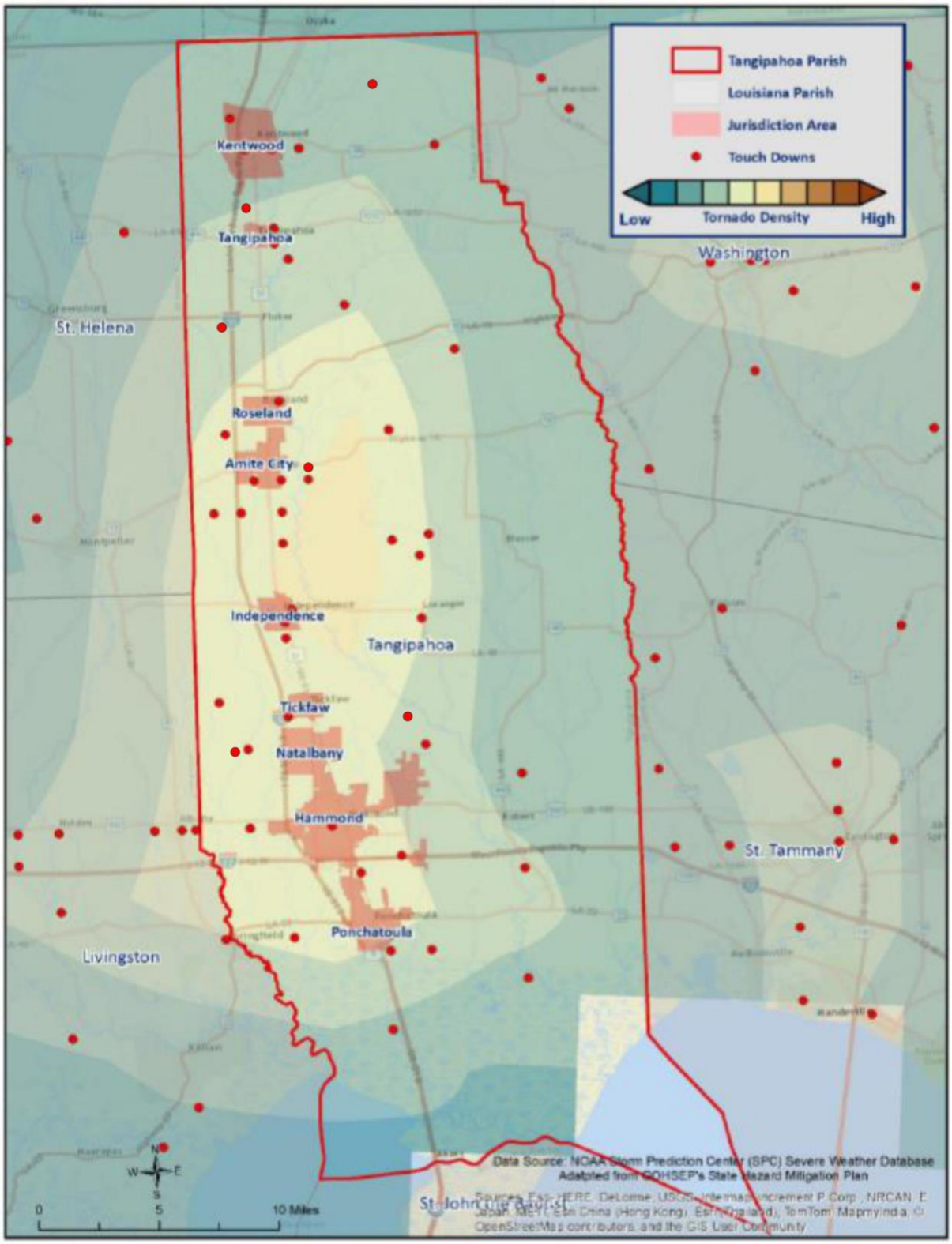


Figure 2-38: Location and density of tornadoes to touchdown in Tangipahoa Parish.
(Source: NOAA/SPC Severe Weather Database)

[INSERT FIGURE 2-39: Probability of tornado events in Tangipahoa Parish and adjacent parishes, based on data from 1987-2012 (Source: State of Louisiana Hazard Mitigation Plan) See Page 2-103

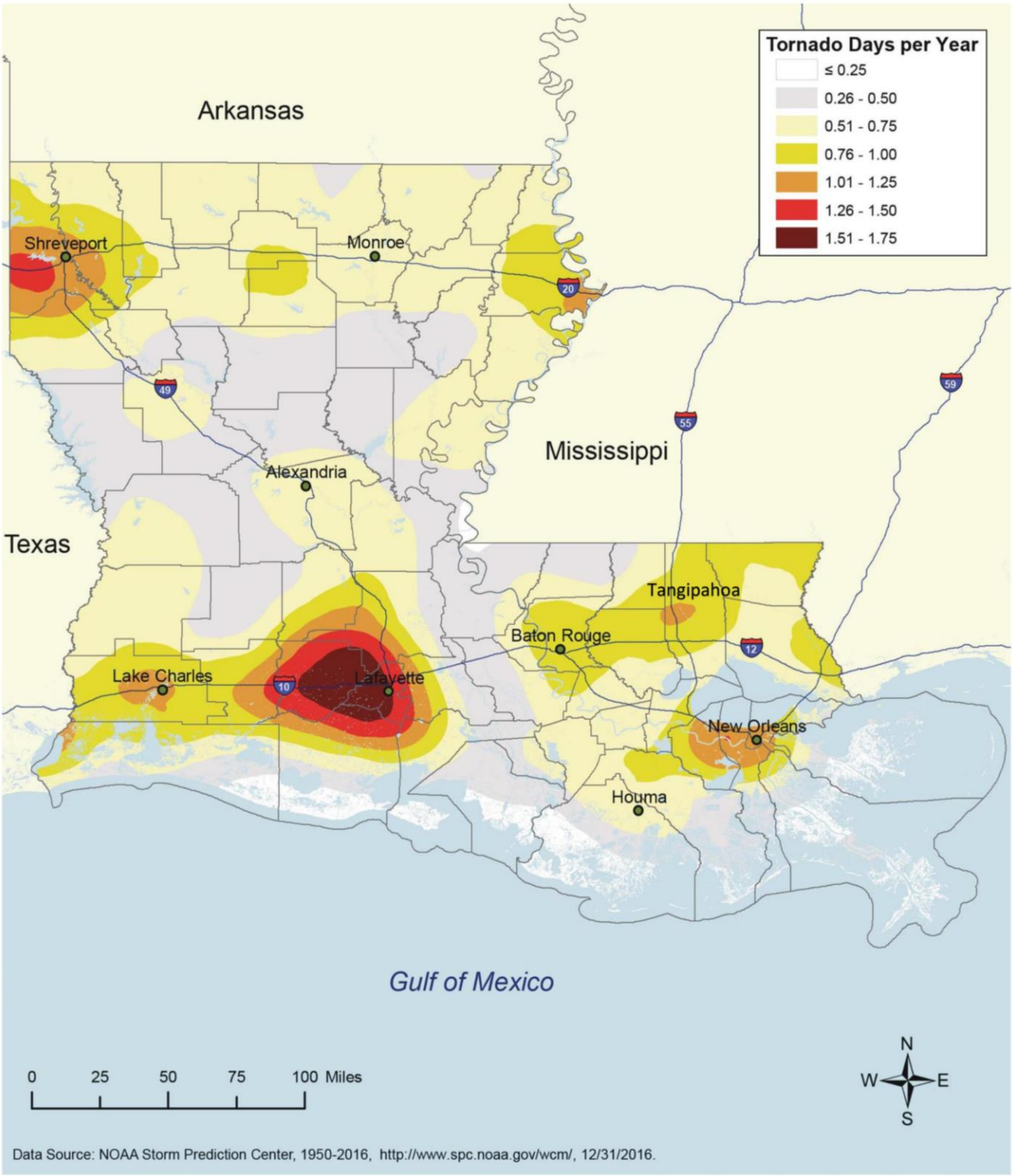


Figure 2-39: Probability of tornado events in Louisiana.

(Source: State of Louisiana Hazard Mitigation Plan 2019)

Estimated Potential Losses

According to the SHELDUS database, there have been 15 tornadoes that have caused some level of property damage between 1960 to 2014. The total damage from the actual claims for property is $3,593,539, with an average cost of $239,569 per tornado strike. According to State of Louisiana 2019 Hazard Mitigation Plan, the annual estimated potential loss caused by tornadoes is $998,165 in Tangipahoa Parish. To provide an estimated annual potential loss per jurisdiction, the 2017 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. Based on the 2017 Census data, table 2-65 provides an annual estimate of potential losses for Tangipahoa Parish.

Table 2-65: Estimated Annual Losses for tornadoes in Tangipahoa Parish

Estimated Annual Potential Property Losses from Tornadoes for Tangipahoa Parish								
Unincorporated Tangipahoa Parish (70.3% of Population)	Amite (3.4% of Population)	Hammond (15.5% of Population)	Independence (1.4% of Population)	Kentwood (1.8% of Population)	Ponchatoula (5.5% of Population)	Roseland (1.0% of Population)	Tangipahoa (0.6% of Population)	Tickfaw (0.6% of Population)
$701,677	$33,464	$154,286	$14,246	$18,111	$54,731	$9,485	$6,358	$5,808

Table 2:66 below presents an analysis of building exposure that are susceptible to tornadoes by general occupancy type for Tangipahoa Parish along with the percentage of building stock that are mobile homes.

Table 2-66: Building exposure by General Occupancy Type for Tornadoes in Tangipahoa Parish (Source: FEMA's HAZUS-MH 2.2)

Building Exposure by General Occupancy Type for Tornadoes							
Exposure Types ($1,000)							
Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Mobile Homes (%)
7,980,251	996,547	199,124	28,599	206,348	39,139	105,329	25%

The Parish has suffered through a total of 5 days in which tornadoes or waterspouts have accounted for 14 injuries and 1 fatality during this 25-year period (Table 2-67). The average injury per event for Tangipahoa Parish is 0.93 per tornado, with an average of 0.56 per year for the 25-year period. The average fatality per event for Tangipahoa Parish is 0.06 per tornado, with an average of 0.04 per year for the 25-year period.

Table 2-67: Tornadoes in Tangipahoa Parish by magnitude that caused injuries or deaths

Date	Magnitude	Deaths	Injuries
June 8, 1989	F1	0	1
February 15, 1992	F2	0	10
November 10, 1998	F1	0	1
November 15, 2006	F1	0	1
February 12, 2008	EF1	1	0

In assessing the overall risk to population, the most vulnerable population throughout the Parish are those residing in manufactured housing. Approximately 25% of all housing in Tangipahoa Parish consists of manufactured housing. Based on location data collected in a previous hazard mitigation project, there are 41 known locations where manufactured housing is concentrated. Those 41 locations have an overall number of manufactured houses ranging from 4 to 89. The location and density of manufactured houses can be seen in Figure 2-40.

[INSERT FIGURE 2-40 Location & approximate number of units of manufactured housing locations throughout Tangipahoa Parish] See page 2-106

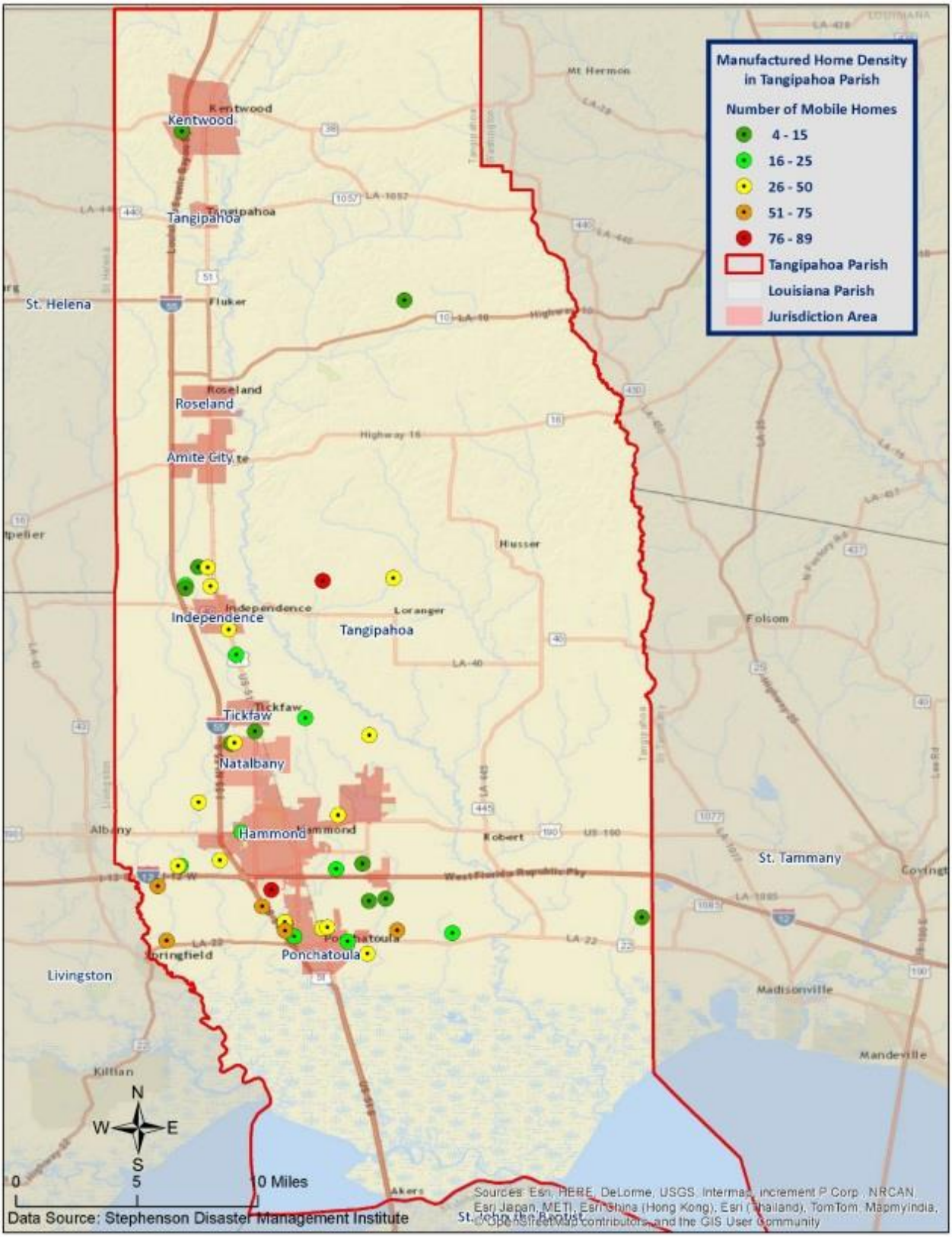


Figure 2-40: Location and approximate number of units in manufactured housing locations throughout Tangipahoa Parish.

Vulnerability
See Appendix C for Parish and municipality building exposure to tornado hazards.

Tropical Hurricanes

Tropical hurricanes are among the worst hazards Louisiana faces. These spinning, low-pressure air masses draw surface air into their centers and attain strength ranging from weak tropical waves to the most intense hurricanes. Usually, these storms begin as clusters of oceanic thunderstorms off the western coast of Africa, moving westward in the trade wind flow. The spinning of these thunderstorm clusters begins because the formation of low pressure in a perturbation in the westerly moto of the storms associated with differential impacts of the Earth's rotation. The west-moving, counterclockwise-spinning collection of storms – now called a tropical disturbance – may then gather strength as it draws humid air toward its low-pressure center, forming a tropical depression (defined when the maximum sustained surface wind speed is 38 mph or less), t hen a tropical storm (when the maximum sustained surface wind ranges from 39 mph to 73 mph), and finally a hurricane (when the maximum sustained surface wind speeds exceed 73 mph). Table 2-68 presents the Saffir-Simpson Hurricane Wind Scale, which categorizes tropical hurricanes based on sustained winds.

Table 2-68: Saffir-Simpson Hurricane Wind Scale

SAFFIR-SIMPSON HURRICANE WIND SCALE			
Category	Sustained Winds	Pressure	Type
Tropical Depression	<39	N/A	
Tropical Storm	39-73	N/A	
1	74-95 mph	>14.2 psi	Very dangerous winds will produce some damage: Well-constructed frame houses could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap and shallow-rooted trees may be toppled, especially after the soil becomes waterlogged. Extensive damage to power lines and poles likely will result in power outages that could last several days.
2	96-110 mph	14-14.2 psi	Extremely dangerous winds will cause extensive damage: Well-constructed frame houses could sustain major roof and siding damage. Many shallow-rooted trees will be snapped or uprooted, especially after the soil becomes waterlogged, and block numerous roads. Near total power loss is expected with outages that could last from several days to weeks.
3	119-129 mph	13.7-14 psi	Devastating damage will occur: Well-built frame houses may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, especially after the soil becomes waterlogged, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130-156 mph	13.3-13.7 psi	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure

			and/or some exterior walls. Most trees will be snapped or uprooted especially after the soil becomes waterlogged, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks, possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 or higher mph	<13.7 psi	Catastrophic damage will occur: A high percentage of framed houses will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks to months.

Many associated hazards can occur during a hurricane, including heavy rain, flooding, high winds, and tornadoes. A general rule of thumb in coastal Louisiana is that the number of inches of rainfall to be expected from a tropical hurricane is approximately 100 divided by the forward velocity of the storm in mph; so a fast moving storm (20 mph) might be expected to drop 5 inches of rain, while a slow-moving (5 mph) storm could produce totals of around 20 inches. However, no 2 storms are alike, and such generalizations have limited utility for planning purposes. Hurricane Beulah, which struck Texas in 1967, spawned 115 confirmed tornadoes. In recent years, extensive coastal development has increased the storm surge resulting from these storms so much that this has become the greatest natural hazard threat to property and loss of life in the state. Storm surge is a temporary rise in sea level, generally caused by reduced air pressure and strong onshore winds associated with a storm system near the coast. Although storm surge can technically occur at any time of the year in Louisiana, surges caused by hurricanes can be particularly deadly and destructive. Such storm surge events are often accompanied by large, destructive waves exceeding 10 m in some places that can inflict high numbers of fatalities and economic losses. In 2005, Hurricane Katrina clearly demonstrated the destructive potential of this hazard, as it produced the highest modern-day storm surge levels in the State of Louisiana, reaching up to 18.7 feet in St. Bernard Parish, near Alluvial City.

Property can be damaged by the various forces that accompany a tropical storm. High winds can directly impact structures in 3 ways: wind forces, flying debris and pressure. By itself, the force of the wind can knock over trees, break tree limbs and destroy loose items, such as television antennas and power lines. Many things can be moved by high winds. As winds increase, so does the pressure against stationary objects. Pressure against a wall rises with the square of the wind speed. For some structures, this force is enough to cause failure. The potential for damage to structures is increased when debris breaks the building “envelope” and allows the wind pressures to impact all surfaces (the building envelope includes all surfaces that make up the barrier between the indoors and the outdoors, such as the walls, foundation, doors, windows, and roof). Buildings needing maintenance and mobile homes are most subject to wind damage. High winds mean bigger waves. Extended pounding by waves can demolish any structure not properly designed. The waves also erode sand beaches, roads, and foundations. When foundations are undermined, the building will collapse.

Nine out of 10 deaths during hurricanes are caused by storm surge flooding. Falling tree limbs and flying debris caused by high winds have the ability to cause injury or death. Downed trees and damaged buildings are a potential health hazard due to the instability, electrical system damage, broken pipelines, chemical releases, and gas leaks. Sewage and water lines may also be damaged. Salt water and fresh water intrusions from storm surge send wildlife, such as snakes, into areas occupied by humans.

Location

Hurricanes are the single biggest threat to all of south Louisiana. With any single hurricane having the potential to devastate multiple parishes during a single event, the risk of a tropical hurricane has the probability of impacting anywhere within the planning area for Tangipahoa Parish. As such, all jurisdictions are equally at risk for tropical hurricanes.

Previous Occurrences / Extent

The central Gulf of Mexico coastline is among the most hurricane-prone locations in the United States, and hurricanes can affect every part of the State. The SHELDUS database reports a total of 14 tropical hurricane events occurring that have impacted Tangipahoa Parish between the years 1989-2014 (Table 2-69).

Table 2-69: Historical tropical hurricane events in Tangipahoa Parish from 1989-2014 (Source: SHELDUS)

Date	Name	Storm type while impacting Tangipahoa Parish
October 15, 1989	Jerry	Tropical Storm
August 26, 1992	Andrew	Tropical Storm
October 4, 1995	Opal	Tropical Storm
September 28, 1998	Georges	Tropical Storm
June 4, 2001	Allison	Tropical Storm
August 8, 2002	Bertha	Tropical Storm
September 27, 2002	Isidore	Tropical Storm
October 3, 2002	Lili	Hurricane – Category 1
June 30, 2003	Bill	Tropical Storm
September 15, 2004	Jeanne	Tropical Depression
September 15, 2004	Ivan	Tropical Storm
October 9, 2004	Matthew	Tropical Storm
July 6, 2005	Cindy	Tropical Storm
August 29, 2005	Katrina	Hurricane – Category 1
September 23, 2005	Rita	Tropical Storm
August 24, 2008	Fay	Tropical Depression
September 1, 2008	Gustav	Hurricane – Category 2
September 12, 2008	Ike	Tropical Storm
September 9, 2009	Ida	Tropical Storm
September 2, 2011	Lee	Tropical Storm
August 21, 2012	Isaac	Tropical Storm

Hurricane Betsy (1965)

Hurricane Betsy made landfall September 1965 as a Category 3 hurricane and caused extensive damage in Tangipahoa Parish. Winds were measured at up to 92 mph, and an estimated $7,812,500 of damages occurred. Injuries in Tangipahoa Parish alone totaled 273 people and while there were no deaths in the Parish, Hurricane Betsy claimed 84 lives statewide.

Tropical Storm Allision (2001)

In June 2001, Tropical Storm Allison made landfall in the state of Texas and moved across Louisiana causing extensive flood damage. Up to 30 inches of rain fell in some areas of the state. The Tangipahoa

River crested at 17.3 feet, causing low-lying areas around Highway 22 and U.S. 190 to become inundated. Ponchatoula reported approximately 20.03 inches of precipitation during Tropical Storm Allison.

Tropical Storm Isidore (2002)
Tropical Storm Isidore made landfall in Grand Isle, Louisiana on September 27, 2002. Tropical Storm Isidore had a large circulation with high force winds extending several hundreds of miles from its center. This caused significant storm surge over a large area specifically on Lake Pontchartrain, where storm surges of 4 – 5 feet above normal were measured. Low-lying areas, roadways, and some non-elevated structures on the lake were flooded.

Tropical Storm Isidore caused minor power outages and damage in Tangipahoa Parish. Approximately 2,750 residents in Hammond and 1,800 residents in Amite experienced power outages due to Tropical Strom Isidore. Amite recorded 4.8 inches of precipitation, Hammond 4.6 inches, and Ponchatoula 4.8 inches, which resulted in localized flooding and some road closures. In Amite, most of the damage was contained to the downtown area along Oak Street. Richou Road, Traino Road, and Fletcher Loop Road in Ponchatoula, and Dummy Line Road Number 2 in Tickfaw were closed due to flood waters.

Hurricane Katrina (2005)
Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. The National Hurricane Center ranked Katrina as the costliest storm (both before and after adjusting for inflation) and the third deadliest in the U.S. since 1851. The Hurricane made landfall in Plaquemines Parish on August 29, 2005, as a Category 3 storm and continued on a north-northeast track, with a second landfall occurring near the Louisiana and Mississippi border.

The eye of Hurricane Katrina passed through Tangipahoa Parish approximately 35 miles east of Amite. Tangipahoa Parish experienced hurricane force winds in excess of 90 mph for over 12 hours which downed thousands of trees and power lines, resulting in a Parish-wide power outage for 3 days and extensive obstruction of all roadways. Hurricane Katrina caused extensive damage to the Tangipahoa Parish's critical facilities infrastructure directly impacting LSU Medical Facility, North Oaks Medical Center, and Southeastern Louisiana University.

Hurricane Rita (2005)
While Hurricane Katrina and resulting levee failures captured headlines worldwide, lesser known but just as destructive Hurricane Rita wreaked havoc on southwestern Louisiana less than a month later. The storm made landfall as a Category 3 hurricane but impacted Tangipahoa Parish as a tropical storm. Across southeast Louisiana, the main effect from Hurricane Rita was the substantial storm surge flooding that occurred in low-lying communities across coastal areas of southern Terrebonne, southern Lafourche, and southern Jefferson Parishes where numerous homes and businesses were flooded. Some of the most substantial damage occurred in southern Terrebonne Parish where storm surge of 5 to 7 feet above normal overtopped or breached local drainage levees, inundating many small communities. Newspaper accounts indicated approximately 10,000 structures were flooded in Terrebonne Parish. Lafitte and other communities in lower Jefferson Parish also suffered extensive storm surge flooding. Storm surge flooding also occurred in areas adjacent to Lake Pontchartrain and Lake Maurepas, with come homes and businesses flooded in the Manchac area of Tangipahoa Parish. Approximately 1500 structures were reported flooded in Livingston Parish near Lake Maurepas. Repaired levees damaged by Hurricane Katrina in late August were overtopped or breached along the Industrial Canal in New Orleans, resulting in renewed flooding in adjacent portions of New Orleans and

St. Bernard Parish, Although the flooding was much more limited in areal coverage than during Hurricane Katrina.

