RED RIVER

PARISH HAZARD MITIGATION UPDATE – 2016

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RED RIVER PARISH

HAZARD MITIGATION PLAN UPDATE

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Red River Parish

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ACKNOWLEDGMENTS

This 2016 Red River Parish Hazard Mitigation Plan Update was coordinated by the Red River Parish Hazard Mitigation Plan Update Steering Committee, in collaboration with the participating jurisdictions as well as community stakeholders and the general public. The participating jurisdictions are made up of the following communities:

Red River Parish
Town of Coushatta
Village of Edgefield
Village of Hall Summit
Village of Martin

Special thanks is directed to all of those who assisted in contributing feedback and expertise on this document, especially the Red River Parish Office of Homeland Security and Emergency Management. These combined efforts have made this project possible. The Red River Parish Steering Committee consists of the following individuals, who are credited in the creation of this document:

Johnny Cox	Mayor of Coushatta	Town of Coushatta
Tom Mangham	Mayor of Martin	Village of Martin
Lary Wimberly	Mayor of Hall Summit	Village of Hall Summit
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The 2016 Red River Parish Hazard Mitigation Plan Update was written by the Stephenson Disaster Management Institute, Louisiana State University. Further comments should be directed to the Red River Parish Office of Homeland Security and Emergency Preparedness: 615 E. Carrol Street, Coushatta, LA 71019.

Contents

1. Introduction

Hazard Mitigation is defined as sustained actions taken to reduce or eliminate long-term risk from hazards and their effects. Hazard Mitigation Planning is the process through which natural hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies that would lessen the impacts are determined, prioritized, and implemented.

In that regard, this plan (a) documents the Red River Parish Hazard Mitigation Plan Update process; (b) identifies natural hazards and risks within the parish; and (c) identifies the parish's hazard mitigation strategy to make Red River Parish less vulnerable and more disaster resistant. It also includes mitigation project scoping to further identify the extent of work, estimated costs, and implementation timing requirements of proposed selected mitigation projects. Information in the plan will be used to help guide and coordinate mitigation activities and local policy decisions affecting future land use.

The Red River Parish Hazard Mitigation Plan is a multi-jurisdictional plan that includes the following jurisdictions which participated in the planning process:

- Red River Parish
- Town of Coushatta
- Village of Edgefield
- Village of Hall Summit
- Village of Martin

The Federal Emergency Management Agency (FEMA), now under the Department of Homeland Security, has made reducing losses from natural disasters one of its primary goals. The Hazard Mitigation Plan (HMP) and subsequent implementation of recommended projects, measures, and policies is the primary means to achieving these goals. Mitigation planning and project implementation has become even more significant in a post-Katrina and Rita environment in south Louisiana.

This Hazard Mitigation Plan is a comprehensive plan for disaster resiliency in Red River Parish. The parish is subject to natural hazards that threaten life and health and have caused extensive property damage. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the parish's Office of Homeland Security and Emergency Preparedness undertook this Natural Hazards Mitigation Plan.

"Hazard mitigation" does not mean that all hazards are stopped or prevented. It does not suggest complete elimination of the damage or disruption caused by such incidents. Natural forces are powerful and most natural hazards are well beyond our ability to control. Mitigation does not mean quick fixes. It is a long term approach to reduce hazard vulnerability. As defined by FEMA, "hazard mitigation" means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event.

Why this plan? Every community faces different hazards and every community has different resources and interests to bring to bear on its problems. Because there are many ways to deal with natural hazards and many agencies that can help, there is no one solution or cookbook for managing or mitigating their effects.

Planning is one of the best ways to correct these shortcomings and produce a program of activities that will best mitigate the impact of local hazards and meet other local needs. A well-prepared plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and

with other goals and programs, preventing conflicts and reducing the costs of implementing each individual activity.

Mitigation activities need funding. Under the Disaster Mitigation Act of 2000 (42 USC 5165), a mitigation plan is a requirement for federal mitigation funds. Therefore, a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from FEMA. FEMA also recognizes plans through its Community Rating System, a program that reduces flood insurance premiums in participating communities. This program is described at the end of this chapter.