Hurricane Gustav (2008)
Hurricane Gustav emerged into the southeast Gulf of Mexica as a major Category 3 hurricane on August 31, 2008, after developing in the Caribbean Sea and moving across western Cuba. Gustav tracked northwestward across the Gulf of Mexico toward Louisiana and made landfall as a Category 2 hurricane near Cocodrie, Louisiana, during the morning of September 1. Gustav continued to move northwest across south Louisiana and weakened to a Category 1 storm over south central Louisiana later that day. The Storm diminished to a tropical depression over northwestern Louisiana on September 2.

The highest wind gust recorded was 102 knots or 117 mph at a USGS site at the Houma Navigational Canal and at the Pilot Station East C-MAN at near the Southwest Pass of the Mississippi River. The highest sustained wind of 91 mph was recoded at the Pilot's Station East C-MAN site. However, due to the failure of equipment at some observation sites during the storm, higher winds may have occurred. The minimum sea level pressure measured was 951.6 millibars at a USGS site at Caillou Lake southwest of Dulac and 954.5 millibars at the LUMCON facility near Dulac. Rainfall varied considerably across southeast Louisiana, ranging from around 4 inches to just over 11 inches.

Gustav produced widespread wind damage across southeast Louisiana, especially in the area from Houma and Thibodaux through the greater Baton Rouge area, including Tangipahoa Parish. Hurricane force wind gusts occurred across the inland areas through the Baton Rouge area and surrounding parishes. A peak wind gust of 91 mph was recorded at the Baton Rouge (Ryan Field) Airport at 112 PM CST. This was only 1 mph less than the highest wind gust recorded during Hurricane Betsy in 1965. The electric utility serving most of southeast Louisiana reported 75 to 100 percent of utility customers were without power after the storm, from Lafourche and Terrebonne Parishes northwest through the Baton Rouge area to southwest Mississippi and central Louisiana. Considerable damage occurred to many houses and structures as large tree limbs and trees were toppled by the hurricane force winds. Preliminary estimates from the American Red Cross indicated that around 13,000 single-family dwellings were damaged by the hurricane in southeast Louisiana, and several thousand more apartments and mobile homes. Early estimates from Louisiana Economic Development indicated that Gustav caused at least $4.5 million in property damage in Louisiana, including insured and uninsured losses.

Rainfall from Hurricane Gustav resulted in localized flood throughout Tangipahoa Parish. Hammond recorded 4.65 inches of precipitation and Amite 6 inches. Areas south of Highway 22 in the extreme portion of the Parish received the brunt of damage, especially in the Manchac area which experienced severe flooding.

Tropical Storm Lee (2011)
Tropical Storm Lee initially developed as Tropical Depression 13 in the middle of the Gulf of Mexico on Thursday evening September 1, 2011. The depression moved slowly north and gradually strengthened, eventually reaching tropical storm strength just south of the Louisiana coast on Friday afternoon September 2, 2011. Tropical Storm Lee made only slow and haltingly northward progress over the next 24 hours, eventually moving onshore the Louisiana coast on Saturday night, September 3, 2011, with a maximum sustained wind estimated around 60 mph. Lee moved slowly inland to the north of Baton Rouge late Sunday, September 4, 2011 and eventually weakened to a tropical depression on Sunday evening.

Tropical Depression Lee then moved steadily northeast throughout Monday September 5, 2011, taking on extra-tropical characteristics over the next 24 hours, as it interacted with an upper-level disturbance moving through the region. The maximum wind observed in Louisiana was a southerly wind of 40 knots (46 mph) sustained, 50 knots (58 mph) gust at New Orleans Lakefront Airport on September 4, 2012 at 5:28 CST. The lowest minimum central pressure was 993.2 mb at Baton Rouge (Ryan Field) Airport on September 4, 2012 at 9:59 CST. As Tropical Depression Lee was moving northeast and taking on mid-latitude characteristics, strong northerly winds were experienced across the region, occasionally gusting to higher levels than experienced when Lee as characterized as a tropical storm. No fatalities or injuries were associated with any Tropical Storm Lee hazards.

The main impacts associated with Tropical Storm Lee were associated with storm surge and rainfall. Both of these impacts were related to its slow forward speed as it crossed the region which allowed the circulation to linger over the area for several days. Storm surge associated with Lee caused storm tides 3 to 5 feet above normal, causing lowland flooding. Additional detailed information about Tropical Storm Lee's storm surge is contained in the separate storm surge report. Four-day rainfall ranged between 7 and 15 inches across the area. A maximum of 15.48 inches was recorded near Holden in Livingston Parish. Due to the dry antecedent conditions, river flooding was minimal for the amount of rainfall that occurred. Wind impacts were generally minimal, due to only tropical storm strength winds being recorded, resulting in tree limbs being blown down and weak trees toppling, causing power outages.

[INSERT HERE: FIGURE 2-41: Wind and Precipitation fields affecting Tangipahoa Parish from Tropical Storm Lee (See page 2-113)

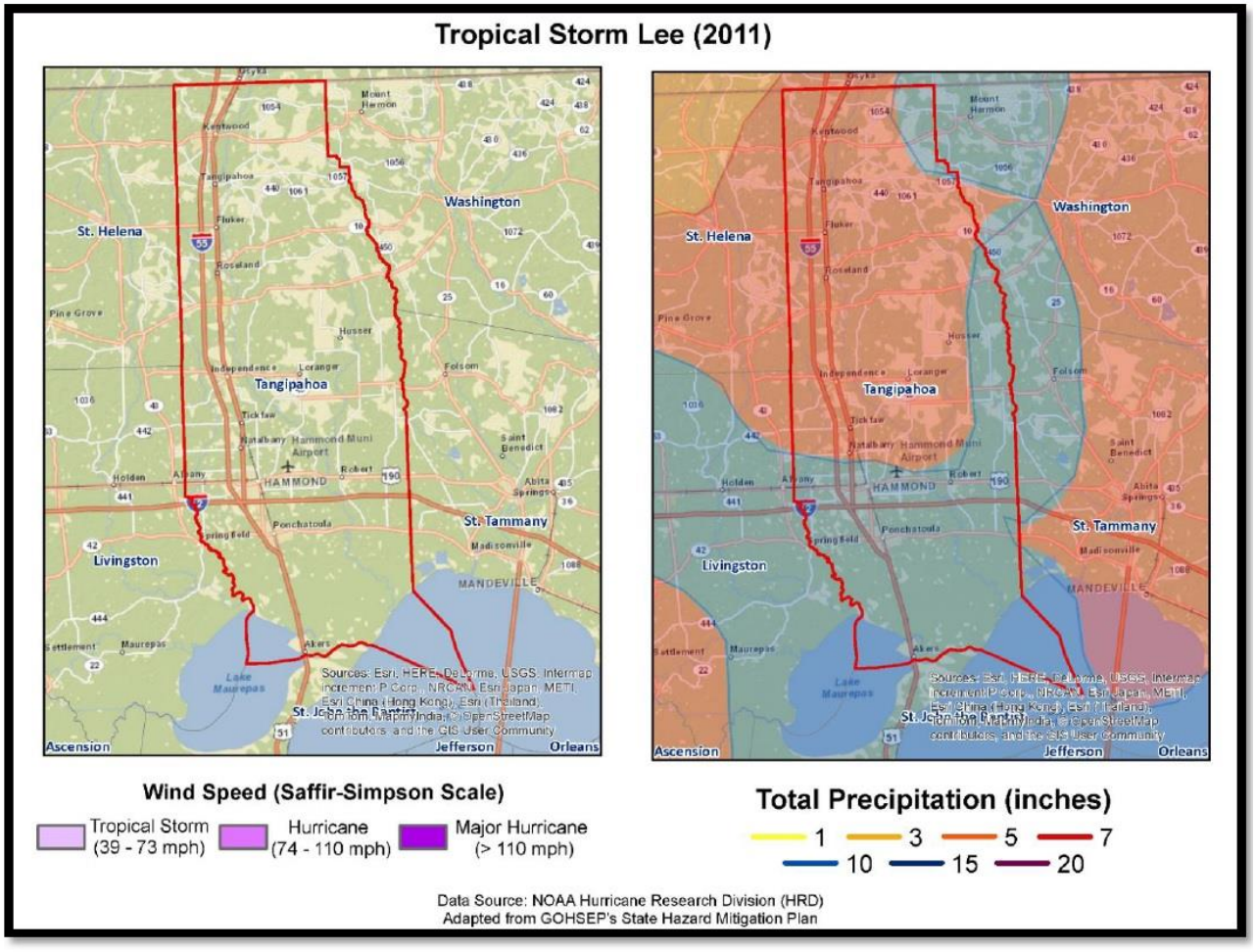


Figure 2-41: Wind and Precipitation fields affecting Tangipahoa Parish from Tropical Storm Lee.

Effects from the landfall of Tropical Storm Lee were felt in different areas throughout Tangipahoa Parish and its incorporated jurisdiction. According to the National Weather Service, the following statistics were recorded in association with Tropical Storm Lee:

- Rainfall totals: Ponchatoula – 13.24 inches, Robert – 11.8 inches, Kentwood – 8.77 inches
- Overall synopsis: Zero deaths or injuries; several recreational camps flooded along with roadways near Lake Maurepas due to tidal flooding

Source: *National Weather Service Post Tropical Cyclone Report*

Hurricane Isaac (2012)
Isaac entered the Gulf of Mexico as a tropical storm on August 26, 2012, moving northwest after crossing Haiti, Cuba and the Florida Straits. Isaac strengthened into a hurricane on the morning of the 28th, when it was 75 miles south-southeast of the mouth of the Mississippi River. Isaac made landfall in Plaquemines Parish as a Category 1 Hurricane near Southwest Pass of the Mississippi River on the evening of the 28th. A second landfall occurred near Port Fourchon the following morning. The storm weakened to a tropical storm on the afternoon of the 29th about 50 miles west-southwest of New Orleans and weakened further to a tropical depression on the afternoon of the 30th near Monroe, Louisiana.

The highest wind gust recorded on land in Louisiana was 75 knots (86 mph), measured by a portable weather station (Texas Tech University) near Buras on the evening of August 28th. The maximum sustained wind in Louisiana was 65 knots (75mph) at the same portable weather station near Buras on the evening of August 28. There were several marine observations near the coast that had slightly higher wind readings, but their observation heights were generally 80 feet or higher.

Due to Isaac's very large size and slow forward speed, tropical storm force winds lasted in excess of 48 hours in many areas of coastal southeast Louisiana. Occasional hurricane gusts of 70 to 85 mph were recorded across southeast Louisiana during the night of August 28th and early on the 29th, especially south of Lake Pontchartrain. Interior areas of southeast Louisiana, such as round Baton Rouge and northward, experienced tropical storm force winds. Widespread power outages occurred across the area. Local utility companies reported over 700,000 customers were without power at the peak of the storm in southeast Louisiana. Generally, most of the wind damage was limited to downed trees and power lines, and roof damage caused by wind and falling trees and tree limbs.

Significant impact also occurred around Lakes Pontchartrain and Maurepas with a storm tide of 5 to 9 feet. Five to 10 thousand homes were flooded in low-lying areas that border these lakes in the following parishes: Tangipahoa, Livi9ngston, Ascension, St. James and St. John the Baptist. Laplace in St. John the Baptist Parish was especially hit hard, with over 5,000 homes flooded by storm surge. An additional storm surge fatality occurred I Tangipahoa Parish on the morning of the 30th, when a 75-year old man drove his car into a storm surge filled ditch. Storm surge flooding also affected areas south and southwest of New Orleans with a storm tide of 4 to 7 feet. Roadways and low-lying property were flooded. Local levees around Lafitte and Myrtle Grove were overtopped and/or breached, resulting in flooding of numerous houses and property in this area.

[INSERT FIGURE 2-42: Wind and Precipitation fields affecting Tangipahoa Parish from Hurricane Isaac]
See page 2-115

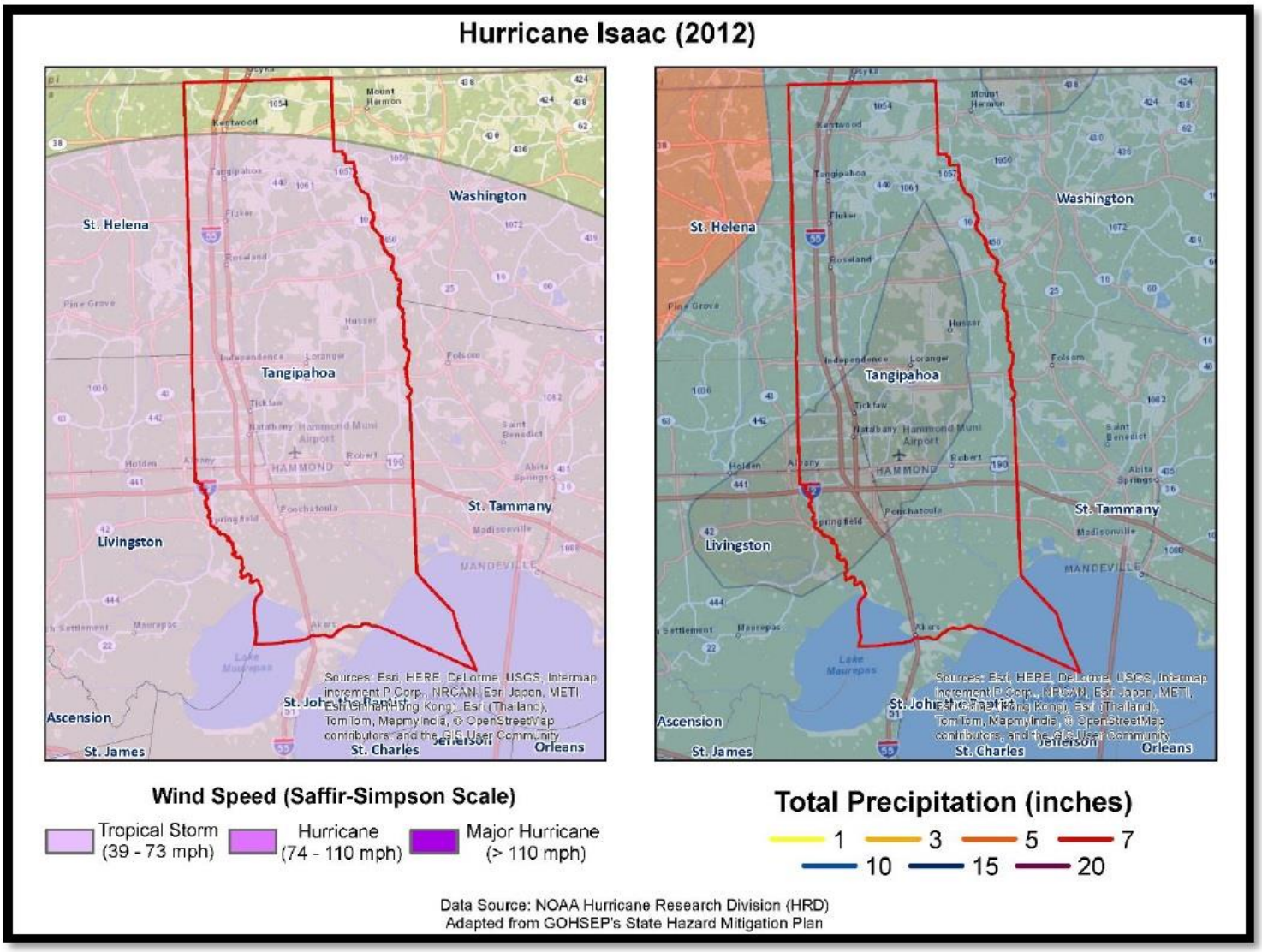


Figure 2-42: Wind and Precipitation fields affecting Tangipahoa Parish from Hurricane Isaac.

Many areas of southeast Louisiana received 8 to 12 inches of rain with a few locations having 15 inches or more of rain. Maximum storm total rainfall was 20.66 inches at the New Orleans Carrollton gauge on the Mississippi River. Rainfall run-off produced moderate to major flooding on the Tangipahoa, Tchefuncte, Tickfaw, Amite, Pearl, Bogue Chitto and Bogue Falaya Rivers. Storm surge and high tides reflected outflow of the rivers near the coast and lakes, exacerbating flooding in those areas.

Overall impacts of Isaac resulted in at least $600 million in damages in southeast Louisiana, 3 direct fatalities and 2 indirect fatalities. Storm surge flooding accounted for the bulk of damage, estimated around $500 million and the 3 direct storm surge fatalities in Louisiana. Winds accounted for a much lesser amount of slightly more than $100 million.

In Tangipahoa Parish, Isaac caused significant building damage and power outages throughout the Parish. Approximately 4,584 homes located in Tangipahoa Parish were damaged by Hurricane Isaac and approximately 43% of the Parish experienced power outages. Hammond, Robert, Amite, Kentwood, and Ponchatoula experienced localized flooding. Notable road closures include Interstate 55 south of the Mississippi border, US Hwy 51 from Manchac to Ponchatoula, Louisiana Highway 445 between US Hwy 190 and Interstate 12, Louisiana 440 westbound at the Tangipahoa River, US 190 east of Louisiana 445, and US Hwy 190 between Old Covington Highway and Louisiana 445.

Several mandatory evacuations were ordered in Tangipahoa Parish due to Hurricane Isaac. Residents located within a half-mile of the Tangipahoa River were ordered to evacuate due to the river reaching major flood stage. An earthen dam located at Percy Quin State Park, located along the banks of the 700-acre Lake Tangipahoa on the Mississippi/Louisiana border was severely damage, resulting in mandatory evacuations of small towns and rural areas in Tangipahoa Parish. IN advance of the storm, the extreme southern portions of Tangipahoa Parish were ordered to evacuate. This included the Manchac area, the Akers community, Lee's Landing, and all areas south of Wadesboro Road and Weinberger Road.

Figure 2-43 displays the wind zones that affect Tangipahoa Parish in relation to critical facilities throughout the Parish and Figures 2-44 and 2-45 show the amount of precipitation and wind the Parish received from 4 major tropical hurricanes that struck the Louisiana coast.

[INSERT HERE FIGURE 2-43: Wind zones for Tangipahoa Parish in relation to critical facilities] See page 2-117

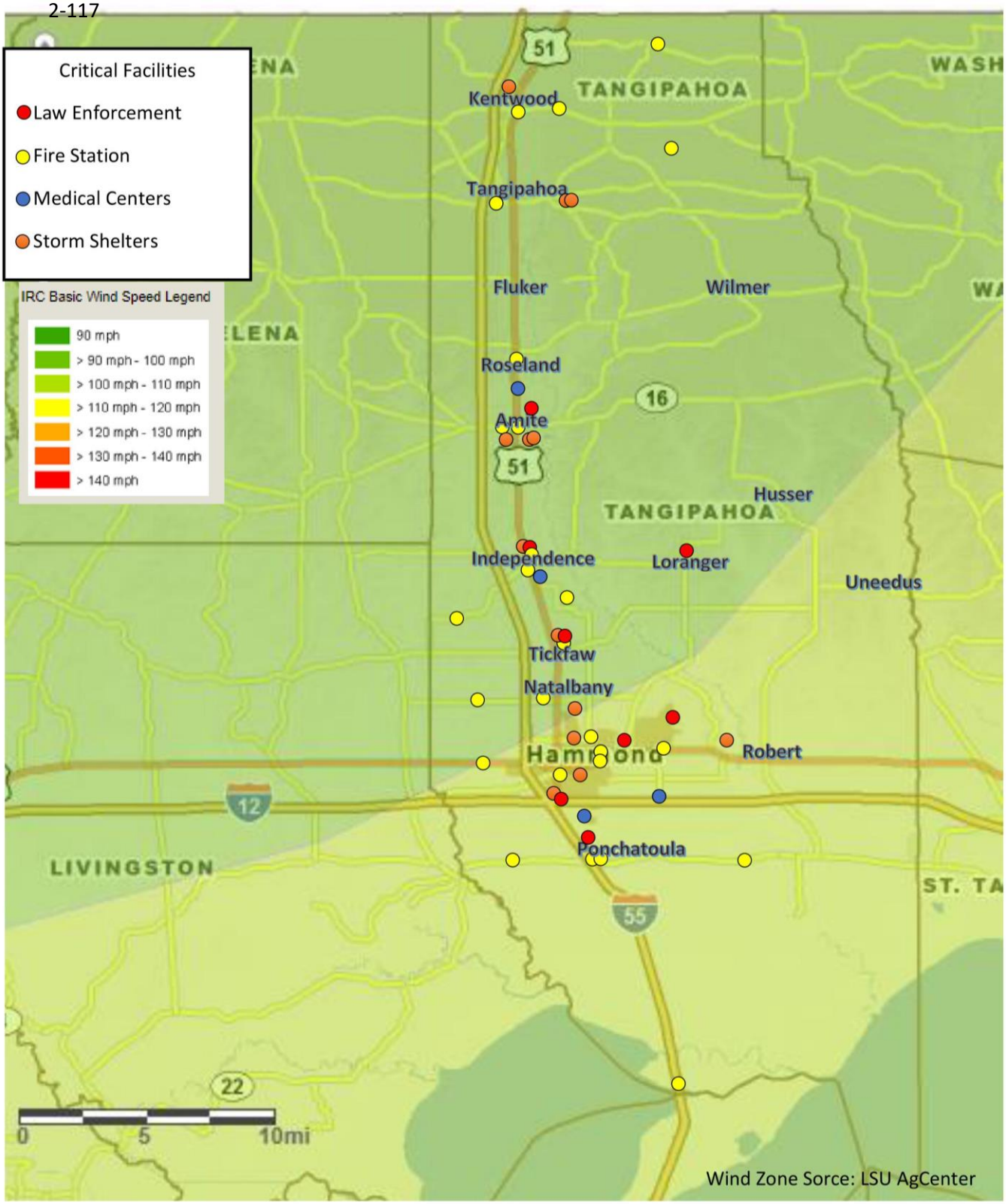


Figure 2-43: Winds zones for Tangipahoa Parish in relation to critical facilities.

[INSERT HERE FIGURE 2-44: Precipitation totals from Hurricane Katrina, Hurricane Rita, Hurricane Gustav, and Hurricane Ike for Tangipahoa Parish] See page 2-118

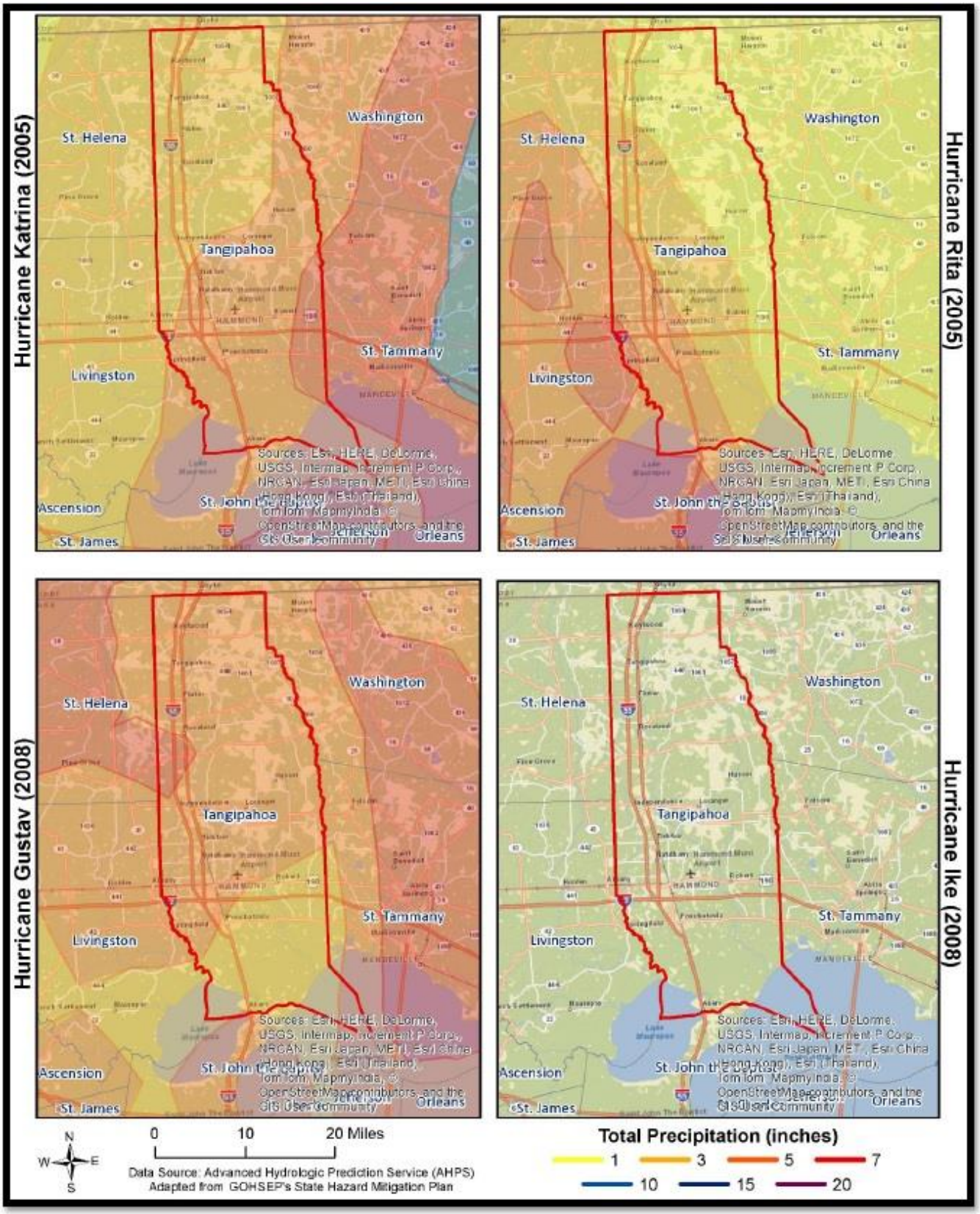


Figure 2-44: Precipitation totals from Hurricane Katrina, Hurricane Rita, Hurricane Gustav, and Hurricane Ike for Tangipahoa Parish.
(Source: State of Louisiana Hazard Mitigation Plan)

[INSERT FIGURE 2-45: Maximum sustained winds from Hurricane Katrina, Hurricane Rita, Hurricane

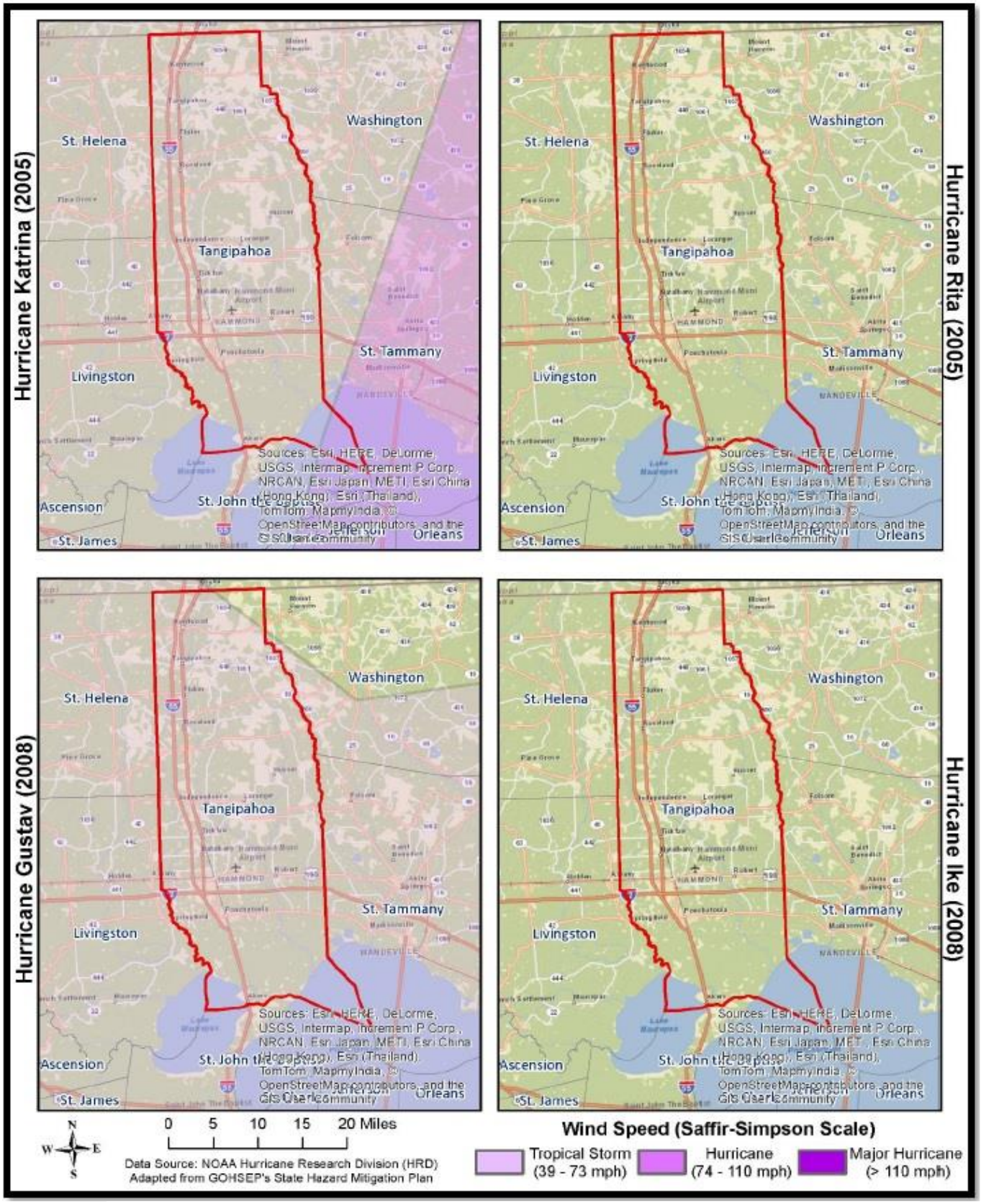


Figure 2-45: Maximum sustained winds from Hurricane Katrina, Hurricane Rita, Hurricane Gustav, and Hurricane Ike.
(Source: State of Louisiana Hazard Mitigation Plan)

Frequency / Probability

Tropical hurricanes are large natural hazard events that occur regularly within Tangipahoa Parish. The annual chance for a tropical hurricane occurrence is estimated at 84% for Tangipahoa Parish and its municipalities.

[INSERT FIGURE 2-46: Probability of Tropical Cyclones impacting Tangipahoa Parish] Source: State of Louisiana Hazard Mitigation Plan) See page 2-120

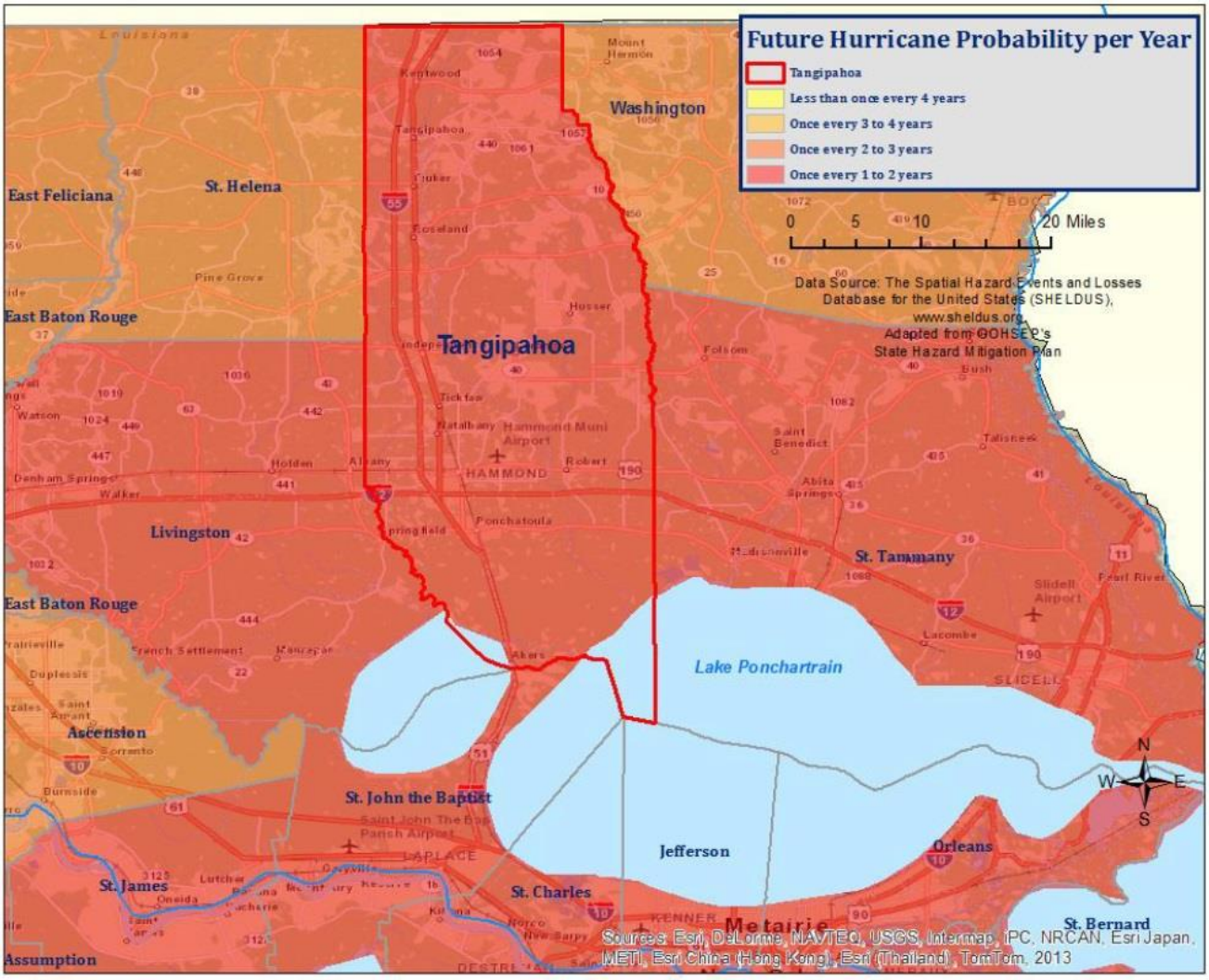


Figure 2-46: Probability of Tropical Cyclones impacting Tangipahoa Parish. (Source: State of Louisiana Hazard Mitigation Plan)

The tropical hurricane season for the Atlantic Basin is from June 1 through November 30, with most of the major hurricanes (Saffir-Simpson Categories 3,4,5) occurring between the months of August and October. Based on geographical location alone, Tangipahoa Parish is highly vulnerable to tropical hurricanes. This area has experienced several tropical hurricane events in the past and can expect more in the future. Based on historical record, illustrated in Figure 2-46, the probability of future occurrence of tropical hurricanes in Tangipahoa Parish is approximately 1 event every 1 to 2 years.

Estimated Potential Losses

Using HAZUS-MH 100-year hurricane model, the 100-year hurricane scenario was analyzed to determine losses from this worst-case scenario. Table 2-70 shows the total economic losses that would result from this occurrence.

Table 2-70: Total estimated losses for a 100-year hurricane event
(Source: HAZUS-MH)

Jurisdiction	
Tangipahoa Parish (unincorporated)	$100,795,363
Amite	$4,791,931
Hammond	$24,036,002
Independence	$1,999,098
Kentwood	$2,639,050
Ponchatoula	$7,875,125
Roseland	$1,348,341
Tangipahoa	$898,093
Tickfaw	$833,258
Total	$145,396,260

The HAZUS-MH hurricane model also provides a breakdown by jurisdiction for 7 primary sectors (HAZUS occupancy throughout the Parish. The losses for each jurisdiction by sector are listed in the tables below.

Table 2-71: Estimated losses in unincorporated Tangipahoa Parish for a 100-year hurricane event (Source: HAZUS-MH)

Tangipahoa Parish (unincorporated)	Estimated total losses from 100-year hurricane event
Agricultural	$199,761
Commercial	$4,820,083
Government	$114,437
Industrial	$579,006
Religious / Non-Profit	$599,282
Residential	$94,083,273
Schools	$399,521
Totals	$100,795,363

Table 2-72: Estimated losses in Amite for 100-year hurricane event
(Source: HAZUS-MH)

Amite	Estimated total losses from 100-year hurricane event
Agricultural	$9,854
Commercial	$237,760
Government	$5,645
Industrial	$28,561
Religious / Non-Profit	$29,561
Residential	$4,640,844
Schools	$19,707

Totals	$4,971,931

Table 2-73: Estimated losses in Hammond for a 100-year hurricane event
(Source: HAZUS-MH)

Hammond	Estimated total losses from 100-year hurricane event
Agricultural	$47,636
Commercial	$1,149,413
Government	$27,289
Industrial	$138,072
Religious / Non-Profit	$142,907
Residential	$22,435,414
Schools	$95,271
Totals	$24,036,002

Table 2-74: Estimated losses for Independence for a 100-year hurricane event
(Source: HAZUS-MH)

Independence	Estimated total losses from 100-year hurricane event
Agricultural	$3,962
Commercial	$95,598
Government	$27,289
Industrial	$138,072
Religious / Non-Profit	142,907
Residential	$22,435,414
Schools	$95,271
Totals	$24,036,002

Table 2-75: Estimated losses for Kentwood for a 100-year hurricane event
(Source: HAZUS-MH)

Kentwood	Estimated total losses from 100-year hurricane event
Agricultural	$5,230
Commercial	126,201
Government	$2,996
Industrial	$15,160
Religious / Non-Profit	$15,691
Residential	$2,463,312
Schools	$10,460
Totals	$2,639,050

Table 2-76: Estimated losses for Ponchatoula for a 100-year hurricane event
(Source: HAZUS-MH)

Ponchatoula	Estimated total losses from 100-year hurricane event
Agricultural	$15,607
Commercial	$376,592
Government	$8,941
Industrial	$45,238
Religious / Non-Profit	$46,822
Residential	$7,350,711
Schools	$31,215
Totals	$7,375,125

Table 2-77: Estimated losses for Roseland for a 100-year hurricane event
(Source: HAZUS-MH)

Roseland	Estimated total losses from 100-year hurricane event
Agricultural	$2,672
Commercial	$64,478
Government	$1,531
Industrial	$7,745
Religious / Non-Profit	$8,017
Residential	$1,258,553
Schools	$5,344
Totals	$1,348,341

Table 2-78: Estimated losses for Tangipahoa for a 100-year hurricane event

Tangipahoa	Estimated total losses from 100-year hurricane event
Agricultural	$1,780
Commercial	$42,947
Government	$1,020
Industrial	$5,159
Religious / Non-Profit	$5,340
Residential	$838,288
Schools	$3,560
Totals	$898,093

Table 2-79: Estimated losses for Tickfaw for a 100-year hurricane event
(Source: HAZUS-MH)

Tickfaw	Estimated total losses from 100-year hurricane event
Agricultural	$1,651
Commercial	$39,847
Government	$946
Industrial	$4,787
Religious / Non-Profit	$4,954
Residential	$777,770
Schools	$3,303
Totals	$833,258

Threat to People
The total population within the Parish that is susceptible to a hurricane hazard are shown in the table below.

Table 2-80: Number of people susceptible to a 100-year hurricane event in Tangipahoa Parish
(Source: HAZUS-MH)

Number of People Exposed to Hurricane Hazards			
Location	# in Community	# in Hazard Area	% in Hazard Area
Parish (unincorporated)	83,950	83,950	100%
Amite	4,141	4,141	100%
Hammond	20,019	20,019	100%
Independence	1,665	1,665	100%
Kentwood	2,198	2,198	100%
Ponchatoula	6,559	6,559	100%
Roseland	1,123	1,123	100%
Tangipahoa	748	748	100%
Tickfaw	694	694	100%

The HAZUS-HM hurricane model was also extrapolated to provide an overview of vulnerable populations throughout the jurisdictions in the tables on the following pages.

Table 2-81: Vulnerable populations in unincorporated Tangipahoa Parish for a 100-year hurricane
(Source: HAZUS-MH)

Tangipahoa Parish (Unincorporated)		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	83,950	100%
Persons under 5 years	6,165	7.4%
Persons under 18 years	21,669	25.8%
Persons 65 years and over	9,243	11%

White	62,081	73.9%
Minority	21,869	26.1%

Table 2-82: Vulnerable populations in Amite for a 100-year hurricane
(Source: HAZUS-MH)

Amite		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	4,141	100%
Persons under 5 years	220	5.3%
Persons under 18 years	920	22.2%
Persons 65 years and over	526	12.7%
White	1,805	43.6%
Minority	2,336	56.4%

Table 2-83: Vulnerable populations in Hammond for a 100-year hurricane
(Source: U.S. Census Bureau)

Hammond		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	20,786	100%
Persons under 5 years	1,310	6.3%
Persons under 18 years	4,615	22.2%
Persons 65 years and over	2,308	11.1%
White	9,686	46.6%
Minority	11,100	53.4%

Table 2-84: Vulnerable populations in Independence for a 100-year hurricane
(Source: HAZUS-MH)

Independence		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	1,665	100%
Persons under 5 years	136	8.2%
Persons under 18 years	450	27%
Persons 65 years and over	255	15.3%
White	909	54.6%
Minority	756	45.4%

Table 2-85: Vulnerable populations in Kentwood for a 100-year hurricane
(Source: HAZUS-MH)

Kentwood		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	2,198	100%
Persons under 5 years	145	6.6%
Persons under 18 years	590	26.8%
Persons 65 years and over	296	13.5%
White	593	27%
Minority	1,605	73%

Table 2-86: Vulnerable populations in Ponchatoula for a 100-year hurricane
(Source: U.S. Census Bureau)

Ponchatoula		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	7,371	100%
Persons under 5 years	619	8.4%
Persons under 18 years	2,308	31.3%
Persons 65 years and over	973	13.2%
White	4,246	57.6%
Minority	3,125	42.4%

Table 2-87: Vulnerable populations in Roseland for a 100-year hurricane
(Source: HAZUS-MH)

Roseland		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	1,123	100%
Persons under 5 years	77	6.9%
Persons under 18 years	310	27.6%
Persons 65 years and over	139	12.4%
White	359	32%
Minority	764	68%

Table 2-88: Vulnerable populations in Tangipahoa for a 100-year hurricane
(Source: HAZUS-MH)

Tangipahoa		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	748	100%
Persons under 5 years	73	9.8%
Persons under 18 years	275	36.8%
Persons 65 years and over	50	6.7%
White	58	7.8%
Minority	690	92.2%

Table 2-89: Vulnerable populations in Tickfaw for a 100-year hurricane
(Source: HAZUS-MH)

Tickfaw		
Category	Total Numbers	Percentage of People in Hazard Area
Number in Hazard Area	694	100%
Persons under 5 years	73	9.8%
Persons under 18 years	275	36.8%
Persons 65 years and over	50	6.7%
White	58	7.8%
Minority	690	92.2%

Wildfire

A wildfire is combustion in a natural setting, marked by flames or intense heat. Most frequently wildfires are ignited by lightning or unintentionally by humans. Fires set purposefully (but lawfully) are referred to as controlled fires or burns. There are 3 different types of wildfires. 1) Ground fires burn primarily in the thick layers of organic matter, directly on the forest floor and even within the soil. Ground fires destroy root networks, peat, and compact litter. These fires spread extremely slowly and can smolder for months. (2) Surface fires burn litter and vegetative matter in the underbrush of a forest. (3) Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. There are 2 types of crown fires – (a) passive (or dependent) crown fires rely on heat transfer from surface fire, whereas (b) active (or independence) crown fires do not require any heat transfer from below. Active crown fires tend to occur with greater tree density and drier conditions. A firestorm is a mass, crown fire (also called a running crown fire, area fire, or conflagration). They are large, continuous, intense fires that lead to violent convection. They are characterized by destructively violent surface in-drafts near and beyond their perimeter. Crown fires are the most damaging and most difficult to contain. The intensity of crown fires enables the fire to produce its own wind gusts. These so-called fire whirls can move embers ahead

of the fire front and ignite new fires. Fire whirls are spinning vortex columns ascending hot air and gases rising from the fire. Large whirls have the intensity of a small tornado.

The conditions conducive to the occurrence of wildfires are not distributed equally across the United States. Wildfires have a much greater likelihood of occurring in the western part of the country. Although less frequent than in other areas, wildfires do occur in Louisiana. Wildfire danger can vary greatly season to season and is exacerbated by dry weather conditions. Factors that increase susceptibility to wildfires are the availability of fuel (e.g., litter and debris), topography (i.e., slope and elevation affect various factors like precipitation, fuel amount, and wind exposure), and specific meteorological conditions (e.g., low rainfall, high temperatures, low relative humidity, and winds).; The potential for wildfire is often measured by the Keetch-Byram Drought Index (KBDI) which represents the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in the soil. The KBDI tries to measure the amount of precipitation needed to return soil to its full field capacity, with KBDI values ranging from 0 (moist soil) to 800 (severe drought).

According to the State of Louisiana Forestry Division, most forest fires in Louisiana are caused by intentional acts (arson) or carelessness and negligence committed by people, exacerbated by human confrontation with nature. The wildland-urban interface is the area in which development meets wildland vegetation, where both vegetation and the build environment provide fuel for fires. As development near wildland settings continues, more people and property are exposed to wildfire danger. Figure 2-48 displays the areas of wildland-urban interaction in Tangipahoa Parish.

The Southern Group of State Foresters developed the Southern Wildfire Risk Assessment Portal to create awareness among the public and government sectors about the threat of wildfires in their areas. The Southern Wildfire Assessment Portal allows users to identify areas that are most prone to wildfires. The table below summarizes the intensity levels assigned to areas in the Southern Wildfire Assessment Portal.

Table 2-90: Southern Group of State Foresters Wildfire Risk Assessment Fire Intensity Scale
(Source: Southern Wildfire Assessment Portal)

Fire Intensity Scale	
Level	Definition
1	Lowest Intensity: Minimal direct wildfire impacts. Location has a minimal chance of being directly impacted by a wildfire.
2	Low Intensity: Small flames usually less than 2 feet long; small amount of very short-range spotting possible. Fires are easy to suppress.
3	Moderate Intensity: Flames up to 8 feet in length; short-range spotting is possible.
4	High Intensity: Large flames up to 30 feet in length; short-range spotting common; medium-range spotting possible.
5	Highest Intensity: Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds.

Location

Wildfires impact areas that are populated with forests and grasslands. Because every jurisdictional area in Tangipahoa Parish has some form of wildland-urban interface or wildland-urban intermix, the entire planning area is equally at risk for wildfires.

Previous Occurrences / Extents

National Climatic Data Center report no wildfire events occurring within the boundaries of Tangipahoa Parish, between the years of 1960 – 2019. The United States Fire Service's Active Fire Mapping Program estimates 158 fire events have occurred within the boundaries of Tangipahoa Parish between the years of 2001 – 2014. This discrepancy between the different data bases is attributed to SHELDUS and NCDC only recording events that cause damage to crops and property, or injury and deaths.

Frequency / Probability

Because there has been no reported event that has caused damage to property, crops, or life, the State Hazard Mitigation Plan accesses the overall probability of a significant wildfire event occurring within Tangipahoa Parish as less than once every 100 years.

[INSERT HERE FIGURE 2-47: Probability of wildfire events in Tangipahoa Parish and adjacent parishes based on data from 1987 – 2012. See page 2-130

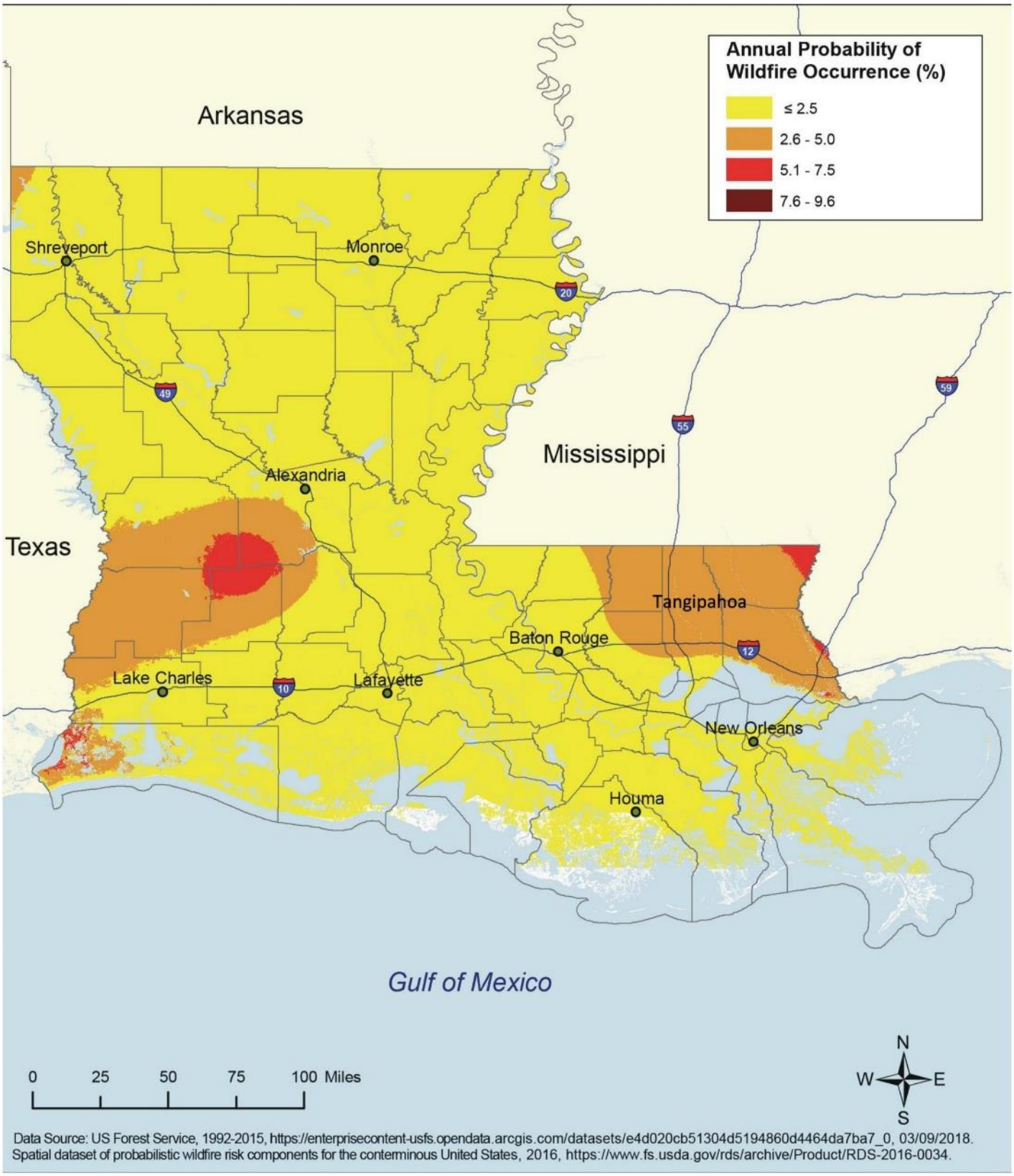


Figure 2-47: Annual probability of wildfire events in Louisiana.