This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural hazards. It fulfills the federal mitigation planning requirements, qualifies for Community Rating System credit, and provides the parish and its municipalities with a blueprint for reducing the impacts of these natural hazards on people and property.

Location, Demography, and Economy

Location

Located in the northwestern portion of Louisiana, Red River Parish is an irregular-shaped parish and is located about 35 miles southeast of Shreveport and 80 miles northwest of Alexandria (*Figure 1-1*). Red River Parish is bounded by Bossier Parish to the north, Caddo Parish to the northwest, Bienville Parish to the northeast, DeSoto Parish to the west, and Natchitoches Parish to the east and southeast. The total area of the parish is 402 square miles, of which 13 square miles is water.

Figure 1-1: Location of Red River Parish within the State of Louisiana

The parish includes four incorporated municipalities – Coushatta, Edgefield, Hall Summit and Martin. Coushatta, the parish seat, and Edgefield are neighboring communities located in the approximate middle of the parish. Hall Summit is located in the northeastern portion of the parish. Martin is located in the east central portion of the parish near the border with neighboring Natchitoches Parish.

Divided by the parish's namesake, the Red River, Red River Parish is defined by two distinct sections: the rich river bottomlands on the west and the pine & oak uplands on the east. Elevations throughout the parish range from approximately 90 feet, found mainly along the river, to approximately 280 feet in the forested areas to the east. The main transportation arteries through the parish are U.S. Highways 71, 84, and 371, as well as State Highway 1.

Red River Parish is located in Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) Region 7.

As noted above, Red River Parish is located in the northwestern region of Louisiana.

Figure 1-2: Louisiana Homeland Security Regions

Table 1-1: Red River Parish Population
(Source: U.S. Census Bureau)

	2010 Census	2014 Census	Current Year (If Available)	Percent Change 2010 - 2014
Total Population	9,091	8,669	____	-4.60%
Population Density (Pop/Sq Mi)	23.4	____	____	____
Total Households	4,128	4,131	____	____

Economy

A hard-working labor force, abundant raw materials, location near a corridor of significant industrial activity, and land for commercial and industrial development make Red River Parish an ideal prospect for business investment.

Though Red River Parish is one of the smallest parishes, it is well known for its fertile lands. Until recently, the economy of this parish relied primary on the agriculture, timber, and forestry industries. Pine trees are the number one agricultural commodity grown in the area, followed by cotton and soybeans. Beef cattle is also an important agricultural commodity in Red River Parish.

However, the discovery of the Haynesville Shale in northwest Louisiana has shifted the economic focus of Red River Parish and has injected millions into the local economy. Energy companies are setting up shop and drilling in Red River Parish. Mining has also become a major factor in the Red River economic portfolio. In 2010, ADA Carbon Solutions and Energy Capital Partners built a $350 million activated carbon manufacturing

plant in Red River Parish near Coushatta - the largest, most-automated carbon plant in North America. The plant processes lignite mined at nearby Five Forks Mine into activated carbon, which is processed and shipped from a rail and logistics facility in Campti, La., near Natchitoches. Industry data for business patterns in Red River Parish can be found in the table below:

Table 1-2: Business Patterns in Red River Parish
(Source: http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl)

Business Description	Number of Employees	Number of Establishments	Annual Payroll ($1,000)
Retail Trade	100-249	18	___
Manufacturing	100-249	5	___
Health Care and Social Assistance	434	14	11,648
Mining, Quarrying, Oil and Gas Extraction	250-499	6	___
Transportation and Warehousing	81	7	1,995
Construction	100-249	10	___
Administration and Support and Waste Management and Remediation Services	20-99	5	___
Real Estate and Rental and Leasing	0-19	4	___
Wholesale Trade	78	8	2,532
Other Services (except Public Administration)			
Accommodation and Food Services	113	9	1,557
Financial and Insurance	74	9	2,714
Professional, Scientific, and Technical Services	29	10	786
Information	0-19	2	___
Educational Services	0-19	2	___
Agriculture, Forestry, Fishing and Hunting	0-19	3	954
Utilities	20-99	3	___

While nature has presented the parish with a variety of hazards, the parish has the human resources that can face those hazards and manage the impact they have on people and property. This plan will discuss hazards affecting Red River Parish. Hazard Profiles (see Section Two) contain detailed 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.