(Source: State of Louisiana Hazard Mitigation Plan 2019)

Estimated Potential Losses

According to the SHELDUS database, there have been no wildfire events that have caused property damage, crop damage, injuries, or fatalities in Tangipahoa Parish. In accessing the overall risk to population, the most vulnerable population throughout the Parish consists of those residing in areas of wildland-urban interaction. Figure 2-48 displays the areas of wildland-urban interaction in Tangipahoa Parish.

[INSERT HERE FIGURE 2-48: Wildland-Urban Interaction in Tangipahoa Parish] see page 2-131

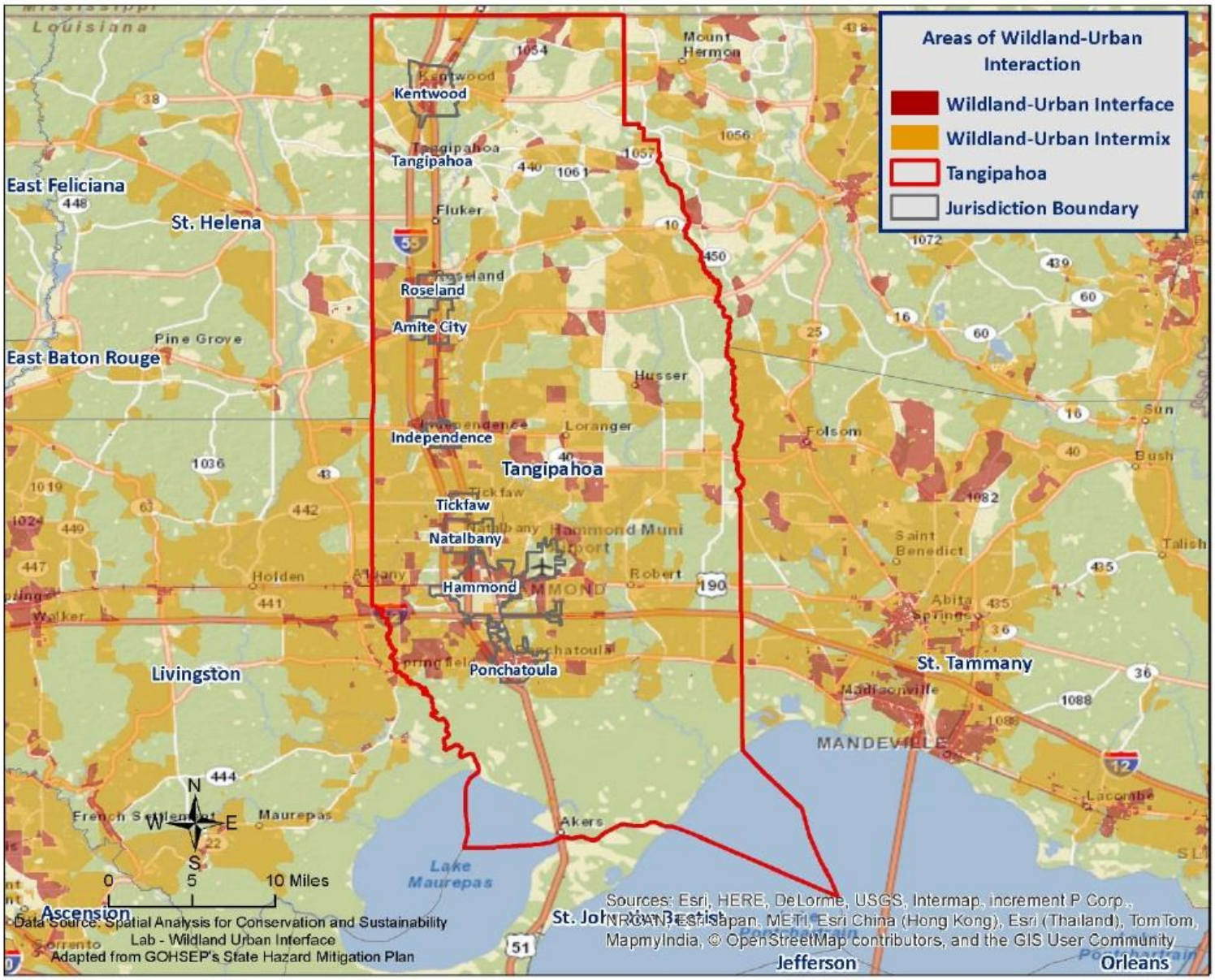


Figure 2-48: Wildland-Urban Interaction in Tangipahoa Parish

Table 2-91 presents an analysis of building exposure that are susceptible to wildfires based on location within the wildland-urban interface intermix.

Table 2-91: Total building exposure to wildfires based on wildland-urban interface and intermix. (Source: HAZUS-MH)

Jurisdiction	Exposure
Tangipahoa Parish (unincorporated)	$4,793,172,000
Amite	$431,329,000
Hammond	$1,914,744,000
Independence	$144,384,000
Kentwood	$168,214,000
Ponchatoula	$743,175,000
Roseland	$78,336,000
Tangipahoa	$35,120,000
Tickfaw	$83,746,000
Total	$8,728,090,000

Vulnerability

See Appendix C for Parish and municipality facilities that could potentially be exposed to a wildfire hazard. Buildings were determined based on whether or not they fill within the wildfire-urban interface and/or intermix.

Winter Weather

For Louisiana and other parts of the southeastern United States, a severe winter storm occurs when humid air from the Gulf of Mexico meets a cold air mass from the north. As the temperature falls once the cold air mass crosses Louisiana, precipitation may fall in the form of snow or sleet. If the ground temperature is cold enough but air temperature is above freezing, rain can freeze instantly on contact with the surface, causing massive ice storms.

The winter weather events that affect the State of Louisiana are ice storms, freezes, and snow events. Each event can affect any part of Tangipahoa Parish. Of the winter weather types listed above, ice storms are the most dangerous. Ice storms occur during a precipitation event when warm air aloft exceeds 32° F, while the surface remains below the freezing point. Ice will form on all surfaces when precipitation originating as rain or drizzle contacts physical structures. These ice storms are usually accompanied by freezing temperatures and occasionally snow.

Winter storms can be accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chill. These types of conditions are very rare in Louisiana – even in north Louisiana – but ice storms are more common. The climatic line between snow and rain often stalls over north Louisiana creating ideal conditions for ice accumulation.

Location

Winter weather typically impacts a region and not one specific parish or jurisdiction. Because winter weather is a climatological-based hazard and has the same probability of occurring in Tangipahoa Parish as all of the adjacent parishes, the entire planning area for Tangipahoa Parish is equally at risk for winter weather.

Previous occurrences / Extent

The SHELDUS database reports a total of 21 winter weather events occurring with the boundaries of Tangipahoa Parish between the years of 1960 – 2014. Table 2-92 provides an overview of winter weather events that have impacted the Tangipahoa Parish Planning area from 1989 – 2014.

Table 2-92: Previous occurrences of winter weather in Tangipahoa Parish from 1989 – 2019. (Source: SHELDUS, NCDC)

Date	Property Damage
December 1989	$14,677
March 1993	$0
February 1996	$0
January 2014	$0
January 2018	$0

Frequency / Probability

Winter weather is a rare occurrence within Tangipahoa Parish with an annual chance of occurrence calculated at 12%, based on the records for the past 25 years (1989 – 2014). Based on the State Hazard Mitigation Plan, the overall probability of a winter weather event in Tangipahoa Parish is less than once every 8 years.

Estimated Potential Losses

According to the SHELDUS database, property damage due to winter weather in Tangipahoa Parish have totaled approximately $6,620,495 between 1960 to 2014. An estimated annual property damage by winter weather event can be found in Table 2-93. According to State of Louisiana 2019 Hazard Mitigation plan, the annual estimated potential loss from winter weather is $1,999,557. To access potential losses proportionally across the jurisdictions, the 2017 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. Based on the 2017 Census data, the following table provides an estimate of potential property damage for Tangipahoa Parish:

Table 2:93: Estimated annual property damage in Tangipahoa Parish from winter weather.

Estimated Annual Potential Losses from Winter Weather for Tangipahoa Parish								
Unincorporated Tangipahoa Parish (70.3% of Population)	Amite (3.4% of Population)	Hammond (15.5% of Population)	Independence (1.4% of Population)	Kentwood (1.8% of Population)	Ponchatoula (5.5% of Population)	Roseland (1.0% of Population)	Tangipahoa (0.6% of Population)	Tickfaw (0.6% of Population)
$1,405,662	$67,036	$309,071	$28,538	$36,280	$109,639	$19,000	$12,737	$11,635

The Parish has suffered no deaths or injuries due to winter weather from 1960 – 2019.

Based on historical data, winter weather is determined not to pose a significant risk to the planning area within Tangipahoa Parish.

Vulnerability
See Appendix C for Parish and municipality exposure to winter weather.

According to State of Louisiana 2019 Hazard Mitigation Plan, the estimated annual potential losses from all the events, including wildfire, high wind, hailstorm, lightning, tornado, and extreme cold, is $ 11,081,112 in Tangipahoa Parish. To access potential losses proportionally across the jurisdictions, the 2017 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. Based on the 2017 Census Data, the following table provides an estimate of potential property damage for Tangipahoa Parish:

Based on the NCDC data, a total of 35 injuries and 8 deaths have been reported from all events from 1960 to 2019 .

Table 2-94: Estimated average annual property damage in Tangipahoa Parish from all events (Wildfire, extreme cold, wind, hailstorm, tornado, and lightning)

Estimated Average Annual Potential Losses from all events for Tangipahoa Parish								
Unincorporated Tangipahoa Parish (70.3% of Population)	Amite (3.4% of Population)	Hammond (15.5% of Population)	Independence (1.4% of Population)	Kentwood (1.8% of Population)	Ponchatoula (5.5% of Population)	Roseland (1.0% of Population)	Tangipahoa (0.6% of Population)	Tickfaw (0.6% of Population)
$7,789,655	$371,497	$1,712,802	$158,150	$201,054	$607,593	$105,294	$70,586	$64,481

Cyber Security

Cyber terrorism is the act of using existing computers and information to cause physical or financial harm or disturbance of the infrastructure service. The primary motivation of cyber-attacks are driven by political or social objectives. The types of cyber-attacks that can disrupt the reliability of equipment includes:

- Directing kinetic weapons against computer equipment, a computer facility, or transmission lines to create a physical attack.
- Electronic attack against computer equipment or data transmissions.
- Using malicious code to create a cyber-attack against computer processing code, instruction logic, or data. The code can create malicious network packets that disrupt data or logic in computer software, or computer security of an organization (Wilson and Clay, 2007)

(Source: State of New Jersey – Office of Emergency Management)

Frequency / Probability
The probability of cyber-attacks are difficult to calculate due to unpredictable human behavior and rapid evolution of technologies.

In order to increase the cyber security of the Tangipahoa Parish, the Parish implemented several strategies to mitigate the risk of cyber-attacks:

1. The Parish employed Nortech to support the cyber security for the parish. Nortech will strive to provide Tangipahoa Parish Government with the best possible support and technology guidance, helping the organization to progress. Nortech's vision is to aid Tangipahoa Parish Government in providing technological excellence to its staff in becoming skilled, knowledgeable, independent, and self-directed learners who are comfortable with and proficient in using technology in all its forms as information resources. Through the use of technology, with its varied aspects and applications, each staff member at Tangipahoa Parish Government will be afforded opportunities and challenges that will allow them to successfully engage the future. The goal is to upgrade current server structure, to improve reliability of the wired & wireless network, to provide upgrade paths to newer technology, to create an reliable backup solution, and to provide high level tech support and monitoring.

2. Mobile Device Management (MDM) Implementations
Implement MDM solution to manage “TPG Owned” mobile devices:
1. Select MDM software solution
2. Create mobile policies for device security and WIFI access
3. Create Samsung Knox and Apple Business Manager accounts
4. Enroll devices and apply policies
5. In service staff to new security policies

3. Endpoint Security and Compliance
Implement endpoint solution to manage AV, Web filtering and vulnerability scanning.
1. Configure AV, Web filtering, Vulnerability scanning and removable storage access policies
2. Install & test device policies

4. Disaster Recovery Solution
Implement hybridized disaster recovery solution:
1. Configure hybridized disaster recovery solution
2. Create backup and recovery policies
3. Rack hybrid appliances
4. Install backup software on critical servers
5. Validate and test recovery procedures

5. Monitoring and Tech Support
1. Implement monitoring tools
2. Configure notifications in order to prevent mass network outages
3. Create a server software / firmware upgrade rollout plan
4. Schedule a time in order to accommodate time involved in rollout completion
5. Create a tech support and server / network maintenance package

Bioterrorism

Bioterrorism is the intentional use of pathogenic strains of microbes to spread life-threatening diseases on a mass scale with the aim to devastate the population of an area. The biologic weapons can cause a mass-scale of mortality and morbidity in a short period of time.

Previous Occurrence
There is no history of bioterrorism in Tangipahoa Parish.

Lack of preparedness for bioterrorism can cause political and medical consequences in the affected site. To mitigate the risk bioterrorism, it requires the cooperation of the law enforcement and public health. Public health will focus on developing effective disease prevention and control measures and law enforcement will strive for prevention of future attacks (Sharma, Mishra, Newaskar, Khasgiwala).

Pandemic

I. SUBJECT - Hazard Mitigation Disaster Planning

A pandemic is an epidemic of infectious disease that has spread through human populations across a large region that has worldwide consequences. Viral pandemics present special requirements for disease surveillance, public communications, rapid delivery of available vaccines and antiviral drugs, allocation of limited medical resources, and expansion of health care services to meet a surge in demand for care.

II. PURPOSE

The purpose of this Pandemic Appendix to the Parish Multi-Hazards Plan is to provide general guidance to Tangipahoa Parish Government Departments, Municipal Governments located in Tangipahoa Parish, and to other stakeholders with duties and responsibilities during an emergency response specific to a pandemic epidemic.

A. The specific purpose of this document is to:

1. Limit illness and/or mortality within the parish during a pandemic epidemic.
2. Preserve the continuity of essential government functions within a parish.
3. Minimize economic loss within the parish.
4. Minimize social disruption within the parish.

The information contained in this Plan is based upon information contained within information provided by the Center for Disease Control, the Louisiana Department of Health and the Tangipahoa Parish Multi-Hazards Plan.

III. SITUATIONS AND ASSUMPTIONS

Tangipahoa Parish is located north of the City of New Orleans and is adjacent to the parishes of Washington, St. Tammany, St. Helena, Livingston, St. John and the State of Mississippi. It encompasses the municipalities of Kentwood, Village of Tangipahoa, Roseland, Amite City, Independence, Village of Tickfaw, Hammond and Ponchatoula. The size of the parish is approximately 873 square miles with an approximate population of 138,000.

A. Situations

1. Tangipahoa Parish is subject to the effects of many natural and man-made disasters, varying widely in type and magnitude from local communities to statewide in scope.

    a. Natural Disasters to include, but not limited to hurricanes, tornadoes, floods, and other sever weather event, high water, wind driven water, tidal wave, drought, forest fires, high winds extreme temperatures, lighting strikes and famine.

    b. Man-made Disasters to include but not limited to Explosions, transportation accidents involving hazardous materials spill and Chemical, Biological, Radiological, and Nuclear Explosion (CBRNE), Terrorist Acts. As with any other community, the Parish is also exposed to building or bridge collapse, utility service interruptions, energy shortages, civil disturbances or riots, financial issues, economic depression, inflation, and act of war.

c. Biological-Hazards to include Diseases that impact humans and animals (Corona, plague, smallpox, anthrax, West Nile and other viruses, Pandemic Outbreak, and other animal or insect infestations.

B. Assumptions

1. Health and Medical Assumptions

a. The primary mechanism or controlling a Pandemic Epidemic will always be coordinated, consistent, and thorough public information campaign, focusing on disease prevention, homecare, treatment, risk groups, and recovery.

b. The number of hospitalizations and deaths will depend on the virulence and communicability of the pandemic virus.

c. Local governments and municipalities have the primary responsibility to provide public safety and emergency management services in Tangipahoa parish. During a pandemic epidemic local government and municipalities will assist the Louisiana Department of Health with the emergency response.

d. Federal and State resources maybe provide and/or augment public health and emergency management services that exceed the capabilities of local governments.

e. At a point of transition into a pandemic, the Center for Disease Control (CDC) may activate the Strategic National Stockpile Plan upon an approved declared Emergency Declaration by the State Louisiana Department of Health.

f. New influenza strains may prove to be sensitive or resistant to antiviral medications.

g. The primary functions related to the transition of a Stage 2 pandemic may include sustained antiviral distribution operations, if appropriate.

h. An effective licensed vaccine to the pandemic strain will eventually be produced, and made available to high-risk groups followed by the general public, coordinated by LDH/OPH.

i. Certain public health measure (e.g., closing schools, quarantining household contacts of infected individuals, “Stay Home Days”) are likely to increase rates of absenteeism

2. Education Assumptions

a. The educational system will be a primary pandemic communication channel for all health and educational related materials, with the ability to reach Principals, teachers, parents and students through DOE in coordination with LDH.

b. Absenteeism will be monitored through a system of “trigger” points, and/or a sentinel system through DOE, and reported to LDH for consultation.

c. All school closures and dismissals will be reported by DOE to LDH and GOHSEP.

d. The closure of schools and childcare facilities will affect the workforce related to childcare. Any impact upon the workforce will have a corresponding influence on local, regional, and State economic communities.

e. Decision points leading to the school closure recommendations will require multi-agency coordination and epidemiological data.

f. Schools may be needed during a pandemic for other purposes such as vaccine distribution sites, or even medical triage centers.

3. Workforce Assumptions

   The CDC will estimate the number of personnel that will be affected by a pandemic that affects the workforce.

   a. Absenteeism attributable to illness, the need to care for ill family members, and fear of infection may reach 40% during the peak weeks of a community outbreak, with lower rates during the weeks before and after the peak.

   b. The potential for a 40% reduction in the labor force will require parish departments to adjust essential services and staffing patterns to support these services.

   c. Social distancing and telecommuting measures will be encouraged and/or implemented where policies and capability exist; however, when enacted, these measures will decrease the on-site availability of the parish workforce.

   d. A pandemic may increase demand on governmental or non-governmental social services and decrease available social service workforce, thus the availability of social services may be impacted.

   e. Essential personnel who must work in traditional office structures will practice social distancing measures.

   f. Parish non-essential personnel may work via remote access.

4. Public Safety, Fire, and EMS Assumptions

   a. The traditional definition of “first responder” (e.g., fire, EMS, law enforcement) may need to be adjusted for a pandemic to include and/or prioritize health care responders and other support response agencies.

   b. Various issues exist during a pandemic event that would challenge State and local law enforcement.

   c. A significant decrease in the law enforcement and emergency response workforce will over-task available staff.

   d. Secondary effects such as public demonstrations, looting, and civil unrest during a pandemic event or a concurrent disaster may lead to an increased need for law enforcement.

   e. All operational actions taken will be in accordance with applicable State and local laws, statutory authorities, and regulations.

   f. Some law enforcement activities that may occur outside of normal duties may include situations of quarantine and/or isolation enforcement and support at sites of distribution of vaccinations and medications.

g. The potential spread of disease and illness within correctional institutions is high due to the congregate nature of these facilities.

5. Strategic Messaging and Communications Assumptions

a. Effective communications leading into, during, and after a pandemic are necessary to mitigate public fear and concerns.

b. The State of Louisiana has established a website to serve as a centralized point of public information. Tangipahoa Parish Government will use this website as part of the jurisdiction's communications strategy. Updated information specific to Louisiana can be found at http://.ldh.la.gov/index.cfm/page/3835

6. Concurrent Disaster during a Pandemic Event Assumptions

a. During a severe pandemic, in combination with another disasters such as a hurricane, other states will not absorb evacuated Louisiana residents.

b. During a pandemic, out-of-state resources through the Emergency Management Assistance Compact may not be available to support Louisiana's evacuation and sheltering operations.

c. During a pandemic, up to 40% of the evacuated population may be affected by pandemic creating difficulty in the separation of populations

d. In the event of a projected landfall of a Category 3 or higher hurricane anywhere on the coastline of Louisiana during a pandemic, the State of Louisiana will use the H-Hour Timeline to manage the evacuation and sheltering of coastal Louisiana.

e. A Category 3 hurricane may necessitate the decision to evacuate and shelter Tangipahoa Parish citizens.

7. Critical Infrastructure Assumptions

a. Critical infrastructure systems and operations, while intact, may be significantly impacted due to shortages of personnel.

8. Continuity of Operations (COOP) Assumptions

a. Supply chain and delivery networks, just-in-time delivery, warehousing, logistics, and the domestic and international flow of goods could be substantially restricted.

b. Shortages of and disruptions to basic commodities and municipal infrastructure may cause localized security challenges for businesses and communities.

c. The normal COOP paradigm of moving all personnel to an alternate location must be changed to personnel working in a decentralized fashion to comply with social distancing recommendations.

IV. Strategic Goals

Preparedness activities related to a pandemic outbreak plan are based on strategic goals. Tangipahoa has identified the following strategic goals.

A. Educate Parish Employee and their family members of the virus.

B. Preventive Measures
   1. Promoting Good Personal Hygiene
   2. Practicing Social Distancing

C. Ensure continuity of operations of parish departments by monitoring daily operations and absenteeism through effective communications.

D. Continue educating employees and family members as new information arises

E. Educate Tangipahoa Parish residents of the virus and keep them updated.

F. Sustainment and support of critical infrastructure and key resources located within Tangipahoa Parish.

V. MISSION ESSENTIAL TASKS

A. Provide information prior to an outbreak and continually during an outbreak to key departments to ensure timely responses and reaction to trigger points regarding to pandemic outbreak.

B. Develop strategic points, convey and coordinate public outreaches to Tangipahoa Parish Government, Municipal Government and citizens, through all available media resources.

C. Support municipal government and Louisiana Department of Health in their response to a pandemic event, including containment of the pandemic when possible.

D. Ensure safety is number one priority of all personnel supporting pandemic operations.

E. Support nonprofit organizations in their emergency responses to a pandemic event when possible.

F. Implement this operating plan, share reports horizontally, vertically, and ensure collaboration with community parish partners and participating agencies.

G. Monitor economic impact of a pandemic at the local levels.

H. Monitor number of confirmed cases of the virus by schools, parish government and municipal government.

I. Implement process for closures of schools and childcare facilities, and cancellation of school-related activities as determined necessary by LDH and the Louisiana Department of Education (DOE)

J. Support Louisiana Department of Health regarding voluntary, or quarantine measures.

K. When available distribute personal protective equipment (PPE) to Parish employees and other emergency support personnel offering emergency assistance in Tangipahoa Parish.

L. Monitor and disseminate reports on number of confirmed cases versus personnel absent due to family illness or other sickness or injury when available.

M. Monitor number of hospital admissions and deaths related to the outbreak through our Designated Regional Coordinator (DRC).

N. Support Louisiana Department of Health vaccination centers when necessary, guided by the SNS distribution plan.

O. Implement process for closure and/or cancellation of public events and other large gatherings as determined necessary by LDH with support from law enforcement as needed.

P. Request for additional support for local law enforcement agencies when needed.

VI. CRITICAL INFORMATION REQUIREMENTS

The parish may need to support the State's senior leadership in order to make critical operational decisions in the event of a pandemic outbreak in Louisiana. This information may be in the form of:

A. Estimation of infection rate in Parish, preferably by location

B. Number of cases reported in a locality, virulence of the virus, and severity of the disease spread.

C. School Board's report on student absenteeism.

D. Closure decisions regarding schools, school-related activities, and childcare facilities; coordinated with the Parish School Board.

E. Available health care resources by LDH region (Information reported through EMSystems and EM Resources by the LDH Designated Regional Coordinator.

F. Overall reports of businesses or municipalities closures.

G. Report of any major closures of public gatherings/events.

H. Parish Government employee's workforce status by department, and where applicable, if that department personnel are essential and critical to local government operations.

I. Status of information on first responder's PPE inventory and distribution.

CRITICAL INFORMATION REQUIREMENTS Continued

J. Status of COOP plan implementation.

K. Parish President and executive staff status and COOP planning

L. Public information campaigns (media distribution sources) and news conferences

VII. CONCEPT OF OPERATIONS

A. General

Tangipahoa Parish Government will to the maximum extent possible, provide initial emergency management (response) before, during and after a Pandemic Outbreak. The Parish President has the authority to declare a “State of Emergency” and to terminate it. “State of Emergency” is the authority for exercising the pre-delegated emergency authority. The Parish can request needed assistance by executing mutual-aid agreements with the American Red Cross, other volunteer groups, the private sector, neighboring parishes and the Louisiana Governor’s Office of Homeland Security and Emergency Preparedness (GOHSEP). GOHSEP will coordinate requests for additional assistance beyond its capabilities, including a request to the Federal Emergency Management Agency (FEMA) for a Presidential Declaration of an emergency or major disaster to allow for supplemental federal financial and technical assistance. Understand that during a Pandemic Outbreak, typically other areas and regions may be affected as well, this could hinder and limit addition resources due to other commitments to those affected areas.

B. Emergency Action Levels

For the purpose of integrated emergency management, Tangipahoa Parish uses the same emergency-situation notification levels used by federal agencies in the National Incident Management system (NIMS).

C. Phases of Management

The Five phases of emergency management that will be used for a Pandemic event by Tangipahoa Parish are:

1. Prevention-
2. Mitigation -
3. Preparedness -

   Preparedness activities serve to develop the response capabilities needed during an event, designing public-information programs and providing warning systems.

4. Response

   Emergency services are provided during the response phase. These activities help reduce casualties, damage, and speed recovery. Response activities include warning, evacuation, rescue, and similar operations addressed in this plan.

5. Recovery

   Recovery includes both short-term and long–term activities. Short–term operations seek to restore critical services to the community and provide basic public needs. Long-term recovery focuses on restoring the community to normal or improved
   state of affairs. The recovery period is also an opportune time to institute mitigation measures, particularly those related to the recent emergency.

   The Parish President will issue an order terminating a State of Emergency when emergency conditions no longer exist.

VIII. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

A. General

Most departments/agencies of government have emergency functions in addition to normal, day-to-day duties. Emergency functions usually parallel or complement normal functions. Each

department/agency is responsible for developing and maintaining emergency management procedures within their departments/agencies, these procedures will compliment Tangipahoa Parish's overall emergency management response.

Tangipahoa Parish Pandemic Emergency planning group has identified departments and personnel of local government that have essential function that will be required to ensure parish government continues to operate and support it citizens before during and after a pandemic outbreak. Some departments may have overlapping duties and responsibilities to remedy Human Capital shortages to meet the need of the public.

B. Organization

1. Governor

   The Governor has the overall responsibility for emergency management in the state and is assisted in these duties by the Governor's Office of Homeland Security (GOHSEP) Director.

   Upon delegation of authority by the governor, the GOHSEP director acts on behalf of the governor in coordinating and executing state activities to cope effectively with the emergency.

2. Tangipahoa Parish Emergency Management structure:

   a. Parish President
   b. Parish Chief Administrative Officer
   c. Director of the Office of Homeland Security and Emergency Management (OHSEM)
   d. Deputy Director Office of Homeland Security and Emergency Management
   e. Sheriff
   f. Chief Deputy
   g. Municipalities Mayor'
   h. Police Department Chiefs
   i. Fire District #2 Administrator
   j. Fire Department Chiefs

C. Assignment of Responsibilities

Following are the assignments of primary emergency functions to departments in Tangipahoa Parish as well as to any other concerned organizations necessary to carry out this emergency response to a Pandemic Outbreak.

1. Parish President / Chief Administration Officer Shall be responsible for:

   a. initiating the execution of this Pandemic Plan and the Continuity of Operations Plan.
   b. declaring and terminating a State of Emergency,
   c. retaining overall control of all emergency decision during a declared declaration,
   d. providing leadership throughout emergency crisis,
   e. providing guidance for continuity of operations for parish government.
   f. utilize administrative staff as needed.

2. Parish Office of Homeland Security and Emergency Management (OHSEM) Shall be responsible for the coordination of:

   a. EOC functioning,
   b. communications,
   c. emergency public information,
   d. warning system,
   e. Military and other outside assistance,
   f. emergency control and use of resources,

g. Tangipahoa Parish departments and agencies as well as organizations not directly under the control of the Parish President,
h. training and education,
i. rumor control,
k. damage assessment,
l. comprehensive emergency planning,
m. coordination with organizations that provide service during an emergency.
n. Serve as liaison to the Governor's Office of Homeland Security and the Federal Government.

3. Law enforcement agencies shall be responsible for:

   a. maintaining law and order,
   b. controlling traffic,
   c. protecting vital installations and critical facilities
   d. controlling and limiting access to the critical/key area,
   e. supplementing communications,
   f. Integrating national guard support to law enforcement

4. Parish Fire District #2 Administrator shall be responsible for:

   a. serving as Fire representative between parish government and fire districts.
   b. coordinate Fire Districts resource request.
   c. maintain constant information flow to all Tangipahoa Parish Fire Districts.

   Fire Districts Shall:

   a. provide fire protection and the combating of fires,
   b. perform decontamination of hazardous material to the level of their expertise
   c. assist with damage assessment, and reporting of pandemic cases
   d. enforce necessary fire codes. (Fire Districts not having such capabilities will continue to rely on the State Fire Marshall's Office for the enforcement of those code)

5. Parish Finance Department shall be responsible for:

   a. maintaining economic stabilization as required,
   b. maintaining list of suppliers, vendors and items of critical emergency need (through the Procurement Department)
   c. serve as emergency purchasing agent during any declared emergency
   d. review all emergency relate contracts,
   e. participate in recording and documenting absenteeism of parish employees.
   f. initiate and account for all parish resource requested to state and Federal Emergency Management Agency (FEMA) involving the emergency response to a Pandemic outbreak.
   g. submittal of vital information to employees through pay-roll literature.
   h. update daily status report of personnel absenteeism.

6. Parish Medical Director (Coroner)shall be responsible for:

   a. emergency medical care,
   b. emergency hospital treatment
   c. health advisories,
   d. supplying and using medical and health items
   e. inoculations for the prevention of disease and aid in the distribution vaccines.
   f. sanitation
   g. coordinating activities between local and state health providers

h. Developing and maintaining a Mass Fatality Plan (MFP)

7. Parish Facility Management shall:

   a. provide support and resources to all critical facilities during a Pandemic outbreak i.e.(Hand Sanitizer, Paper Towel, Signs for Rest Rooms reminding to wash hands,
   b. provide building technicians for EOC, Central Office and any other critical facility deemed necessary by parish administration.
   c. Develop and maintain a plan for building layout to encourage social distancing of parish workers.

8. Parish Public Information (PIO) shall,

   a. release all public information relating to all emergencies and Pandemic Outbreak.
   b. coordinate information flow with the state to ensure factual information is delivered to the local citizens.
   c. develop adequate educational materials for dissemination to the parish employees and the public,
   d. act as single point of contact for all media and new releases,
   e. ensure that capabilities of live broadcast is available from the EOC and remotely.

9. Parish Technology Department

   a. maintain backup of all data on the parish network
   b. backup of server and user data to Cloud for offsite storage
   c. copy financial data to backup server at EOC for possible accessibility though Virtual Private Networking remotely during the activation of Continuity of Operations Plan (COOP).
   d. copying of critical data to portable hard drives for easy access
   e. provide technical support to the EOC, Parish Administrative Complex and the Mobile Command Center if applicable.
   f. maintain sufficient data processing equipment to support parish government operating 5% of its employees remotely (VPN).
   g. ensure servers/ network/internet equipment is functioning.

10. Parish Health and Human Services Department shall:

    a. keep the healthcare community, Red Cross and other volunteer organizations informed via e-mail of the parish current emergency condition in cooperation with the parish Public Information Officer,
    b. work with all volunteer organizations to assure availability of welfare assistance and services to eligible victims of emergencies pertaining to a Pandemic outbreak.
    c. develop information to be distributed to all Tangipahoa Parish employees and citizens through public information office.
    d. Work in conjunction with Louisiana Department of Health regarding vaccination centers.

11. Parish Legal Council:

    a. assist all department by providing advise on legal issues,
    b. draft necessary forms and/or documents needed by various department on legal issues
    c. work closely with the Pubic Information Officers on the release information to the public.

12. All Other Parish Departments Not Listed

a. develop department emergency operations plan for a Pandemic outbreak.
b. report employee absentee on a daily basis
c. Identify department essential function needed to ensure parish government continues to function support the citizens of Tangipahoa Parish.
d. cross train critical essential employees with critical essential functions.
e. ensure adequate personal hygiene supplies are available in department workspace.

IX. DIRECTION AND CONTROL

A. Authority to Initiate Actions

1. The Tangipahoa Parish Pandemic Plan:

a. is the official operations source for Tangipahoa Parish governing a response related to administrative and operational tasks when responding to a Pandemic outbreak.
b. has legal standing by virtue of the letter of implementation signed by the Parish President,
c. has the concurrence of the Louisiana Governors Office of Homeland Security and Emergency Preparedness, and by that authority, the concurrence of all other branches of the State Government that operate under their direction and/or coordination under Public Law 93-288 and Louisiana Homeland Security Emergency Assistance and Disaster Act of 2006.
d. all parish departments, agencies and boards of local government are an integral part of this plan.

Specifically named departments with specific responses; other departments of parish government may constitute a large reserve of material and manpower resources; at the direction of the Parish President these departments may be requested to perform previously unassigned tasks or may be requested to supplement specifically assigned disaster response roles.

B. Command Responsibility for Specific Action

1. The Parish President, under the authority provided by the Louisiana Homeland Security Emergency Assistance and Disaster Act of 2006, and the various ordinances enacted by the Tangipahoa Parish Government has the responsibility for identifying and minimizing the effects of the dangers to the Parish. This authority shall include but not be limited to the declaration of an emergency condition within the political jurisdiction.

2. The Emergency Management Director acts as the chief advisor to the Parish President during any declared emergency affecting the people and property of Tangipahoa Parish. Various Parish agencies and departments under the direction of the Tangipahoa Parish President will conduct emergency operations.

3. State and Federal officials will coordinate their operations through the Parish President or his designated representative.

C. Emergency Operating Center (EOC)

Tangipahoa Parish Government assumes direction and control activities relative to emergency operations from the primary EOC located at 114 N. Laurel St. Amite, LA 70422.

Should relocation of direction and control be necessary because of the primary EOC becoming inoperative, the parish will establish an alternate EOC.

X. CONTINUITY OF GOVERNMENT

Effective emergency management operations depend upon two important factors to ensure continuity of government from the highest to the lowest level: (1) lines of succession for officials/agency heads/authorized personnel and (2) preservation of records.

A. Succession of Command

1. State Government Succession

Article IV, Section 5(A) of the Constitution of Louisiana rests in the governor, the chief executive power of the State. The governor holds office for four years and can immediately succeed himself/herself. Article IV, Section 5(J) further establishes the emergency management powers of the governor. Article IV, Section 14 of the Constitution provides for the line of succession to the governor as follows:

a. Governor
b. Lieutenant Governor
c. Secretary of State
d. Attorney General
e. Treasurer
f. Presiding Officer of the Senate
g. Presiding Officer of the House of Representatives.

2. Local Government Succession

a. The Emergency Interim Local Executive Succession Act references government succession on a local level.

b. The Tangipahoa Parish Home Rule Charter (3-7-B) provides for an orderly government succession should the Parish President become vacant for any cause. That line of succession is as follows:

1. Parish President
2. Parish Chief Administrative Officer

B. Relocation of Government

Tangipahoa Parish provides for the relocation of needed elements of government to the Emergency Operating Center in Amite, Louisiana, during times of emergency. If the primary EOC is determined inoperable, isolated and /or unusable the Parish OHSEM director shall issue relocation procedures to another location. It is to be understood that in a server case of a Pandemic Outbreak the health and well-being of the citizens and all responders to the pandemic will be taken into consideration for the relocation of government.

C. Preservation of Records

1. State Level

Each agency/department is responsible for maintaining and recording all legal documents affecting their organization and administration. It is the further responsibility of state officials to ensure that all records are secure and protected from elements of damage or destruction at all times.

2. Local Level

It is the responsibility of the elected officials to ensure legal documents of both a public and private nature recorded by the designated official (i.e., tax assessor, sheriff's office) be protected and preserved in accordance with applicable state and local laws. Examples include ordinances, resolutions, and minutes of meetings, land deeds, and tax records.

XI. ADMINISTRATION AND LOGISTICS

A. Agreements and Understandings

Should local government resources prove to be inadequate during emergency operations, the parish will seek assistance from other local jurisdictions, higher levels of government and other agencies in accordance with existing or emergency-negotiated mutual-aid agreements and understandings. Such assistance may take the form of equipment, supplies, personnel, or other available capabilities. Only duly authorized officials shall enter into agreements.

B. Emergency Purchasing

The Parish President has the authority to order any emergency purchases and/or authorize contracts for emergency services.

C. Record and Reports

1. Responsibility for submitting local government reports to the Louisiana Governor's Office of Homeland Security and Emergency Preparedness rests with the Tangipahoa Parish Emergency Management Director.

2. Parish and municipal officials shall provide any requested records relating to their agency to the Parish EOC.

3. Department Heads will record and report employee status daily.

4. Parish government and municipalities shall provide bookkeeping procedures, maintain records of expenditures and obligations in emergency operations.

5. The Parish Office of Homeland Security and Emergency Management will maintain all EOC operations records.

D. Environmental Policy

The State Department of Environmental Quality will assist local, state and federal agencies in the implementation of the National Environmental Policy Act.

XII. PLAN DEVELOPMENT, MAINTENANCE, AND EXECUTION

A. Tangipahoa Parish Office of Homeland Security and Emergency Management has the overall responsibility for emergency planning, coordination of resources, and direction of disaster operations.

B. Directors of supporting agencies have the responsibility for developing and maintaining internal plans, Standard Operating Procedures, Guidelines and Resource Data reporting to ensure prompt and effective disaster response to a Pandemic Outbreak.

C. If a plan is to be effective, its procedures must be known and understood by those who are responsible for its implementation. The Director will brief the Parish President, Parish Government Directors and other appropriate officials in emergency management and in the implementation of this plan.

D. The Tangipahoa Parish OHSEM Director will maintain and update this plan as required. Parish department directors, municipal officials and other entities as required by law should recommend periodic changes of personnel, available resources and operational planning. The Director will

conduct an annual review and revise as necessary. Revisions will be forwarded to those on distribution list.

E. This plan shall be effective upon approval of the Tangipahoa Parish President.

F. This Pandemic plan will be executed upon order of the Parish President, Director of OHSEM, or an authorized representative.

G. This plan applies to all Tangipahoa Parish boards, commissions, and departments assigned emergency responsibilities and to all elements of local government.

H. For training purposes and exercises, the Director may activate this plan as necessary to ensure a readiness posture. This plan should be activated at least once a year in the form of a simulated emergency, regardless of actual events, in order to provide practical controlled operations experience to those who have EOC responsibilities.

XIII. AUTHORITIES AND REFERENCES

A. Legal Authority

1. Federal

   a. Robert T. Stafford Act, Public law 93-288, as amended

2. State

   a. Louisiana Emergency assistance and Disaster Act of 2006 – Act 800
   b. Pelican Planning Guidance and Crosswalk for Parish Multi-Hazard Emergency Operations Plans.
   c. 2009 Louisiana Pandemic Influenza Annex Planning Guidance for Louisiana Parishes.
   d. Other State executive orders and acts pertaining to disasters.

3. Local

   a. Tangipahoa Parish Police Jury Resolution 85-596, dated February 28, 1985.
   b. The Parish Multi-Hazards Plan
   c. Any other acts, which may apply.

4. Volunteer, Quasi-Governmental

   a. Act 58-4-1905 American National Red Cross Statement of Understanding, 12/30/85
   b. Mennonite Disaster Services – Agreement with FDAA 1974
   c. Salvation Army Charter – May 12, 1974
   d. Public Law 93-288
   e. Statements of Understanding between the State of Louisiana and the agencies above.

B. References
Tangipahoa Parish Hazard Analysis

XIV. DEFINITIONS

The list of definitions appears in Appendix 4. Definitions relevant to the Parish Multi-Hazards Emergency Support Function Plan and Emergency Support Function 10 Hazardous Materials and Radiological Annex, Appendix 7. Neither list is intended to be all-inclusive.

APPENDICES

(1) Continuity of Operations Plan
(2) Organization Chart
(3) Homeland Security/Emergency Management Organization Chart
(4) Lines of Succession
(5) Delegation of Authority
(6) Essential Function
(7) Mission Essential Personnel
(8) Vital Facilities

I. PURPOSE

The following considerations have been identified as courses of action within the working draft of the State of Louisiana influenza Pandemic Operations Plan or Supplement 7 to the State Emergency Operations Plan. Planning for and responding to a pandemic event is a complex situation. These considerations have been identified as key issues following the May 2009 H1N1 event. The development of parish-based strategies and tactics requires the establishment of a multi-disciplinary planning team. Recommended parish stakeholders have been identified as part of each consideration.

Key Parish Stakeholders

Parish President	Charles Robert “Robby” Miller Jr.
Parish OHSEM Director	Dawson Primes LEM
Chief Administrative Officer	Shelby Joe Thomas
Parish School Superintendent	Melissa Stilley
Private Schools Representative	
Parish Health and Human Services	Dr. Gina Legarde
Regional Office of Public Health	Thomas Jordan
Parish Sheriff	Daniel Edwards
Municipal Law Enforcement Officials	
Kentwood	Michael Kazerooni
Village of Tangipahoa	Darryl Martin
Roseland	Henry Wright
Amite City	Jerry Trabona
Independence	Frank Edwards III
Village of Tickfaw	Frank Dibenidetto
Hammond	Edwin Bergeron
Ponchatoula	Bry Layrisson
Local Diocesan School Officials	
Parish Head Start	
Daycare/Childcare Representative	
Parish Economic Development	Ginger Cangelosi

Local Emergency Medical Services	Dwain Meche
Parish Council Chair	Carlo Bruno
Local Recreation Officials	
Parish Legal Counsel	Chris Moody
Parish District Attorney	Scott Perriloux
Parish Coroner	Dr. Rick Foster
Parish Council on Aging	Debi Fleming
Chamber of Commerce	Melissa Bordelon

H. Mass Fatality Planning
(See Appendix C)

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SECTION 3 CAPABILITY ASSESSMENT

This section summarizes the results of Tangipahoa Parish, its jurisdictions and other agency efforts to develop policies, programs, and activities that directly or indirectly support hazard mitigation. It also provides information on resources and gaps in the Parish and participating jurisdictions' infrastructures, as well as relevant changes in its law since the last Plan Update, in order to suggest a mitigation strategy.

Through this assessment, Tangipahoa Parish and the participating jurisdictions are able to identify strengths that could be used to reduce losses and reduce risk throughout the community. It also identifies areas where mitigation actions might be used to supplement current capabilities and create a more resilient community before, during and after a hazard event.

Policies, Plans and Programs

Tangipahoa Parish capabilities are unique to the Parish, including planning, regulatory, administrative, technical, financial, and education and outreach resources. There are a number of mitigation-specific acts, plans, executive orders, and policies that lay out specific goals, objective, and policy statements which already support or could support pre- and post-disaster hazard mitigation. Many of the ongoing plans and policies hold significant promise for hazard mitigation and take an integrated and strategic look holistically at hazard mitigation in Tangipahoa Parish to continually propose ways to improve it. These tools are valuable instruments in pre- and post-disaster mitigation, as they facilitate the implementation of mitigation activities through the current legal and regulatory framework. Examples of existing documents in Tangipahoa Parish and its jurisdictions include the following:

Table 3-1: Planning and Regulatory									
	Tangipahoa Parish	Hammond	Ponchatoula	Amite	Kentwood	Roseland	Independence	Tickfaw	Village of Tangipahoa
Plans	**Yes / No**								
Comprehensive / Master Plan	Y	Y	Y	Y	N	N	N	N	N
Capital Improvements Plan	Y	Y	Y	Y	Y	N	N	N	N
Economic Development Plan	Y	Y	N	N	N	N	N	N	N
Local Emergency Operations Plan	Y	Y	N	Y	N	N	N	N	N
Continuity of Operations Plan	Y	Y	N	N	N	N	N	N	N
Transportation Plan	Y	Y	N	N	N	N	N	N	N
Stormwater Management Plan	Y	Y	Y	N	N	N	N	N	N
Community Wildfire Protection Plan	N	N	N	N	N	N	N	N	N
Cyber Security	Y	Y	N	N	N	N	N	N	N
Long Range Resilience Plan	Y	N	N	N	N	N	N	N	N
Other plans (redevelopment, recovery, coastal zone management)	Y	N	N	N	N	N	N	N	N
Building Code, Permitting and Inspection	**Yes / No**								
Building Code, Permitting and Inspection	Y	Y	Y	Y	Y	Y	Y	Y	Y
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	N	N	N	N	N	N	N	N
Fire Department ISO/PIAL rating	Y	2	N	N	4	7	5	6	6
Site plan review requirements	Y	Y	Y	Y	Y	N	N	Y	N
Land Use Planning and Ordinances	**Yes / No**								
Zoning Ordinance	Y	Y	Y	Y	Y	N	Y	Y	N
Subdivision Ordinance	Y	Y	Y	Y	Y	N	N	Y	N
Floodplain Ordinance	Y	Y	Y	Y	Y	Y	Y	Y	Y
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	Y	Y	Y	N	N	N	N	N	N
Flood Insurance Rate Maps	Y	Y	Y	Y	Y	Y	Y	Y	Y
Acquisition of land for open space and public recreation uses	Y	Y	Y	Y	Y	N	N	N	N

Building Codes, Permitting, Land Use Planning and Ordinances

As of the 2015 Update, Tangipahoa Parish and its jurisdictions ensures that all building codes adopted are enforced and in compliance, relating to the construction of any within the boundaries of the Parish. The Parish Planning Department, created in 2008, directly addresses land use and subdivision regulations, to verify compliance with subdivision regulations and the Comprehensive Land Use Plan. The Tangipahoa Parish Government Planning Department and Permit Office outline the administration and enforcement of any construction that occurs, or will occur, within the Parish. Permitting and inspections capabilities are in place within the Parish and its incorporated jurisdictions. Permit offices are located at two locations within the Parish, in the jurisdictions of Hammond and Roseland. Some examples of leveraging these capabilities within the Parish are seen above in Table 3-1.

While local capabilities for mitigation can vary from community to community, Tangipahoa Parish as a whole has a system in place to coordinate and share these capabilities through the OHSEP and through this Parish Hazard Mitigation Plan.

Some programs and policies, such as the above-described, might use complementary tools to achieve a common end, but fail to coordinate with or support each other. Thus, coordination among local mitigation policies and programs is essential to hazard mitigation.

Administration, Technical and Financial

As a community, Tangipahoa Parish has administrative and technical capabilities in place that may be utilized in reducing hazard impacts or implementing hazard mitigation activities. Such capabilities include staff, skillset, and tools available in the community that may be accessed to implement mitigation activities and to effectively coordinate resources. The ability to access and coordinate these resources is also important. The following are examples of resources in place in Tangipahoa Parish and its jurisdictions:

Table 3-2: Administration and Technical									
	Tangipahoa Parish	Hammond	Ponchatoula	Amite	Kentwood	Roseland	Independence	Tickfaw	Village of Tangipahoa
Administration	**Yes / No**								
Planning Commission	Y	Y	Y	Y	Y	N	Y	Y	N
Mitigation Planning Committee	Y	N	Y	N	N	N	N	N	N
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	Y	Y	Y	Y	Y	N	N	N	N
Staff	**Yes / No; FT/PT: % Hazard Mitigation**								
Chief Building Official	Y/FT/25%	Y	Y	y	Y	N	N	N	N
Floodplain Administrator	Y/FT/25%	Y	Y	Y	Y	Y	Y	Y	Y
Emergency Manager	Y/FT/25%	Y	Y	N	Y	N	N	N	N
Community Planner	Y/FT/25%	Y	Y	Y	N	N	N	N	N
Civil Engineer (Staff)	Y/FT/25%	N	N	N	N	N	N	N	N
GIS Coordinator	Y/FT/25%	Y	N	N	N	N	N	N	N
Grant Writer	Y/FT/25%	Y	Y	N	N	N	N	N	N
Other	N	N	N	N	N	N	N	N	N
Technical	**Yes / No**								
Warning Systems / Service (Reverse 911, outdoor warning signals)	Y	N	Y	N	Y	N	N	Y	N
Hazard Data & Information	Y	N	N	N	N	N	N	N	N
Grant Writing	Y	Y	Y	N	N	N	N	Y	N
Hazus Analysis	Y	N	N	N	N	N	N	N	N
Other	N	N	N	N	N	N	N	N	N

Financial capabilities are the resources that Tangipahoa Parish and its incorporated jurisdictions have access to or are eligible to use, in order to fund mitigation actions. Costs associated with implementing the actions identified by the jurisdictions may vary from little to no cost actions, such as outreach efforts or substantial action costs, such as acquisition of flood-prone properties.

The following resources are available to fund mitigation actions in Tangipahoa Parish and its jurisdictions:

Table 3-3: Financial									
	Tangipahoa Parish	Hammond	Ponchatoula	Amite	Kentwood	Roseland	Independence	Tickfaw	Village of Tangipahoa
Funding Resource	**Yes / No**								
Capital Improvements project funding	Y	Y	Y	Y	Y	Y	Y	Y	Y
Authority to levy taxes for specific purposes	Y	Y	N	Y	Y	Y	Y	Y	Y
Fees for water, sewer, gas, or electric services	Y	Y	Y	Y	Y	Y	Y	Y	Y
Impact fees for new development	N	Y	Y	N	N	N	N	N	N
Stormwater Utility Fee	N	N	N	N	N	N	N	N	N
Community Development Block Grant (CDBG)	Y	Y	Y	Y	Y	Y	Y	Y	Y
HMGP & FMA (FEMA)	Y	Y	Y	Y	Y	Y	Y	Y	Y
State funds	Y	Y	Y	Y	Y	Y	Y	Y	Y

Education and Outreach

A key element in hazard mitigation is promoting a safer more disaster resilient community through Education and Outreach activities and/or programs. Successful outreach programs provide data and information that improves overall quality and accuracy of important information for citizens to feel better prepared and educated with mitigation activities. These programs enable the individual jurisdictions and Parish as a whole to maximize opportunities for implementation of activities through greater acceptance and consensus of the community.