Hazard Mitigation

To fully understand hazard mitigation efforts in Red River 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 (FEMA) 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 before 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.

Figure 1-3 illustrates 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.

As *Figure 1-3* demonstrates, mitigation relies on 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.

Figure 1-3: The Four Phases of Emergency Management and their Relation to Future Hazard Mitigation
(Source: Louisiana State Hazard Mitigation Plan 2014)

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 well-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 had profound impacts on emergency management and hazard mitigation throughout Louisiana. As detailed later in this document, significant funding has been made available to the State of Louisiana and its parishes for the purpose of hazard mitigation planning. The storms also raised awareness of the importance of hazard mitigation among decision-makers and the general population, which has been particularly important 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 to the Louisiana State Hazard Mitigation Plan, the State 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 within the state, the SHMT has worked to incorporate this information into the decision process.

Part of the ongoing integration process is that GOHSEP encourages 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 2016 Red River Parish Hazard Mitigation Plan maintains much of the information from the 2006 and 2011 plan versions, but it now reflects the order and methodologies of the 2011 Louisiana State Hazard Mitigation Plan. The sections in the 2011 Red River Parish Hazard Mitigation Plan were as follows:

- Section One Prerequisites
- Section Two Planning Process
- Section Three Risk Assessment
- Section Four Mitigation Strategy
- Section Five Plan Maintenance
- Appendices

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 subdivisions are not required to meet such standards, the Act aligns with 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 Red River Parish Hazard Mitigation Steering Committee was not ignorant or 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 it when appropriate, and augmenting it when constructive.

2016 Plan Update

This 2016 plan update proceeds with the previous goals of the Red River Parish Hazard Mitigation Plan. The current goals are as follows:

- Mitigate both critical and non-critical structures and infrastructure around Red River Parish to reduce the impact of hazards
- Pursue opportunities to educate the public on the hazards that can impact Red River Parish
- Maintain a continuity of government before, during, and after a disaster

This plan update makes a number of textual changes throughout, but the most obvious changes are data related and structural edits. 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 event data from other sources including the NOAA Storm Prediction Center, National Hurricane Center, and 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 eleven, separate sections for 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, as well as the removal of repetition between sections from the previous plan updates. The 2016 plan update is organized generally as follows:

- Section One Introduction
- Section Two Hazard Identification and Parish-Wide Risk Assessment
- Section Three Capability Assessment
- Section Four Mitigation Strategy
- Appendix A Planning Process
- Appendix B Plan Maintenance
- Appendix C Essential Facilities
- Appendix D Plan Adoption
- Appendix E State Required Worksheets

Table 1-4: Plan Crosswalk

2011 Plan	Revised Plan (2016)
Section 1: Prerequisites	Section 1: Introduction
Section 2: Planning Process	Appendix A: Planning Process
Section 3: Risk Assessment	Section 2: Hazard Identification and Risk Assessment, Section 3: Capability Assessment
Section 4: Mitigation Strategy	Section 4: Mitigation Strategy
Section 5: Plan Maintenance	Appendix B: Plan Maintenance
Appendices	Appendices

Despite changes in this plan update, the plan remains consistent in its emphasis on the few types of hazards that pose the most risk to loss of life, injury, and property in Red River Parish and its municipalities. The extent of this risk is dictated primarily by its geographic location. Most significantly, Red River Parish remains at high risk of water inundation from various sources, including flooding, tornadoes, and tropical cyclone 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 great degrees 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. 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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2. Hazard Identification and Parish-Wide Risk Assessment

This section assesses the various hazard risks that Red River 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 hazards that had been previously profiled in the Red River Parish Hazard Mitigation Plan published in 2011, as well as the hazards that were identified in the state's 2014 Hazard Mitigation Plan that were considered to be of high or medium risk for the parish by the state. Those hazards identified as high or medium risk by the state or previously identified as a risk by the parish, have been determined to provide a risk to the parish and will be profiled in this section.