Tangipahoa Parish and its jurisdictions have existing education and outreach programs to implement mitigation activities, as well as communicate risk and hazard-related information to its communities. Specifically focusing on advising repetitive loss property owners of ways they can reduce their exposure to damage by repetitive flooding remains a priority for the entire Parish. The existing programs are as follows:

Table 3-4: Education and Outreach									
	Tangipahoa Parish	Hammond	Ponchatoula	Amite	Kentwood	Roseland	Independence	Tickfaw	Village of Tangipahoa
Program / Organization	**Yes / No**								
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Y	Y	N	N	N	N	N	N	N
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environment education)	Y	Y	Y	Y	Y	Y	Y	Y	Y

Natural Disaster or safety related school program	N	N	N	N	N	N	N	N	N
Storm Ready certification	Y	N	N	N	N	N	N	N	N
Firewise Communities certification	N	Y	N	N	N	N	N	N	N
Public/Private partnership initiatives addressing disaster-related issues	N	N	N	N	N	N	N	N	N
PDM (FEMA)	Y	Y	Y	Y	Y	Y	Y	Y	Y

In some cases, the jurisdictions rely on Tangipahoa Parish OHSEP and/or Tangipahoa Parish Government Agencies for the above-listed planning and regulatory, administrative and technical, financial, and education and outreach capabilities. Comments regarding the jurisdictions utilization or intentions to utilize and leverage the capabilities of the Parish government can be found in Appendix E in the jurisdictional specific worksheets.

As reflected with the above existing regulatory mechanisms, programs and resources within each jurisdiction, Tangipahoa Parish and the jurisdictions remain committed to expanding and improving on the existing capabilities within the Parish. Each participating jurisdiction will work toward increased participation in funding opportunities and available mitigation programs. Should funding become available, the hiring of additional personnel to dedicate to Hazard Mitigation initiatives and programs, as well as increasing ordinances within the jurisdictions will all enhance and expand risk reduction measures within the Parish.

With the sharing of these capabilities, the following municipalities and entities are recognized by the Parish of Tangipahoa under the Hazard Mitigation Plan, allowing them to apply for available hazard mitigation funding for as long as these municipalities and entities notify the Parish of their intentions and the Parish concurs:

- Tangipahoa Parish
- City of Hammond
- City of Ponchatoula
- City of Amite
- Town of Kentwood
- Town of Independence
- Town of Roseland
- Village of Tangipahoa
- Village of Tickfaw

Flood Insurance and Community Rating System

Tangipahoa Parish is a participant in the Community Rating System (CRS). Maintaining and improving the CRS rating for the Parish is recognized as a high priority by the Hazard Mitigation Steering Committee. Participation in the CRS strengthens local capabilities by lowering flood insurance premiums for jurisdictions that exceed NFIP minimum requirements.

The Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) administers the Community Rating System (CRS). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. This program

can have a major influence on the design and implementation of flood mitigation activities, so a brief summary is provided here.

A community receives a CRS classification, based upon the credit points it receives for its activities. It can undertake any mix of activities that reduce flood losses through better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs.

There are 10 CRS classifications: Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction (See Table). A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a Class 10 community.

CLASS	DISCOUNT	CLASS	DISCOUNT
1	45%	6	20%
2	40%	7	15%
3	35%	8	10%
4	30%	9	5%
5	25%	10	---

Tangipahoa Parish entered CRS in October 1996 and has current class rating of 9. As of the 2019 update, Jefferson Parish all lead the State with the best classifications, Class 5.

As of 2019, 317 communities in the State of Louisiana participate in the Federal Emergency Management Agency's National Flood Insurance Program (NFIP) Of these communities, 41 (or 13%) participate in the Community Rating System (CRS). Of the top 50 Louisiana communities, in terms of total flood insurance policies held by residents, 27 participate in the CRS. The remaining 23 communities present an outreach opportunity for encouraging participation in the CRS.

The CRS provides an incentive, not just to start new mitigation programs, but to keep them going. There are 2 requirements that "encourage" a community to implement flood mitigation activities.

First, the Parish will receive CRS credit for this Plan when it is adopted. To retain that credit, though, the Parish must submit an evaluation report on progress toward implementing this Plan to FEMA by October 1 each year. That report must be made available to the media and the public.

Second, the Parish must annually re-certify to FEMA that it is continuing to implement its CRS credited activities. Failure to maintain the same level of involvement in flood protection can result in a loss of CRS credit points and a resulting increase in flood insurance rates to residents.

The changes to the 2017 CRS Coordinator's Manual are the result of a multi-year program evaluation that included input from a broad group of contributors to evaluate the CRS and refine the program to meets its state goals.

The upcoming changes will drive new achievements in the following 6 core flood loss reduction areas important to the NFIP: (1) reduce liabilities to the NFIP fund; (2) improve disaster resiliency and sustainability of communities; (3) integrate a whole community approach, addressing emergency management; (4) promote natural and beneficial functions of floodplains; (5) increase understanding of risk, and; (6) strengthen adoption and enforcement of disaster-resistant building codes.

The 2017 CRS Coordinator's Manual changes impacts each CRS community differently. Some communities will see an increase in the points they receive, since points for certain activities have increased (i.e., Activity 410 Floodplain Mapping and 420 Open Space Preservation). The increases in maximum credit for a CRS activity are due to the credit for special flood-related hazards being added to the Coordinator's Manual. ~~Other communities will receive fewer points for certain activities (e.g., Activity 320 Map Information Service)~~. It is likely that some communities with marginal CRS Class 9 programs will have to identify new CRS credits, in order to remain in the CRS.

Typically, CRS communities do not request credit for all activities that they are currently implementing, unless it would earn enough credit to advance the community to a higher CRS class. A community that finds itself losing CRS credit with the 2013 Manual could likely identify activities deserving credit that they had not previously received.

Due to the changes in both activities and CRS points, community CRS coordinators should speak with their ISO/CRS Specialist, in order to understand how the 2018 Manual will impact their community and when.

INSERT HERE: Map/Diagram entitled: Louisiana NFIP Community Rating System Participation Based on Flood Insurance Policy Count (see page 3-7)

In addition to the direct financial reward for participating in the Community Rating System, there are many other reasons to participate in the CRS. As FEMA staff often say, "if you are only interested in saving premium dollars, you are in the CRS for the wrong reason." The other benefits that are more difficult to measure dollars include:

1. The activities credited by the CRS provide direct benefits to residents, including:
    - Enhanced public safety
    - A reduction in damage to property and public infrastructure
    - Avoidance of economic disruption and losses
    - Reduction of human suffering
    - Protection of the environment
2. A community's flood programs will be better organized and more formal. Ad hoc activities, such as responding to drainage complaints rather than an inspection program, will be conducted on a sounder, more equitable basis.
3. A community can evaluate the effectiveness of its flood program against a nationally-recognized benchmark.
4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.
5. The public information activities will build a knowledgeable constituency interested in supporting and improving flood protection measures.
6. A community would have an added incentive to maintain its flood programs over the years. The fact that its CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new developments would be taken into account by the governing board, when considering such actions.
7. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

**More information on the Community Rating System (CRS) can be found at https://www.fema.gov/national-flood-insurance-program-community-rating-system

NFIP Worksheets

Parish and participating jurisdiction NFIP worksheets can be found in Appendix E: State Required Worksheets

SECTION 4 MITIGATION STRATEGY

The Tangipahoa Parish Hazard Mitigation Strategy validates the Parish and jurisdictions commitment to reduce risks from hazards and serves as a guide for Parish and local decision makers, as they commit resources to reducing the effects of the hazards identified during the risk assessment phase of this project.

An online public opinion survey was conducted of Tangipahoa Parish residents between August and December 2014. The 25-question survey was completed by Parish residents over the age of 18.

The survey was designed to capture public perceptions and opinions, regarding natural hazards in Tangipahoa Parish and its jurisdictions. In addition, the survey collected information regarding the methods and techniques preferred by the respondents for reducing the risks and losses associated with local hazards.

When asked to gauge from a list which categories were more susceptible to impacts caused by natural hazards, the top three categories selected were:

1. Human (loss of life and/or injuries)
2. Economic (business closures and/or job losses)
3. Infrastructure (damage or loss of bridges, utilities, schools, etc.)

[See page 4-1 for table diagraming #1 - #3 above]

The survey results also indicated which natural disasters citizens were most concerned with being affected by in Tangipahoa Parish and its jurisdictions. The top 3 natural disasters selected were:

1. Tropical Storm or Hurricane
2. Severe Thunderstorm
3. Tornado

See page 4-2 for table/diagram showing natural disasters

Tangipahoa Parish and the participating jurisdictions revised the goals and actions over the period of the hazard mitigation plan update process. The mitigation actions in this 2015 HMP update are a product of analysis and review of the Tangipahoa Parish Hazard Mitigation Plan Steering Committee and jurisdictions under the coordination of the Tangipahoa Parish Office of Homeland Security and Emergency Preparedness. The Committee was presented a list of projects and actions, new and from the 2009 Plan, for review from September 2014 – December 2014.

During the meeting, the Committee and participating jurisdictions provided a status of the projects from 2009 and the proposed projects for the 2015 update.

Committee members and jurisdictions then submitted jurisdiction specific projects based on feasibility for funding, ease of completion and other community specific factors. The actions were later prioritized for the Parish and jurisdiction-specific projects.

This activity confirms that the goals and action items developed by the Tangipahoa Hazard Mitigation Plan Steering Committee and jurisdictions are representative of the outlook of the community at large. Full survey results can be found here:

www.surveymonkey.com/r/tangipahoaparish

SEE ATTACHED PAGE 4-3 from ORIGINAL document / Need to continue typing from ORIGINAL DOCUMENT PAGE 4-3

The goals are to represent the guidelines the Parish and its jurisdiction want to achieve with this Plan update to help implement the strategy and adhere to the mission of the Hazard Mitigation Plan, the Section 2 OF THE Plan Update was focused on identifying and quantifying the risks faced by the residents and property owners in Tangipahoa Parish and its jurisdictions from natural hazards. By articulating goals and objectives based on the risk assessment results, and intending to address those results, this section sets the stage for identifying, evaluating, and prioritizing feasible, cost effective, and environmentally sound actions to be promoted at the Parish and jurisdictions. By doing so, Tangipahoa Parish

2020 Mitigation Actions and Update on Previous Plan Actions

The Tangipahoa Parish Hazard Mitigation Plan Steering Committee and participating jurisdictions identified mitigation actions that would reduce and/or prevent future damage. In that effort, the group focused collectively on a comprehensive range of specific mitigation actions and projects. These actions and projects were identified in thorough fashion by the Steering Committee and the individual jurisdictions by way of frequent and open communications and meetings held throughout the planning process, taking into consideration the changing priorities of the Parish.

Tangipahoa Parish and the participating jurisdictions continue their efforts to better understand the exposure risk to flooding, specifically due to recent flooding events that had a measurable impact on people and property within the Parish. These events have helped the Parish and its communities identify additional exposure risk to flooding include ongoing work to develop flood risk maps of the entire Parish. These maps will be continuously updated with current information and made available to local officials, residents and other jurisdictions to refine the planning process and mitigate potential damage. Along with these internal efforts, Tangipahoa Parish and the participating parishes identified mitigation actions and projects.

As outlined in the Local Mitigation Planning Handbook, the following are eligible types of Mitigation Actions:

- Local Plans & Regulations – These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.
- Structure and Infrastructure Projects – These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area, and also includes projects to construct manmade structures to reduce the impact of hazards.
- Natural System Protection – These actions minimize the damage and losses and also preserve or restore the functions of natural systems.
- Education and Awareness Programs – These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

Action items relative to each goal mentioned above were filtered to only include those of the highest local priority. The status of mitigation actions from the original hazard mitigation plan are also included in this update. The established and agreed upon mitigation actions relative to the established goals are as follows:

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Public Building Wind Hardening	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds and helps assure that the public buildings can be used, occupied and operable during or after storms.	HMGP and Parish or City funding (75% - 25% grants)	December 2025	Tangipahoa Parish	Severe Thunderstorm, Tropical Hurricane, Tornado	Not Funded
2. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Initially identified projects include Chappapeela Road in 2 locations, Village of Tangipahoa Drainage, Forrest Lane Drainage (off N. Thibodaux), River Road Drainage, Will Richardson Drainage, Simms Creek / Havens Drainage, Skinner Drive Drainage, Fox Hollow Drainage, David Drive Drainage, a north end retention pond, and several other stormwater relief projects. and other potential sites. Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and	HMGP and Parish or City funding (75% - 25% grants)	January 2020 through December 2025	Tangipahoa Parish	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornado	In progress, several projects in process

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	blocking roadways during storm periods.					
3. Residential elevations and acquisitions for repetitive loss properties	Elevation or acquisition-demolition of approximately 100 properties in Tangipahoa Parish. Benefits: Relieves property owners of the continual flooding problems. Saves flood relief and damage repayment for each property.	HMGP and Parish or Property Owner funding (75% - 25% grants or 90%-10%)	January 2020 through December 2025	Tangipahoa Parish	Flooding and Wind	35 In progress; 30 – 40 units completed
4. Public sewerage infrastructure retrofits	The sewerage retrofit projects include the systems owned and operated by the City of Ponchatoula, the Town of Amite, and the Velma area. Benefits: The project proposed will relieve the communities and property owners with sewage back-up into their buildings, strengthen existing treatment site levees, and provide pump station retrofits to keep the systems operating during high water flow.	HMGP and Parish or City funding (75% - 25% grants)	January 2015 through December 2024	Tangipahoa Parish	Flooding, Severe Thunderstorm, Tropical Hurricane	Ongoing
5. Radios for Interoperable Communications	700mhz radios to allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and Parish	2020-2021	Tangipahoa Parish	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornadoes, Wildfire	New?
6. Safe Room Projects/ Parish and Towns	Construction of a Safe Room for first responders located in Hammond. Other locations will be identified based on funding availability.	HMGP and Parish	2020-2024	Tangipahoa Parish	Hurricane	In design stage

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
7. Mitigation Public Outreach	Enhance the public outreach programs for the Parish and all communities by increasing awareness of risks and safety for flooding, tropical hurricane, severe thunderstorms, tornadoes and wildfire hazards, as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the Parish and its communities.	HMGP and Parish	January 2016 through December 2018	Tangipahoa Parish	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornadoes, Wildfire	New
8.	**Improve drainage ways, along the Natalbany River and the Tangipahoa River,** by enlarging any inferior culverts along the major drainage laterals. Benefits: to ensure water flows freely within the drainage system, which will protect the surrounding area from flooding.	N/A	Ongoing	Tangipahoa Parish	Flooding	Tangipahoa Parish continuing its search for grant funds for drainage improvements and continues maintenance of existing systems. The completion of this initiative will be dependent upon available funding and resources.
9.	**Improve drainage ways along Ponchatoula Creek,** by enlarging any inferior culverts along the major drainage laterals. Benefits: To ensure water flows freely within the drainage system, which will protect the surrounding areas from flooding.	N/A/	Ongoing	Tangipahoa Parish	Flooding	Tangipahoa Parish is continuing its search for grant funds for drainage improvements and continues maintenance of existing systems. The completion of this initiative will be dependent upon available funding and resources.
10.	**Develop a master drainage plan** which will evaluate drainage projects at major drainage	N/A/	Ongoing	Tangipahoa Parish	Flooding	Tangipahoa Parish has applied or drainage-related grants and continues to

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	laterals to determine best methods of increasing drainage capacity. **Implement recommended projects resulting from drainage plan.** Benefits: Reduces the number of flooded structures by increasing the volume of water the pumps can handle at final outfall.					support the Consolidate Drainage District to maintain and increase drainage capacity along the major drainage laterals.
11.	**Expand the drainage districts** to cover the entire Parish. Currently, the Parish has 3 drainage districts in the southern part of the Parish, but only has 1 staff. Benefits: By improving drainage in flood-prone areas, homeowners will suffer less flooded structures and therefore, suffer less mental and physical anguish, displacement, and flood damage. In addition the drain on the NFIP is reduced by a decrease in flood claims.	N/A/	Ongoing	Tangipahoa Parish	Flooding	In progress Tangipahoa Parish continues its efforts to expand the Drainage District throughout the Parish.
13.	Install securely attached and elevated, backup power supply/generator at various location throughout the Parish. Benefits: Provide a source of power during power outages to continue essential operations.	HMGP	2020-2021	Tangipahoa Parish and FEMA	High Winds/Thunderstorms Flooding	Ongoing
14.	Install quick connection fittings on all water connections in the boiler room at Hood Memorial	N/A	Complete	Tangipahoa Parish Water District, and Hood Memorial	High Winds/Thunderstorms	Complete

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	Hospital. Benefits: Provide a source of power during power outages to continue essential operation.					
15.	Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential. Benefits: by improving drainage in the flood prone areas, homeowners will suffer less flooded structures and therefore, suffer less mental and physical anguish, displacement days, and flood damage. In addition, the drain on the NFIP is reduced by a decrease in flood claims.	N/A	Ongoing	Tangipahoa Parish	Flooding	New
16.	Review the existing floodplain ordinance and evaluate ways to improve the Parish's "Community Rating System (CRS)" rating to reduce the flood insurance premium. Choose from the variety of methods and projects available that can be implemented to improve CRS rating. Benefits: Reduce flood insurance premiums and thereby encourage more people to purchase flood insurance which would potentially result in lower cost and more timely recovery.	N/A	Ongoing	Tangipahoa Parish	Flooding	Tangipahoa Parish adopted a new flood damage prevention ordinance in 2010. The Parish permit office continues to implement existing activities, as well as new activities toward a lower CRS rating.

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
17.	Adopt additional **commercial building regulations** which include stricter building standards and incorporate dry floodproofing techniques. Benefits: Results in additional techniques to harden structures and thereby withstand the impacts of hazards.	N/A	2023	Tangipahoa Parish	High Winds, Tornadoes, Hurricanes	For 2024
18.	Develop additional **subdivision guidelines** that would help reduce flooding, such as requiring proper drainage with adequate sloping; stormwater retention ponds; dikes; levees and floodwalls, if appropriate, and requiring freeboard above the Base Flood Elevation (BFE) in flood-prone areas. Encourage new subdivision developments to install underground utilities, which would help reduce the chances of power outages. Benefits: reduce the localized flooding problems that would occur with new development. Reduce potential power outages.	N/A	Ongoing	Tangipahoa Parish	Flooding	In – progress The Tangipahoa Parish Planning Office continues to review and suggest modifications to the subdivision guidelines to help reduce flooding. Tangipahoa Parish's stormwater plan has been approved through LDEQ and full implementation in phases is expected from 2020-2023.
19.	Incorporate the draft Comprehensive Plan, flood maps and building codes into long-term planning. Continually update the development of floodplain maps. Benefits: Results in a comprehensive	N/A	Ongoing	Tangipahoa Parish	Flooding	These items have been combined and Tangipahoa Parish is continuing to implement it's Parish-wide disaster preparation plan.

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	effort to develop a Parish-wide approach to disaster damage reduction and preparation.					
20.	Re-evaluate codes for water line sizing and proper placement of flushing devices. Adopt building regulations to acquire adequately sized water distribution lines and fire hydrants in areas to improve water supply for combating fires. Expand the water district. Benefits: Reduce the risk of wildfire damage to structures and property.	N/A	Ongoing	Tangipahoa Parish and Louisiana Forestry Service	Flooding/Wildfire	Ongoing
21.	Purchase equipment to monitor, including weather stations and stream gages.	HMGP, FMA, State and local funds	Dec. 2021	Tangipahoa Parish	Flooding	Awaiting Funding
22.	Use abandoned mines for stormwater detention.	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish	Flooding	Awaiting Funding
23.	Undeveloped low land stormwater detention.	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish	Flooding	Awaiting Funding
24.	Update Tangipahoa Parish land development code to steer future development in a sustainable direction.	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish	Flooding	Awaiting Funding
25.	Green Infrastructure policy and education to prevent continuation of unsustainable development.	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish	Flooding	Awaiting Funding
26.	H & H Modeling	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
27.	Simms Creek Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
28.	Forrest Lane Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
29.	Fox Hallow Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
30.	Will Richardson / Watters-Beach Road Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
31.	River Road Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
32.	David Drive Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
33.	Skinner Drive Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
34.	Retention Ponds Construction	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
35.	Beaver Creek Drainage	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding
36.	Hazard Mitigation Plan Update	HMGP, FMA, State and local funds	May 2020	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding, Hurricanes, Tornadoes, Wildfires, Subsidence, etc.	Complete
37.	Tangipahoa River watershed modeling	HMGP, FMA, State and local funds	June 2024	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Awaiting Funding

Mitigation Actions for: Unincorporated Tangipahoa Parish						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
38.	Dredging, Channeling, and de-snagging of Tangipahoa River, Natalbany River, Tickfaw River, Ponchatoula Creek, Yellow Water Creek, Big Creek, Beaver Creek, Sweetwater Creek, and other Parish drainage ways.	HMGP, FMA, State and local funds	June 2030	Tangipahoa Parish Govt and State GOHSEP/FEMA	Flooding	Not Funded
39.	Regional Detention Reservoir	CDBG Watershed	June 2024	Louisiana Watershed Initiative	Flooding	
40.	Chappapeela Creek Retention Pond	CDBG Watershed	June 2024	Louisiana Watershed Initiative	Flooding	
41.	Village of Tangipahoa Drainage	CDBG Watershed		Louisiana Watershed Initiative	Flooding	
42.	Fox Hollow – Briarwood Drainage	CDBG Watershed		Louisiana Watershed Initiative	Flooding	
43.	Watershed Monitoring Equipment	CDBG Watershed		Louisiana Watershed Initiative	Flooding	
44.	Big Creek / Sweetwater Retention Pond	CDBG Watershed		Louisiana Watershed Initiative	Flooding	
45.	Chappapeela Road Elevation	CDBG Watershed		Louisiana Watershed Initiative	Flooding	
46.	Stormwater Retention in Mines	CDBG Watershed		Louisiana Watershed Initiative	Flooding	
47.	Road Elevation for Stormwater Mitigation	CDBG Watershed		Louisiana Watershed Initiative	Flooding	

Mitigation Actions for: Town of Amite						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Public Building Wind Hardening	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds and helps assure that the public buildings can be used, occupied and operable during or after storms.	HMGP and Parish or City funding (75% - 25% grants)	January 2020 through December 2025	Town of Amite	Severe Thunderstorm, Tropical Hurricane, Tornado	
2. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Initially identified Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking roadways during storm periods.	HMGP and Parish or City funding (75% - 25% grants)	January 2020 through December 2025	Town of Amite	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornado	
3. Public sewerage infrastructure retrofits	The sewerage retrofit projects include the systems by the Town of Amite. Benefits: The project proposed will relieve the communities and property owners with sewage back-up into their buildings, strengthen existing treatment site levees, and provide pump station retrofits to keep the systems operating during high water flow.	HMGP and Parish or City funding (75% - 25% grants) or LCDBG	January 2020 through December 2024	Town of Amite	Flooding, Severe Thunderstorm, Tropical Hurricane	Ongoing

Mitigation Actions for: Town of Amite						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
4. Mitigation Public Outreach	Enhance public outreach for the Parish and all communities by increasing awareness of risks and safety for flooding, tropical hurricane, severe thunderstorms, tornadoes and wildfire hazards, as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the Parish and its communities.	HMGP and Parish	January 2020 through December 2024	Town of Amite	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornadoes, Wildfire	Ongoing
5.	**Improve drainage and sub-drainways.** Benefits: to ensure water flows freely within the drainage system, which will protect the surrounding area from flooding.	N/A	Ongoing	Town of Amite	Flooding	
6.	Expand the drainage districts to cover the entire Parish. Currently, the Parish has 3 drainage districts in the southern part of the Parish, but only has 1 staff. Benefits: By improving drainage in flood-prone areas. In addition, the drain on the NFIP is reduced by a decrease in flood claims.	N/A	Ongoing	Tangipahoa Parish and Drainage District	Flooding	
9.	Install quick connection fittings on all water connections in the boiler room at Hood Memorial Hospital. Benefits: Provide a source of power during power outages to continue essential operation	N/A	April 2021	Town of Amite	High Winds / Thunderstorms Hurricane	Ongoing

Mitigation Actions for: City of Hammond						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	HMGP and Parish funding (75% - 25% matching grants)		Tangipahoa Parish / City of Hammond	Flooding, Severe Thunderstorm, Tropical Hurricane	
2. Public sewerage infrastructure retrofits	Project includes the **sewerage systems owned and operated by City of** Hammond. Benefits: will relieve the City and property owners with sewerage backup into their buildings, strengthen existing treatment site levees, and provide pump station retrofits to keep the system operating during high water flow.	HMGP and City or HUD funding (75% - 25% matching grants)	April 2022	City of Hammond	Flooding, severe Thunderstorm, Tropical Hurricane	
3. Radios for Interoperable Communications	**700mhz radios to** allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and City		City of Hammond	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	

Mitigation Actions for: City of Hammond						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
4. Safe Room Projects	Construction of a safe room for first responders located in Hammond.	HMGP and Parish	June 2024	Tangipahoa Parish and GOHSEP/FEMA	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	
5. Hardening of Critical Facilities	Hardening of Michael J Kenney Center…	City	April 2024	City of Hammond	Hurricane / Tornado	
6.	Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce flood potential…			City of Hammond		

Mitigation Actions for: City of Ponchatoula						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1.	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds and helps assure that the public buildings can be used, occupied and operable during or after storms.	HMGP and Parish or City funding (75% - 25% grants)	May 2024	City of Ponchatoula	Severe Thunderstorm, Tropical Hurricane, Tornado	
2. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Initially identified **projects include Ash Street area in Ponchatoula, near I-55, and other potential sites.** Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	HMGP and Parish funding (75% - 24% matching grants)	April 2024	City of Ponchatoula	Flooding, Severe Thunderstorm, Tropical Hurricane	
3. Public sewerage infrastructure retrofits	Project includes the **sewerage systems owned and operated by City of Ponchatoula.** Benefits: will relieve the City and property owners with sewerage backup into their buildings, strengthen existing treatment site levees, and provide pump	HMGP or HUD funding (75% - 25% matching grants) & City	April 2024	City of Ponchatoula	Flooding, severe Thunderstorm, Tropical Hurricane	

Mitigation Actions for: City of Ponchatoula						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	station retrofits to keep the system operating during high water flow.					
4. Radios for Interoperable Communications	**700mhz radios to** allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and Parish	April 2022	City of Ponchatoula	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	
5. Safe Room Projects	Construction of a safe room for first responders located in Ponchatoula.	HMGP and City	June 2026	City of Ponchatoula	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	
6. Mitigation Public Outreach	Enhance the public outreach by increasing awareness of risks and safety for flooding, tropical hurricane, severe thunderstorms, tornadoes and wildfire hazards, as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will help create resiliency with the City and surrounding area.	HMGP and City	May 2021	City of Ponchatoula	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornadoes, Wildfire	
7.	**Improve drainage ways, along the Ponchatoula Creek, by enlarging any inferior culverts along the major drainage laterals. Benefits: To ensure water flows freely within the drainage system, which will protect the surrounding areas from flooding.**	City	April 2024	City of Ponchatoula		

Mitigation Actions for: City of Ponchatoula						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
8.	Harden the Ponchatoula Community Center. Benefits…		April 2025	City of Ponchatoula	Hurricane / Tornado	

Mitigation Actions for: Town of Kentwood						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Public Building Wind Hardening	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds and helps assure that the public buildings can be used, occupied and operable during or after storms.	HMGP and City funding (75% - 25% grants)	March 2020 through December 2024	Town of Kentwood and Parish	Severe Thunderstorm, Tropical Hurricane, Tornado	
2. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	HMGP and City funding (75% - 25% matching grants)	March 2020 through December 2024	Town of Kentwood and Parish	Flooding, Severe Thunderstorm, Tropical hurricane	
3. Radios for Interoperable Communications	**700mhz radios to** allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and City	March 2020 through December 2024	Town of Kentwood	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	
4. Mitigation Public Outreach This section & numbering below was copied from the TANGIPAHOA	Enhance the public outreach by increasing awareness of risks and safety for flooding, tropical hurricane, severe thunderstorms, tornadoes and wildfire hazards, as well as providing information	HMGP and Parish	March 2020 through December 2024	Parish and City	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornadoes, Wildfire	

Mitigation Actions for: Town of Kentwood						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
PARISH UNINCORPORATED in preceding pages	on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will help create resiliency with the City and surrounding area.					
5.	**Develop a master drainage plan** which will evaluate drainage projects at major drainage laterals to determine best methods of increasing drainage capacity. **Implement recommended projects resulting from drainage plan.** Benefits: Reduces the number of flooded structures by increasing the volume of water the pumps can handle at final outfall.	HMGP	March 2020 through December 2024	Parish	Flooding	
6.	**Expand the drainage districts** to cover the entire Parish. Currently, the Parish has 3 drainage districts in the southern part of the Parish, but only has 1 staff. Benefits: By improving drainage in flood-prone areas, homeowners will suffer less flooded structures and therefore, suffer less mental and physical anguish, displacement, and flood damage. In addition the drain on the NFIP is reduced by a decrease in flood claims. (this section was copied from Tangipahoa Unincorporated)	N/A	March 2020 through December 2024	Parish	Flooding	In progress Tangipahoa Parish continues its efforts to expand the Drainage District throughout the Parish.

Mitigation Actions for: Town of Independence						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Public Building Wind Hardening	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds and helps assure that the public buildings can be used, occupied and operable during or after storms.	HMGP and Town funding (75% - 25% grants)	January 2020 through December 2025	Town of Independence	Severe Thunderstorm, Tropical Hurricane, Tornado	
2. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Initially identified **projects.** Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	HMGP and Town funding (75% - 25% matching grants)	January 2020 through December 2025	Town of Independence	Flooding, Severe Thunderstorms, Tropical Hurricane	
3. Radios for Interoperable Communications	**700mhz radios to** allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and Parish and Town	January 2020 through December 2025	Town of Independence and Parish	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	
4. Mitigation Public Outreach	Enhance the public outreach by increasing awareness of risks and safety for flooding, tropical	HMGP, Parish, and Town	January 2020 through December 2025	Town of Independence and Parish	Flooding, Severe Thunderstorm,	

Mitigation Actions for: Town of Independence						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	hurricane, severe thunderstorms, tornadoes and wildfire hazards, as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will help create resiliency with the City and surrounding area.				Tropical Hurricane, Tornadoes, Wildfire	
5.	**Expand the drainage districts** to cover the entire Parish. Currently, the Parish has 3 drainage districts in the southern part of the Parish, but only has 1 staff. Benefits: By improving drainage in flood-prone areas, homeowners will suffer less flooded structures and therefore, suffer less mental and physical anguish, displacement, and flood damage. In addition, the drain on the NFIP is reduced by a decrease in flood claims. (this section was copied from Tangipahoa Unincorporated)	N/A		Parish	Flooding	

Mitigation Actions for: Town of Roseland						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Initially identified **sites.** Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	HMGP and Town funding (75% - 25% matching grants)	January 2020 through December 2025	Town of Roseland	Flooding, Severe Thunderstorms, Tropical hurricane	
2. Public sewerage infrastructure retrofits	Repair of sewage system	Grants 75% Town 25%	January 2020 through December 2025	Town of Roseland, LCDBG, and others	Flooding	
3. Radios for Interoperable Communications	**700mhz radios to** allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and Town	January 2020 through December 2025	Town of Roseland	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	
4. Mitigation Public Outreach	Enhance the public outreach by increasing awareness of risks and safety for flooding, tropical hurricane, severe thunderstorms, tornadoes and wildfire hazards, as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation	HMGP and Parish or Town	January 2020 through December 2025	Town of Roseland and others	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornadoes, Wildfire	

Mitigation Actions for: Town of Roseland						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	efforts and activities will help create resiliency with the City and surrounding area.					
5.	**Improve drainage ways by enlarging any inferior culverts along the major drainage laterals. Benefits: To ensure water flows freely within the drainage system, which will protect the surrounding areas from flooding.**	Various	January 2020 through December 2025	Town of Roseland, HMGP, and others	Flooding	
6.	**Expand the drainage districts** to cover the entire Parish. Currently, the Parish has 3 drainage districts in the southern part of the Parish, but only has 1 staff. Benefits: By improving drainage in flood-prone areas, homeowners will suffer less flooded structures and therefore, suffer less mental and physical anguish, displacement, and flood damage. In addition, the drain on the NFIP is reduced by a decrease in flood claims. (this section was copied from Tangipahoa Unincorporated)	N/A	January 2020 through December 2025	Parish	Flooding	

Mitigation Actions for: Village of Tangipahoa						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Benefits: Relieves Parish or local government and property-owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	HMGP and Parish funding (75%-25% matching grants)	January 2020 to December 2025	Tangipahoa Parish/ Village of Tangipahoa	Flooding, Severe Thunderstorm, Tropical Hurricane	New
2. Public sewerage infrastructure retrofits	Project includes the systems owned and operated by the Village of Tangipahoa. Benefits: The project proposed will relieve the communities and property-owners with sewage back-up into their buildings, strengthen existing treatment site levees, and provide pump station retrofits to keep the systems operating during high water flow.	HMGP and Parish funding (75%-25% matching grants)	January 2020 to December 2025	Tangipahoa Parish/ Village of Tangipahoa	Flooding, Severe Thunderstorm, Tropical Hurricane	
3. Radios for Interoperable Communications	**700mhz radios to** allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and Parish	January 2020 to December 2025	Tangipahoa Parish/ Village of Tangipahoa	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornados, Wildfire	

Mitigation Actions for: Village of Tickfaw						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
1. Drainage – flood relief projects	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Initially identified **projects.** Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	HMGP and Town funding (75% - 25% matching grants)	January 2020 through December 2025	Village of Tickfaw	Flooding, Severe Thunderstorms, Tropical hurricane	
2. Public sewerage infrastructure retrofits	**Repair of sewage system**	Grants 75% Town 25%	January 2020 through December 2025	Village of Tickfaw and Grants	Flooding	
3. Radios for Interoperable Communications	**700mhz radios to** allow for interoperable communications between Parish and local agencies during events that may compromise communication systems.	HMGP and Parish or Town	January 2020 through December 2025	Village of Tickfaw	Flooding, severe Thunderstorm, Tropical Hurricane, Wildfire	
4. Mitigation Public Outreach	Enhance the public outreach by increasing awareness of risks and safety for flooding, tropical hurricane, severe thunderstorms, tornadoes and wildfire hazards, as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will help	HMGP and Town	January 2020 through December 2025	Village of Tickfaw and Parish	Flooding, Severe Thunderstorm, Tropical Hurricane, Tornadoes, Wildfire	

Mitigation Actions for: Village of Tickfaw						
Action	Action Description	Funding Source	Target Completion Date	Responsible Party, Agency, or Department	Hazard	Status
	create resiliency with the City and surrounding area.					
5.	**Improve drainage ways by enlarging any inferior culverts along the major drainage laterals.** **Benefits: To ensure water flows freely within the drainage system, which will protect the surrounding areas from flooding.**	HMGP and Village	January 2020 through December 2025	Village of Tickfaw and Parish	Flooding	
6.	**Expand the drainage districts** to cover the entire Parish. Currently, the Parish has 3 drainage districts in the southern part of the Parish, but only has 1 staff. Benefits: By improving drainage in flood-prone areas, homeowners will suffer less flooded structures and therefore, suffer less mental and physical anguish, displacement, and flood damage. In addition, the drain on the NFIP is reduced by a decrease in flood claims. (this section was copied from Tangipahoa Unincorporated)	N/A	January 2020 through December 2025	Parish	Flooding	

Mitigation Action Prioritization Process

During the prioritization process, each jurisdiction and the HM Steering Committee considered the costs and relative benefits of each new action. Costs can usually be listed in terms of dollars, although at times it involves staff time rather than the purchase of equipment of services that can be readily measured in dollars. In most cases, benefits, such as lives saved or future damage prevented, are hard to measure in dollars. Many projects were prioritized with these factors in mind.

In all cases, the jurisdictions concluded that the benefits (in terms of reduced property damage, lives saved, health problems averted and/or economic harm prevented) outweighed the costs for the recommended action items.

The jurisdictions prioritized the possible activities that could be pursued by determining a numerical order for each mitigation action listed in this section. Jurisdictions and the Steering Committee members consulted appropriate agencies in order to assist with the prioritizations. The result were items that address the major hazards, are appropriate for those hazards, are cost-effective, and are affordable. The Steering Committee met at the Mitigation Action meeting to review and approve each jurisdiction's and unincorporated Tangipahoa Parish's mitigation actions.

The Tangipahoa Parish Council governs the entire Parish and has the final decision on what projects are worked on and how and when they will be accomplished. The action items in the Tangipahoa Unincorporated and Jurisdiction Action Plans fall under their jurisdiction, and thy will delegate the tasks of the action items. Therefore, the Council will coordinate with the Tangipahoa Parish Planner and Lead Manager of each mitigation item to accomplish the goals and action items. The Lead Manager will follow any current procedures the Parish has while completing the action items. The Annual Progress Report will be submitted to the Parish Council, which will reflect progress on each item and on the Hazard Mitigation Plan.

The action items found in this section will be implemented through the defined political process of the Parish and local jurisdiction's governments. The annual budget, as required by law, is the driving factor in determining what projects are accomplished. Often, a certified public accountant generates the annual budget for the local governments. The lead manager for each action item will submit the corresponding project for consideration to the Council members. Then each Council member submits projects for consideration in the annual budget. They will use this HMP as a guide to help them determine what projects will be submitted into the annual budget for completion. Outlined within each budget are projects that the Parish would like to compete. The Council then will hold budget hearing to determine what projects in the budget can and will be funded. All other projects are then removed and must be resubmitted during the following year's budget hearing.

Unincorporated Tangipahoa Parish Mitigation Actions
INSERT HERE landscaped pages (see original document page 4-5): Mitigation Actions for Unincorporated Tangipahoa Parish

APPENDIX A: PLANNING PROCESS

Purpose

The Hazard Mitigation Plan Update process prompts local jurisdictions to keep their hazard mitigation plan current and moving toward a more resilient community. The Plan Update on the research and planning efforts of previous plans while reviewing recent trends. The Steering Committee and jurisdictions followed FEMA's hazard mitigation planning process per the FEMA Local Mitigation Planning Handbook. This planning process assured public involvement and the participation of interested agencies and private organizations. Documentation of the planning process for the Updated Plan is addressed in this section.

The Tangipahoa Parish Hazard Mitigation Plan Update

The Tangipahoa Parish Hazard Mitigation Plan Update process began in October 2019 with a series of meetings and collaborations between the Parish and the participating jurisdictions. Update activities were intended to give each jurisdiction the opportunity to shape the plan to best fit their community's goals. Community stakeholders and the general public were invited to attend and contribute information to the planning process, during the specific time periods and meetings.

Date	Meeting or Outreach	Location	Public Invited	Purpose
	Coordination Conference Call			Discuss with Parish HM Coordinator and any steering committee members expectations and requirements for the project
	Kick-off Meeting			Discuss with the Plan Steering Committee expectations and requirements of the project. Assign Plan worksheets to jurisdictions.
	Risk Assessment Meeting			Discuss and review the risk assessment with the Steering Committee, discuss and review expectations for public meetings.
	Public Meeting			Hammond Parish Government Building
	Mitigation Strategy Meeting			Discussed, reviewed and prioritized mitigation actions with the Steering Committee.
	Public Survey Tool			This survey asked participants about public perceptions and opinions regarding natural hazards in Tangipahoa Parish. In addition, we asked about the methods and techniques preferred for reducing the risks and losses associated with these hazards. Survey Results: https://www.surveymonkey.com/s/tangipahoaparish
2-week period	Public Plan Review (Digital)	Online	Yes	Parish Website
2-week period	Public Plan Review (Hardcopy)	Hammond, LA	Yes	Parish Government Building, Hammond, LA

Planning

The Plan Update process consisted of several phases.

Coordination

The Tangipahoa Parish Office of Homeland Security and Emergency Preparedness (OHSEP) and participating jurisdictions oversaw the coordination of the 2015 Hazard Mitigation Plan Update Steering Committee during the update process. The Parish Planning Director was responsible for identifying and working directly with members for the committee selected by each jurisdiction.

The Parish Planning Director was responsible for inviting the Steering Committee, jurisdictions and key stakeholders to planned meetings and activities. The Committee assisted the Parish Planning Director with press releases and social media statements for notification to the media and general public for public meetings and public outreach activities. Parish Planning was also responsible for facilitating meetings and outreach efforts during the update process.

Neighboring Community, Local and Regional Planning Process Involvement

From the outset of the planning process, the Hazard Mitigation Team encouraged participation from a broad range of jurisdictional entities. The involvement of representatives from the city, state, and regional agencies provided diverse perspectives and mitigation ideas.

Formal participation in this plan includes but is not limited to the following activities:

- Participation in Hazard Mitigation Team meetings at the local and Parish level
- Sharing local data and information
- Local action item development
- Plan document draft review
- Formal adoption of the Hazard Mitigation Plan document by each jurisdiction following provisional approval by the State of Louisiana and FEMA

The 2015 Hazard Mitigation Plan Update Steering Committee consisted of representatives from the following Parish, municipal and community stakeholders:

- Tangipahoa Parish Government
- City of Hammond
- City of Ponchatoula
- City of Amite
- Town of Kentwood
- Town of Independence
- Town of Roseland
- Village of Tangipahoa
- Village of Tickfaw

Neighboring St. Tammany Parish was invited to participate in planning meetings and the public meetings as well, in an effort to collaborate with neighboring communities. Tangipahoa Parish and St. Tammany Parish border each other and share major state highways which serves as a evacuation routes for citizens of both parishes. Jurisdictions also discussed previous mitigation actions involving hardening shelters which house citizens from St. Charles Parish during disasters. Tangipahoa Parish and St. Charles Parish have agreements in place to assist each other with shelter space. By hardening and retrofitting these buildings, Tangipahoa Parish is able to provide a safe shelter for a neighboring parish and community.

As part of the coordination and planning process, each jurisdiction was provided the State required Hazard Mitigation Plan Update Worksheet. Jurisdictions with the capability to complete and return these worksheets returned them to assist with the 2015 update. The completed worksheets can be found in Appendix E – State Required Plan Update Worksheets.

Below is a detailed list of the 2015 HMPUpdate Steering Committee:

Member / Title	Jurisdiction / Entity
, Administrative Assistant	City of Amite
Lacy Landrum, Director of Administration	City of Hammond
Fire Chief	City of Hammond
Robert Morgan, Public Works Director	City of Hammond
Bobby Zabbia, Mayor	City of Ponchatoula
Russell Hoover, Director of Plant Operations	North Oaks Health Systems
Dawson Primes, OHSEP Director	Tangipahoa Parish
Robby Miller, Parish President	Tangipahoa Parish Government
Lauren Brinkman, Parish Floodplain Manager	Tangipahoa Parish Government
Bill Moorman, GIS	Tangipahoa Parish Government
Nic Leblanc, Parish Building Official	Tangipahoa Parish Government
John Dardis, Grants	Tangipahoa Parish Government
Bridget Bailey, Parish Planning Director	Tangipahoa Parish Government
Ginger Cangelosi, Director - Economic Development	Tangipahoa Parish Government
Missy Cowart, Grants	Tangipahoa Parish Government
Gary Clark, Water District Manager	Tangipahoa Parish Water District #1
Angelo Mannino, Mayor	Town of Independence
Irma Gordon, Mayor	Town of Kentwood
Wanda McCoy, Mayor	Town of Roseland
Trashica Robinson, Mayor	Village of Tangipahoa
Anthony Lamonte, Mayor	Village of Tickfaw

Program Integration

Local governments are required to describe how their mitigation planning process is integrated with other ongoing local and area planning efforts. This subsection describes Tangipahoa Parish programs and planning.

A measure of integration and coordination is achieved through the HMPU participation of Steering Committee members and community stakeholders who administer programs such as: floodplain

management under the National Flood Insurance Program (NFIP), Parish planning and zoning and building code enforcement, comprehensive plans, and Emergency Planning.

Opportunities to integrate the requirements of this Hazard Mitigation Plan into other local planning mechanisms will continue to be identified through future meetings of the Parish and jurisdictions through the 5-year review process described int eh Plan Maintenance Section. The primary means for integrating mitigation strategies into other local planning mechanisms will be through the revision, update and implementation of each jurisdiction's individual city/town plans that require specific planning and administrative tasks (e.g. risk assessment, plan amendments, ordinance revisions, capital improvement projects, etc.).

The members of the Tangipahoa Parish Hazard Mitigation Steering Committee will remain charged with ensuring that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Hazard Mitigation Plan and will not contribute to increased hazard vulnerability in the Parish. Existing plans, studies, and technical information were incorporated in the planning process. Examples include flood data from FEMA, the U.S. Army Corps of Engineers (USACE or Corps), and the U. S. Geological Survey. Much of this data was incorporated into the risk assessment component of the Plan relative to plotting historical events and the magnitude of the damages that occurred. The Parish's 2005 Hazard Mitigation Plan was also used in the planning process.

Other existing data and plans used in the planning process include those listed below:

- Tangipahoa Parish Economic Development Master Plan
- Parish and Local Emergency Operations Plans
- Continuity of Operations Plans (City and Parish)
- State of Louisiana Hazard Mitigation Plan
- Stormwater Management Plan (City and Parish)
- Capital Improvement Plan (City)
- Comprehensive Master Plan (City and Parish)

Further information on the plans can be found in the Capabilities Assessment, Section 3.

Documentation (Meetings and Public Outreach)
The following pages contain documentation of the agendas, attendees, and presentations, as well as any other related documents, for the meetings and public outreach activities conducted during this Hazard Mitigation Plan Update for Tangipahoa Parish and participating jurisdictions.

Meeting#1: Coordination Conference Call
Date:
Location:
Purpose:
Public Initiation:
Invitees included:

- _____
- _____
- _____
- _____

Agenda:
[insert here – pdf copy of – or type – the Agenda for Meeting #1]
Attendees [include each person's name & the organization or community they represent]

- _____
- _____
- _____
- _____

[insert here copy of actual "sign-in" sheet for meeting #1 attendees]
Meeting #2: Hazard Mitigation Plan Update Kick-Off
Date:
Location:
Purpose:
Public Initiation:
Invitees included:

- _____
- _____
- _____
- _____

Agenda:
[insert here – pdf copy of – or type – the Agenda for Meeting #1]
Attendees [include each person's name & the organization or community they represent]

- _____
- _____
- _____
- _____

[insert here copy of actual "sign-in" sheet for meeting #2 attendees]

[note: copy of Meeting #2 PowerPoint Slides, 6 per page]

Meeting #3 Risk Assessment Meeting
Date:
Location:
Purpose:
Public Initiation:
Invitees included:

- _____
- _____
- _____
- _____

Agenda:
[insert here – pdf copy of – or type – the Agenda for Meeting #1]
Attendees [include each person's name & the organization or community they represent]

- _____
- _____
- _____
- _____

[insert here copy of actual "sign-in" sheet for meeting #1 attendees]
[a copy of slides, 6 per page, from Meeting #3 was included in this section here]

Meeting #4 Steering Committee Public Meeting for Hazard Mitigation Plan Update
Date:
Location:
Purpose:
Public Initiation:
Invitees included:

- _____
- _____
- _____
- _____

Agenda:
[insert here – pdf copy of – or type – the Agenda for Meeting #1]
Attendees [include each person's name & the organization or community they represent]

- _____
- _____
- _____
- _____

[included here in ORIGINAL HM Plan Update was PDF copy of Meeting Notice – Public Notice with proof of publication]

[included here in ORIGINAL HM Plan Update was PDF copy of "sign-in sheet" of meeting attendees]

[a copy of slides, 6 per page, from Meeting #3 was included in this section here]

Outreach Activity #1: Public Opinion Survey
Date: Ongoing throughout planning process
Location: online web survey
Public Invitation: Yes
[included here was the actual survey questions – as printed from the www.surveymonkey website]

Outreach Activity #2: Incident Questionnaire
Date:
Location
Public Invitation:
[inserted here in original HM document is PDF copy of the Public Meeting Incident/Issue Questionnaire]
Outreach Activity #3: Mapping Activities

Meeting #5: Mitigation Strategies / Action Meeting
Date:
Location:
Purpose:
Public Initiation:
Invitees included: [below list name, title, and agency of each meeting invitee]

- _____
- _____
- _____

[inserted here in original HM document is a PDF copy of the Meeting #5 sign-in sheet for attendees]
[inserted here in original HM document is PDF copy of PowerPoint presentation slides, 6 per page]

Public Plan Review
[inserted here is a copy of the Facebook Page for Tangipahoa Parish Emergency Management, showing the public notice posted on this Facebook page]

APPENDIX B: PLAN MAINTENANCE

Purpose

The section of the code of Federal Regulations (CFR) pertaining to Local Mitigation Plans lists 5 required components for each plan: a description of the planning process, risk assessments; mitigation strategies; a method and system for Plan maintenance; and documentation of Plan adoption. This section details the method and system for Plan maintenance, following the CFR's guidelines that the Plan Updated must include: (1) "a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a 5-year cycle,; (2) "a process by which local governments incorporated the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans"; and (3) "discussion on how the community will continue public participation in the plan maintenance process."

Monitoring, Evaluating, and Updating the Plan

By law, the plan must be updated every 5 years, prior to re-submittal to the Federal Emergency Management Agency (FEMA) for re-approval. The first part of this subsection describes the whole update process, including the responsible parties, methods to be used, evaluation criteria to be applied, and, scheduling for monitoring and evaluation the plan. These descriptions are followed by an explanation of how and when the plan will be periodically updated. The plan must be updated every 5 years, prior to re-submittal to the Federal Emergency Management Agency (FEMA) for re-approval. The first part of this subsection describes the whole update process, including sections on the following:

- Responsible parties
- Methods to be used
- Evaluation criteria to be applied
- Scheduling for monitoring and evaluating the Plan

These descriptions are followed by an explanation of how and when the Plan will be periodically updated.