Table 2-1: Hazard Profile Summary

Hazard	Profiled in Last Plan	Considered Medium or High Risk in the State's HM Plan	Profiled in the 2016 Update
Subsidence/Coastal Land Loss	X	X	X
Drought	X		X
Earthquakes	X		*
Expansive Soils	X		*
Fog			
Flooding	X	X	X
Extreme Heat	X		X
Sinkholes			
Thunderstorms (Hail, Lightning, & Wind)	X	X	X
Tornadoes	X	X	X
Tropical Cyclones	X	X	X
Tsunamis			
Wildfires	X		X
Winter Storms	X		X
Dam Failure	X		+
Levee Failure	X		+

* Hazard was profiled but discounted

+ Data deficiency

Prevalent Hazards to the Community

While many of the hazards identified in *Table 2-1* occur in the parish, the planning committee did not merit their occurrence for further study. The determination was made to focus attention and resources on the most prevalent hazards, which include the hazards previously profiled. In addition, it was determined earthquake and expansive soil hazards have no impact on the parish and profiled, but not carried forward into risk assessment. Dam and levee failure both claim a data deficiency.

The following hazards have been selected to be included in this risk assessment:

a) Drought
b) Earthquakes
c) Expansive Soils
d) Extreme Heat
e) Flooding (backwater, riverine, localized stormwater event)
f) Thunderstorms (hail, lightning, wind)
g) Tornadoes
h) Tropical Cyclones (flooding and high winds)
i) Wildfires
j) Winter Storms
k) Dam Failure
l) Levee Failure

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

- Flooding from rivers and waterways, rain storms, tropical cyclones, and hurricanes in the following forms:
  a) Riverine
  b) Stormwater
  c) Surge
  d) Backwater flooding (as the result of river flooding and surge)
- High wind damage most commonly resulting from hurricanes, thunderstorms, and tornadoes
- Property and crop damage resulting from drought, extreme heat, and wildfires

The potential destructive power of tropical cyclones and flooding were determined to be the most prevalent hazards to the parish. Seven of the ten Presidential Declarations Red River Parish has received resulted from either tropical cyclones (4 declarations) or flooding (3 declarations), which validates these as the most significant hazards. Therefore, the issues of hurricanes and floods will both serve as the main focus during the mitigation planning process. Hurricanes present risks from the potential for flooding, primarily resulting from storm surge, and high wind speeds. While storm surge is considered the hazard with the most destructive potential, the risk assessment will also asses non-storm surge flooding as well. Flooding can also occur from non-hurricane events, as flash floods are a common occurrence due to heavy rainfall.

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 Red River Parish is included in the hurricane risk assessment.

Red River Parish is also susceptible to tornadoes. Tornadoes can spawn from tropical cyclones or severe weather systems that pass through Red River Parish. High winds produced by tornadoes have the potential to destroy residential and commercial buildings, as well as create wind-borne objects from the debris produced by the destruction of the natural and human environment, such as building materials and trees.

Previous Occurrences

Table 2-2 summarizes federal disaster declarations for Red River Parish since 1965. Information includes names, dates, and types of disaster.

Table 2-2: Red River Parish Major Disaster Declarations

Disaster Declaration Number	Date	Type of Disaster
3031	2/22/1977	Drought and Freezing
829	5/20/1989	Severe Storms and Flooding
904	5/3/1991	Severe Storms, Tornadoes, and Flooding
1264	1/21/1999	Severe Ice Storm
2337	9/11/2000	LA – Western Louisiana Fire Complex – 9/8/00
1603	8/29/2005	Tropical Cyclone – Hurricane Katrina
1607	9/24/2005	Tropical Cyclone – Hurricane Rita
1786	9/2/2008	Tropical Cyclone – Hurricane Gustav
1792	9/13/2008	Tropical Cyclone – Hurricane Ike
4228	7/13/2015	Severe Storms and Flooding

Probability of Future Hazard Events

The probability of a hazard event occurring in Red River Parish is estimated in the table on the following page. 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 2014. In staying consistent with the state plan, the SHELDUS database was evaluated for the last twenty five years (1990 – 2015) 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, in order to assist with determining estimated losses, unless otherwise stated, the full 54-year record was used when Hazus-Multi-Hazard (MH) 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 for inflation in order 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. This was used due to it containing specific data for cities, whereas the data within SHELDUS is limited to parishes.