Responsible Parties

The Tangipahoa Parish Office of Homeland Security and Emergency Preparedness (OHSEP) is the Parish department directly responsible for the Plan. The Tangipahoa Parish Planner, in coordination with the Tangipahoa Hazard Mitigation Steering Committee is responsible for assuring that the Plan monitoring, evaluating and updates are done in accordance with the procedures outlined in this section. Designees from each of the jurisdictions, along with representative from local businesses and private citizens will work as part of the Steering Committee and be involved int eh process of monitoring, evaluating and updating the Plan. The following jurisdictions are represented on the Steering Committee:

- Town of Amite
- City of Hammond
- Town of Independence
- Town of Kentwood
- City of Ponchatoula

- Town of Roseland
- Village of Tangipahoa
- Village of Tickfaw
- Tangiphoa Parish

The following basic schedule will be undertaken for monitoring, evaluating and updating the Plan:

At a minimum, monitoring activities by the Parish Planner should be done every 6 months;
Best practice is that the update should start a year and a half prior to the Plan expiration date, taking into consideration 1 year of development and 6 months to receive Plan approval. Notices regarding annual evaluations should be sent by the Parish Planner to the Parish Hazard Mitigation Steering Committee;
The timetable for evaluations for the first 4 years is expected to last up to 4 months (March – June) and approximately 1 year for the update in the fifth year for re-submittal to FEMA.

Methods for Monitoring and Evaluating the Plan

On a semi-annual basis (and as warranted by circumstances, such as a major disaster declaration), the Tangipahoa Parish Planner will review the Plan, in order to assess the degree to which assumptions and underlying information contained in the Plan may have changed. For example, the Tangipahoa Parish Planner will look for the following:

- Changes in the information available to perform vulnerability assessments and loss estimates. For example: as the Parish and municipal risk assessments and plans are integrated into this Plan Update, the Parish Planner will solicit feedback from Parish and municipal officials about any changes int heir real or perceived risks.
- Changes in laws, policies and regulations. Changes in Parish or jurisdictional departments and/or their procedures, including the Tangipahoa OHSEP and the administration of grant programs.

Progress on the mitigation action items will be monitored and evaluated by the Tangipahoa Parish Planner. The lead agency/manager for each action item will complete an annual progress report and submit them to the Tangipahoa Parish Planner for review. This progress report is designed to monitor the state of the projects and evaluate success of each mitigation item.

Using the compiled results of ongoing monitoring efforts, the Plan will be evaluated annually, generally by March 31 each year (unless circumstances indicate otherwise). The Parish Planer will initiate the evaluations by contacting Parish and municipal departments identified as responsible parties in the Mitigation Action Plan, as well as other departments and organizations that have been involved in developing the Plan. By March 31 each year, the Parish Planner will draft an annual evaluation report on progress toward implementing the Plan Update's action items for the Mitigation Steering Committee. The report will cover the following points:

- A description of how the evaluation report was prepared and how it is submitted to the governing body, released to the media, and made available to the public.
- How the reader can obtain a copy of the original Plan Update.
- A review of action items, including a statement on how much was accomplished during the previous year.
- A discussion of why any objectives were not reached or why implementation is behind schedule.
- Recommendations for new projects or revised recommendations.

The initial contacts will be made no later than January 1 of each year for the first 4 years and in March in the fifth year (in anticipation of the required Plan Update for FEMA re-approval). The initial contact will advise the appropriate agencies/organizations that the plan will be re-evaluated in the coming months and request their participation in the process.

The Tangipahoa Parish Planner also has the authority to evaluate the plan at times other than those identified in this section under the following general conditions: (1) After a major disaster declaration; (2) At the request and in conjunction with the governor's Office of Homeland Security and Emergency Preparedness (GOHSEP); or (3) When significant new information regarding risks or vulnerabilities is identified. If during this process of reviewing the annual progress report, the Tangipahoa Parish Planner determines that the Steering Committee should be reconvened for discussion, the Parish Planner may call a Steering Committee meeting.

Plan Evaluation Criteria

The evaluations will consider several basic factors which are similar to those addressed in the monitoring process, and any additional review indicated by GOHSEP or the Steering Committee. The factors that will be taken into consideration during these periodic evaluations of the Plan include the following:

1. Change in vulnerability assessments and loss estimation. The evaluation will include an examination of the analyses conducted for hazards identified in the Plan and determine if there have been changes in the level of risk to the State and its citizens, to the extent that the Plan (in particular the strategies and prioritized actions the Parish/jurisdiction is considering) should be modified.
2. Changes in laws, policies, ordinances, or regulations. The evaluation will include an assessment of the impact of changes in relevant laws, policies, ordinances, and regulations pertaining to the elements of the Plan.
3. Changes in Parish/jurisdiction departments or their procedures that will affect how mitigation programs or funds are administered.
4. Significant changes in funding sources or capabilities.
5. Progress on mitigation actions (including project closeouts) or new mitigation actions that the Parish/jurisdiction is considering.

Updating the Plan

Updates will follow the original planning process outlined in the Planning Process Section (Appendix A). the updated process will entail a detailed and structured re-examination of all aspects of the Plan, followed by recommended updates. The update process will be undertaken by the Tangipahoa Parish Planner in coordination with the Steering Committee. The Steering Committee will work together as a team, with each member sharing the jurisdiction specific responsibilities for completing the updates. Each member of the Steering Committee is an equal

member of the process. It will be the responsibility of the representative from each jurisdiction to ensure their sections of the Plan are updated to meet the required deadline.

At a minimum, the Plan will be updated and re-submitted to FEMA for re-approval every 5 years, as required by the Disaster Mitigation Act 2000. The 5-year update for FEMA re-approval requires that all the original steps outlined in Appendix A be revisited, in order to make sure that the Plan assumptions and results remain valid, as a basis for further decision making and priority setting.

The Plan will also be subject to amendments as significant changes or new information is identified in the periodic evaluations described above. The degree to which the entire process is repeated will depend on the circumstances that precipitate the update.

The next 2 paragraphs describe the procedures for amendments and 5-year updates, respectively.

The nature of Plan amendments will be determined by the evaluation process described above. In general, the Tangipahoa Parish Planner will notify the Steering Committee that the Parish is initiating an amendment and describe the circumstances that created the need for the amendment (per the list in the Plan Evaluation Criteria section above). The Tangipahoa Parish Planner will determine if the Steering Committee should be consulted, regarding potential changes. If it is determined that the Steering Committee should be involved, the nature of the involvement will be at the discretion of the Tangipahoa Parish Planner. When involved in any amendments, the jurisdictional representatives on the Steering committee will forward information on any proposed change(s) to all interest parties, including, but not limited to, all affected Parish and municipal departments, residents and businesses. When a proposed amendment may directly affect particular private individuals or properties, jurisdictions will follow existing local, State or federal notification requirements, which may include published public notices, as well as direct mailings. When amendments are completed absent the involvement of the Steering Committee, the Tangipahoa Parish Planner will advise all Committee members that the Plan has been amended, and describe the nature of the update. In addition, the Tangipahoa Parish Planner will provide GOHSEP with a copy (although there is no requirement to have the Plan re-approved by FEMA for amendments).

As required by DMA 2000, the Plan will be updated every 5 years and re-submitted to FEMA for re-approval. In those years, the evaluation process will be more rigorous, and will examine all aspects of the Plan in detail. It is anticipated that several meetings of the Steering Committee will be required and that the Parish and each jurisdiction will formally re-approve the Plan prior to submission to FEMA.

Based on the 5-year renewal requirements for Plan Updates, the Tangipahoa OHSEP anticipates that the submission date for the required update will e March 2020. Prior to that time, the Tangipahoa Parish Planner will contact the Committee members and other appropriate agencies/organizations to confirm a schedule for the Plan Update.

2020 Plan Version, Plan Method and Schedule Evaluation

For the current Plan Update, the previously approved Plan's method and schedule were evaluated to determine if the elements and processes involved in the required 2020 update.

Incorporation into Existing Planning Programs

The project requirements from the Hazard Mitigation Plan shall be incorporated into other planning mechanisms, as applicable, during the routine re-evaluation and update of the Parish and jurisdictional plans. Any changes or updates to the floodplain ordinances, Emergency Operation Plan, and FIRMs, Comprehensive Plan, or any other applicable plans will be reflected in this HMP during its updates. During the 2009 update, the Parish was also engaged in the preparation of the Comprehensive Plan. Both the Parish Planner and a Contract Parish Planner who were managing the Comprehensive Plan's development were active Steering Committee members for the HMP Update. They were able to share information from the Comprehensive Plan meetings with the HMP Steering Committee and make sure that the goals of the Steering Committee were shared with the Comprehensive Plan developers. For example, as a result of discussions regarding floodplain managements, the Comprehensive Plan contained recommendations to require a 2-foot freeboard to further protect properties from flooding. The Comprehensive Plan also included other items that resulted from HMP Steering Committee discussions, such as addressing fill in the floodplain. The coordination continues both in the Parish and jurisdictions as of the most recent update.

The Parish, as well as Amite, Hammond, Independence, Kentwood, Ponchatoula, Roseland, Tangipahoa, and Tickfaw ae members of the NFIP and have Floodplain Management Ordinances. When the cities or Parish update their Floodplain Ordinances, the requirements from this HMP will be included in the newly-revised Floodplain Ordinance. This HMP Plan will be made available to each committee leader responsible for revising their Floodplain Ordinance.

The Parish and the municipalities follow the Uniform Construction Code Guidelines. The Uniform Construction Code was developed by the International Code Council and was adopted by the cities and Parish. If the Parish or cities decide to amend any of the codes, within the process of amending them, they will take into account the requirements from this HMP.

The Parish OHSEP has jurisdiction over the incorporated areas during disaster events; therefor, the incorporated areas follow the recommended guidelines in the Parish Emergency Operations Plan.

The Steering Committee members representing each participating jurisdiction for this HMP Update will remain charged with the responsibility to ensure that the requirements of the Tangipahoa HMP are incorporated into applicable Parish local planning mechanisms, when they are due for revisions or updates. Integration and coordination is achieved through the HMP Updated participation of Steering Committee members and community stakeholders who

administer programs such as: floodplain management under the National Flood Insurance Program (NFIP), Parish planning and zoning and building code enforcement, comprehensive plans, and Emergency Planning.

Opportunities to integrate the requirements of this Hazard Mitigation Plan into other local planning mechanisms will continue to be identified through future meetings of the Parish and jurisdictions and through the 5-year review process described in the Plan Maintenance Section. The primary means for integrating mitigation strategies into other local planning mechanisms will be through the revision, update and implementation of each jurisdiction's individual city/town plans that require specific planning and administrative tasks.

The timeline and process for these updates to local plans, ordinance revisions, mutual aid agreements, and other planning programs within each jurisdiction will vary, based off of their planning cycles. Steering Committee members, jurisdiction representatives, and Parish and local planning commission will stay engaged throughout each of these updates to ensure incorporation of any hazard mitigation plan requirements. They will do this through continued communication and participation in their jurisdictions.

The members of the Tangipahoa Parish Hazard Mitigation Steering Committee will remain charged with ensuring that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Hazard mitigation Plan and will not contribute to increased hazard vulnerability in the Parish.

The following Parish and local plans incorporate requirements of this HMP Update as follows, through Steering Committee member and jurisdiction representation throughout the planning processes as described above:

Tangipahoa Unincorporated

- Comprehensive Master Plan/Updated as needed/Parish Planning Department
- Capital Improvement Plan/Updated Annually/Parish Planning Department
- Economic Development Plan/Updated every 5 years/Tangipahoa Economic Development Foundation
- Local Emergency Operations Plan/Updated every 5 years/Parish OHSEP
- Continuity of Operations Plan/updated Annually/Parish OHSEP
- Transportation Plan/Updated as needed/Parish OHSEP
- Stormwater Management Plan/Updated as needed/Parish Department of Public Works

City of Hammond

- Comprehensive Master Plan/Updated every 10 years/Comprehensive Plan Steering Committee
- Capital Improvement Plan/Updated Annually/City of Hammond Planning Department
- Economic Development Plan/Updated every 5 years/City of Hammond Planning Department

- Continuity of Operations Plan/Updated Annually/ City of Hammond Planning Department
- Local Emergency Operation Plan/Updated Annually/ City of Hammond Planning Department
- Transportation Plan/Updated every 4 years/ City of Hammond Planning Department
- Stormwater Management Plan/Updated as needed/ City of Hammond Planning Department

City of Ponchatoula

- Stormwater Management Plan/Updated as needed/City of Ponchatoula Government

Town of Amite

- Local Emergency Operations Plan/Updated every 4 years/Town of Amite Government

Town of Kentwood

- There are no applicable plans within the jurisdiction of Kentwood for the Hazard Mitigation Plan to be integrated.

Town of Roseland

- There are no applicable plans within the jurisdiction of Roseland for the Hazard Mitigation Plan to be integrated.

Town of Independence

- There are no applicable plans within the jurisdiction of Independence for the Hazard Mitigation Plan to be integrated.

Village of Tangipahoa

- There are no applicable plans within the jurisdiction of Tangipahoa for the Hazard Mitigation Plan to be integrated.

Village of Tickfaw

- There are no applicable plans within the jurisdiction of Kentwood for the Hazard Mitigation Plan to be integrated.

Continued Public Participation

Public participation is an integral component of the mitigation planning process and will continue to be essential as this Plan evolves over time. Significant changes or amendments to the Plan require a public hearing, prior to any adoption procedures. Other efforts to involve the public in the maintenance, evaluation, and revision process will be made necessary.

Tangipahoa Parish and its jurisdictions are dedicated to involving the public directly in the re-shaping and updating of the Hazards Mitigation Plan. The Steering Committee members and jurisdictions are involved in the process of the review and update of the Plan, which is to be conducted every 5 years. Although they represent the public to some extent, the public will be

able to directly comment on and provide feedback about the Plan and its updates. Before the Steering Committee is reconvened for any meeting, a public notice will be issued for anyone in the general population who would like to participate in the process of HMP review and update. This would include all jurisdictions. A public notice will be displayed in prominent locations within the main governmental buildings in Tangipahoa Parish and in the city/town halls and government buildings of all participating municipalities. Those who opt to participate int his process will have an opportunity to express their concerns, opinions, or ideas about the Plan.

Copies of the Plan will be catalogued and kept on hand at the Tangipahoa Parish Permit Office, located in Hammond. The existence and location of these copies will be publicized in the Parish official legal publications journal (the Hammond Daily Star newspaper). The Parish OHSEP will be responsible for keeping track of public comments of the Plan. All public comments will be reviewed and incorporated in the HMP at the 5 year update, if appropriate. If an annual meeting of the Steering Committee is held, then the public comments will be reviewed and incorporated at this time, if appropriate.

APPENDIX C: ESSENTIAL FACILITIES

Tangipahoa Unincorporated

Tangipahoa Unincorporated Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Fire & Rescue	Baileyville Husser Volunteer Fire Department					X	X	X	X	X		X
	Eighth Ward Volunteer Fire Department					X	X	X	X	X		X
	Hammond Rural Fire Department					X	X	X	X	X		X
	Husser Fire Station					X	X	X	X	X		X
	Independence Fire & Rescue				X	X	X	X	X	X		X
	Kentwood Fire Department – Central Station					X	X	X	X	X		X
	Kentwood Fire Department – Station 2					X	X	X	X	X		X
	Loranger Volunteer Fire Department – Mixon Corner Substation					X	X	X	X	X		X
	Manchac Volunteer Fire Department	X		X	X	X	X	X	X	X		X
	Natalbany Volunteer Fire Department – Station 2				X	X	X	X	X	X		X

Tangipahoa Unincorporated Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
	Tangipahoa Parish – Central Station – Loranger					X	X	X	X	X		X
	Tangipahoa Rural Fire Protection – District No. 2 Station					X	X	X	X	X		X
	Uneedus Husser Volunteer Fire Department					X	X	X	X	X		X
	Wilmer Volunteer Fire Department					X	X	X	X	X		X
Government	City of Hammond Public Works					X	X	X	X	X		X
	C. M. Fagan Special Services Center					X	X	X	X	X		X
	Consolidated Gravity Drainage District					X	X	X	X	X		X
	DOTD Maintenance Unit					X	X	X	X	X		X
	Louisiana Department of Agriculture and Forestry					X	X	X	X	X		X
	Louisiana National Guard					X	X	X	X	X		X
	Louisiana Wildlife and Fisheries					X	X	X	X	X		X
	Parish Disposal				X	X	X	X	X	X		X
	Parish Public Works					X	X	X	X	X		X

Tangipahoa Unincorporated Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
	Tangipahoa Mosquito Abatement District No. 1					X	X	X	X	X		X
	Tangipahoa Parish Animal Control					X	X	X	X	X		X
	Tangipahoa Parish Assessor					X	X	X	X	X		X
	Tangipahoa Parish Library – Loranger Branch					X	X	X	X	X		X
	Tangipahoa Parish School System					X	X	X	X	X		X
	Tangipahoa Parish School System Maintenance Facility					X	X	X	X	X		X
	Tangipahoa Parish Sheriff's Office					X	X	X	X	X		X
	Tangipahoa Parish Solid Waste Facility					X	X	X	X	X		X
	Tangipahoa Parish Registrar of Voters					X	X	X	X	X		X
	Weigh Station					X	X	X	X	X		X
Law Enforcement	Hammond Police Training Center					X	X	X	X	X		X
	Tangipahoa Parish Sheriff Substation	X		X	X	X	X	X	X	X		X
Public Health	Specialty LTCH Hospital					X	X	X	X	X		X

Tangipahoa Unincorporated Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Schools	Capca Migrant Seasonal Head Start					X	X	X	X	X		X
	Champ Cooper Elementary School and Junior High School					X	X	X	X	X		X
	Chesbrough Elementary School					X	X	X	X	X		X
	Hammond Eastside Primary School					X	X	X	X	X		X
	Hammond High Magnet School					X	X	X	X	X		X
	Jewel Sumner High School					X	X	X	X	X		X
	Loranger High School					X	X	X	X	X		X
	Martha Vinyard Elementary School					X	X	X	X	X		X
	Natalbany Elementary School				X	X	X	X	X	X		X
	Northlake Supports and Services Center *(formerly Hammond State School)*					X	X	X	X	X		X
	Ponchatoula High School					X	X	X	X	X		X
	Spring Creek Elementary School					X	X	X	X	X		X
	St. Thomas Aquinas High School				X	X	X	X	X	X		X
	Sumner Middle School					X	X	X	X	X		X

City of Hammond

City of Hammond Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Fire & Rescue	Firehouse 4					X	X	X	X	X		X
	Hammond Central Fire Station					X	X	X	X	X		X
	Hammond Fire Station 2					X	X	X	X	X		X
	Memorial Fire Department					X	X	X	X	X		X
Government	City of Hammond					X	X	X	X	X		X
	City of Hammond Annex					X	X	X	X	X		X
	City of Hammond Juvenile Services Division					X	X	X	X	X		X
	D. L. Wilcombe United States Army Reserve Center					X	X	X	X	X		X
	Louisiana Department of Transportation and Development				X	X	X	X	X	X		X
	Department of Veterans Affairs					X	X	X	X	X		X
	Hammond Chamber of Commerce					X	X	X	X	X		X
	Leon Ford III Memorial Justice Building					X	X	X	X	X		X

City of Hammond Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
	Louisiana Department of Agriculture and Forestry					X	X	X	X	X		X
	Louisiana Workforce Commission					X	X	X	X	X		X
	Parish Clerk of Clerk Office					X	X	X	X	X		X
	Louisiana Department of Motor Vehicles					X	X	X	X	X		X
	Region 2 Education Service Center				X	X	X	X	X	X		X
	Louisiana Secretary of State Voting Machine Warehouse					X	X	X	X	X		X
	US Social Security Administration					X	X	X	X	X		X
	Tangipahoa Alcohol and Drug Abuse Council (TADAC)					X	X	X	X	X		X
	Tangipahoa Parish Government Planning Department					X	X	X	X	X		X
	Tangipahoa Parish Special Education					X	X	X	X	X		X
Law Enforcement	Hammond Police Department					X	X	X	X	X		X

City of Hammond Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
	Hammond Police Department – Criminal Investigations Division					X	X	X	X	X		X
	Hammond Police Department – Police Annex					X	X	X	X	X		X
Public Health	Community Care Hospice					X	X	X	X	X		X
	Louisiana Department of Health and Hospitals Medicaid Office					X	X	X	X	X		X
Schools	Adult Education Center					X	X	X	X	X		X
	Cedat Fortunis Peritis Academy				X	X	X	X	X	X		X
	Hammond Head Start					X	X	X	X	X		X
	Hammond High School					X	X	X	X	X		X
	Hammond Junior High School					X	X	X	X	X		X
	Hammond Westside Elementary School					X	X	X	X	X		X
	Holy Ghost Catholic School					X	X	X	X	X		X
	Seventh-Day Adventist School and Daycare Center				X	X	X	X	X	X		X
Nursing Homes	Belle Maison Nursing Home											

City of Hammond Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Senior Assisted living typed in red font were added into this document - original document only listed Sunrise Assisted Living Facility	Hammond Nursing Home					X	X	X	X	X		X
	Hammond Senior Living											
	Heritage Manor Nursing Home											
	Landmark Nursing Center											
	Summerfield Senior Living											
	Oak Park Village											
	Sunrise Assisted Living Facility					X	X	X	X	X		X

Town of Independence

Town of Independence Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Fire & Rescue	Independence Fire & Rescue Station 1				X	X	X	X	X	X		X
Government	Independence Town Hall					X	X	X	X	X		X
	Parish Library – Independence Branch											
Law Enforcement	Independence Police Department					X	X	X	X	X		X
Schools	Central Tangi Head Start					X	X	X	X	X		X
	Independence Elementary School					X	X	X	X	X		X
	Independence High School					X	X	X	X	X		X
	Independence Middle School				X	X	X	X	X	X		X
	Mater Dolorosa Catholic School				X	X	X	X	X	X		X

Town of Kentwood

Town of Kentwood Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightening**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Fire & Rescue	Kentwood Volunteer Fire Department				X	X	X	X	X	X		X
Government	Kentwood Town Hall					X	X	X	X	X		X
	Parish Library – Kentwood Branch					X	X	X	X	X		X
	Department of Public Works					X	X	X	X	X		X
Law Enforcement	Kentwood Police Department					X	X	X	X	X		X
Schools	Kentwood High School					X	X	X	X	X		X
	O. W. Dillon Elementary School					X	X	X	X	X		X
Public Health	Southeast Community Health Systems					X	X	X	X	X		X

City of Ponchatoula

City of Ponchatoula Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightning**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Government	City of Ponchatoula Community Center					X	X	X	X	X		X
	City of Ponchatoula Maintenance Yard					X	X	X	X	X		X
	First Circuit Court of Appeal					X	X	X	X	X		X
	Ponchatoula City Hall					X	X	X	X	X		X
	South Tangipahoa Port Commission					X	X	X	X	X		X
	State Representative Steve Pugh					X	X	X	X	X		X
Law Enforcement	Ponchatoula Police Department					X	X	X	X	X		X
Public Health	North Oaks Health Systems					X	X	X	X	X		X
	Ochsner Health Clinic					X	X	X	X	X		X
Schools	D. C. Reeves Elementary School					X	X	X	X	X		X
	Ponchatoula Junior High School					X	X	X	X	X		X
	St. Joseph's Catholic School					X	X	X	X	X		X
	Tucker Elementary School					X	X	X	X	X		X

Village of Tangipahoa

Village of Tangipahoa Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightning**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Government	Mayor's Office and Town Hall					X	X	X	X	X		X

Village of Tickfaw

Village of Tickfaw Essential Facilities												
Type	**Name**	**Coastal Land Loss**	**Dam Failure**	**Expansive Soils**	**Flood**	**Hail**	**Heavy Winds**	**Lightning**	**Tornado**	**Tropical Hurricanes**	**Wildfires**	**Winter Storms**
Government	Tickfaw City Hall					X	X	X	X	X		X
Law Enforcement	Tickfaw Police Department					X	X	X	X	X		X
Schools	Nesom Middle School					X	X	X	X	X		X

APPENDIX D: PLAN ADOPTION

[insert here: PDF scanned copies of RESOLUTIONS adopting HM Plan 2020 for:

- ☐ Tangipahoa Parish
- ☐ Hammond
- ☐ Ponchatoula
- ☐ Independence
- ☐ Tickfaw
- ☐ Tangipahoa, Village of
- ☐ Kentwood
- ☐ Roseland

APPENDIX E: STATE REQUIRED WORKSHEETS

During the planning process (Appendix A), the Hazard Mitigation Plan Update Steering Committee was provided State-required Plan Update process worksheets to be filled out by each jurisdiction. The worksheets were presented at the Kickoff Meeting by the contractor, as tools for assisting in the update of the Hazard Mitigation Plan. The Plan Update worksheets allowed for collection of information such as planning team members, community capabilities, critical infrastructure, and vulnerable populations, as well as NFIP information. The following pages contain documentation of the worksheets.

Capability Assessment

[INSERT HERE PDF COPIES OF Plan Update Worksheets completed for:

- ☐ Amite
- ☐ Hammond
- ☐ Independence
- ☐ Kentwood
- ☐ Ponchatoula
- ☐ Roseland
- ☐ Tangipahoa, Village of
- ☐ Tickfaw
- ☐ Tangipahoa Parish