The following table shows the annual probability for each hazard occurring across the parish and in separate jurisdictions:

Table 2-3: Probability of Future Hazard Reoccurrence

Hazard	Probability				
	Red River Parish (Unincorporated)	Coushatta	Edgefield	Hall Summit	Martin
Drought	4%	4%	4%	4%	4%
Subsidence/Coastal Land Loss	<1%	< 1%	< 1%	<1%	<1%
Expansive Soils	<1%	< 1%	< 1%	<1%	<1%
Extreme Heat	16%	16%	16%	16%	16%
Flooding	24%	32%	4%	8%	4%
Thunderstorms (Hail)	16%	16%	16%	16%	16%
Thunderstorms (Lightning)	4%	4%	4%	4%	4%
Thunderstorms (Wind)	80%	80%	80%	80%	80%
Tornadoes	12%	12%	12%	12%	12%
Tropical Cyclones	12%	12%	12%	12%	12%
Wildfires	<1%	< 1%	< 1%	<1%	<1%
Winter Storms	40%	40%	40%	40%	40%
Dam Failure	<1%	< 1%	< 1%	<1%	<1%
Levee Failure	<1%	< 1%	< 1%	<1%	<1%

As shown in *Table 2-3*, thunderstorm winds for the entire planning area have the highest annual chance of occurrence in the parish (80%). Winter storms have a 40% annual chance of occurrence, followed by flooding for the incorporated area of Coushatta at a 32% annual chance. Flood events in the remaining incorporated areas and unincorporated area have a slightly lower chance of occurring annually. Both extreme heat and hail have an annual chance of occurrence of 16%, followed by tornadoes and tropical cyclones at 12%, and lightning and drought at 4%. Wildfires have the lowest annual chance of occurrence in Red River Parish with an annual chance of occurrence calculated at less than 1%. Both expansive soils and earthquakes were discounted since they have no impact on Red River Parish and the annual chance of occurrence was calculated at less than 1% for both hazards. Dam and levee failure both claim a data deficiency.

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 (GOHSEP) on critical infrastructure from a previous hazard mitigation project.

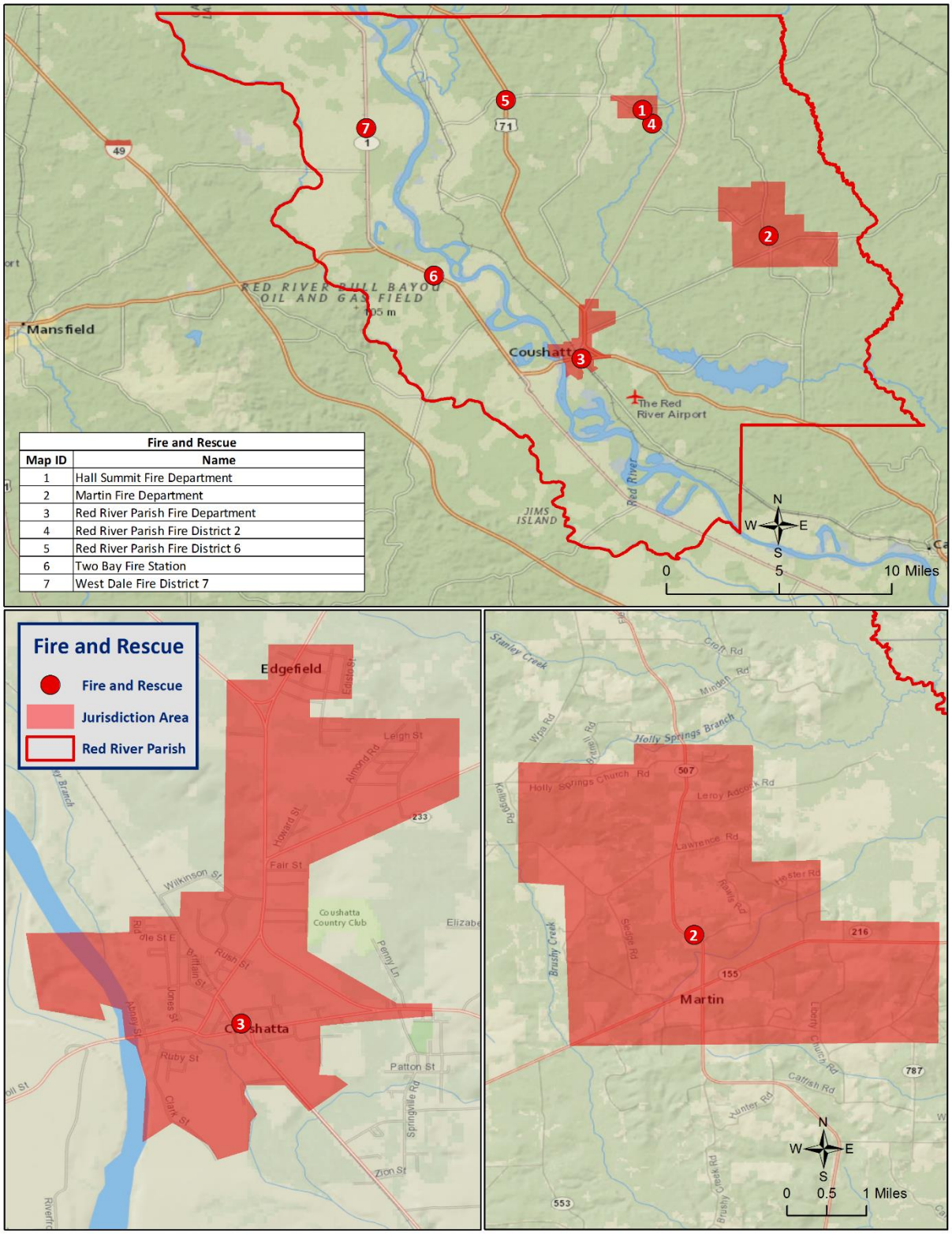
Within the entire planning area, there is an estimated value of $18,611,725,000 in structures throughout the parish. The table below provides the total estimated value for each type of structure by occupancy.

Table 2-4: Estimated Total of Potential Losses throughout Red River Parish

Occupancy	Red River Parish	Unincorporated Red River	Coushatta	Edgefield	Hall Summit	Martin
Agricultural	$4,322,000	$2,492,000	$1,358,000	$0	$472,000	$0
Commercial	$162,315,000	$36,587,000	$115,412,000	$0	$900,000	$9,416,000
Government	$12,422,000	$6,008,000	$5,618,000	$0	$796,000	$0
Industrial	$21,159,000	$11,885,000	$8,416,000	$0	$858,000	$0
Religion	$28,950,000	$18,696,000	$9,372,000	$0	$882,000	$0
Residential	$994,500,000	$663,082,000	$189,237,000	$32,221,000	$36,028,000	$73,932,000
Education	$14,830,000	$0	$11,138,000	$0	$3,692,000	$0
Total	$1,238,498,000	$738,750,000	$340,551,000	$32,221,000	$43,628,000	$83,348,000

Essential Facilities of the Parish

The following figures show the locations and names of the essential facilities within the parish:



Fire and Rescue	
Map ID	Name
1	Hall Summit Fire Department
2	Martin Fire Department
3	Red River Parish Fire Department
4	Red River Parish Fire District 2
5	Red River Parish Fire District 6
6	Two Bay Fire Station
7	West Dale Fire District 7

Figure 2-1: Fire and Rescue Buildings in Red River Parish

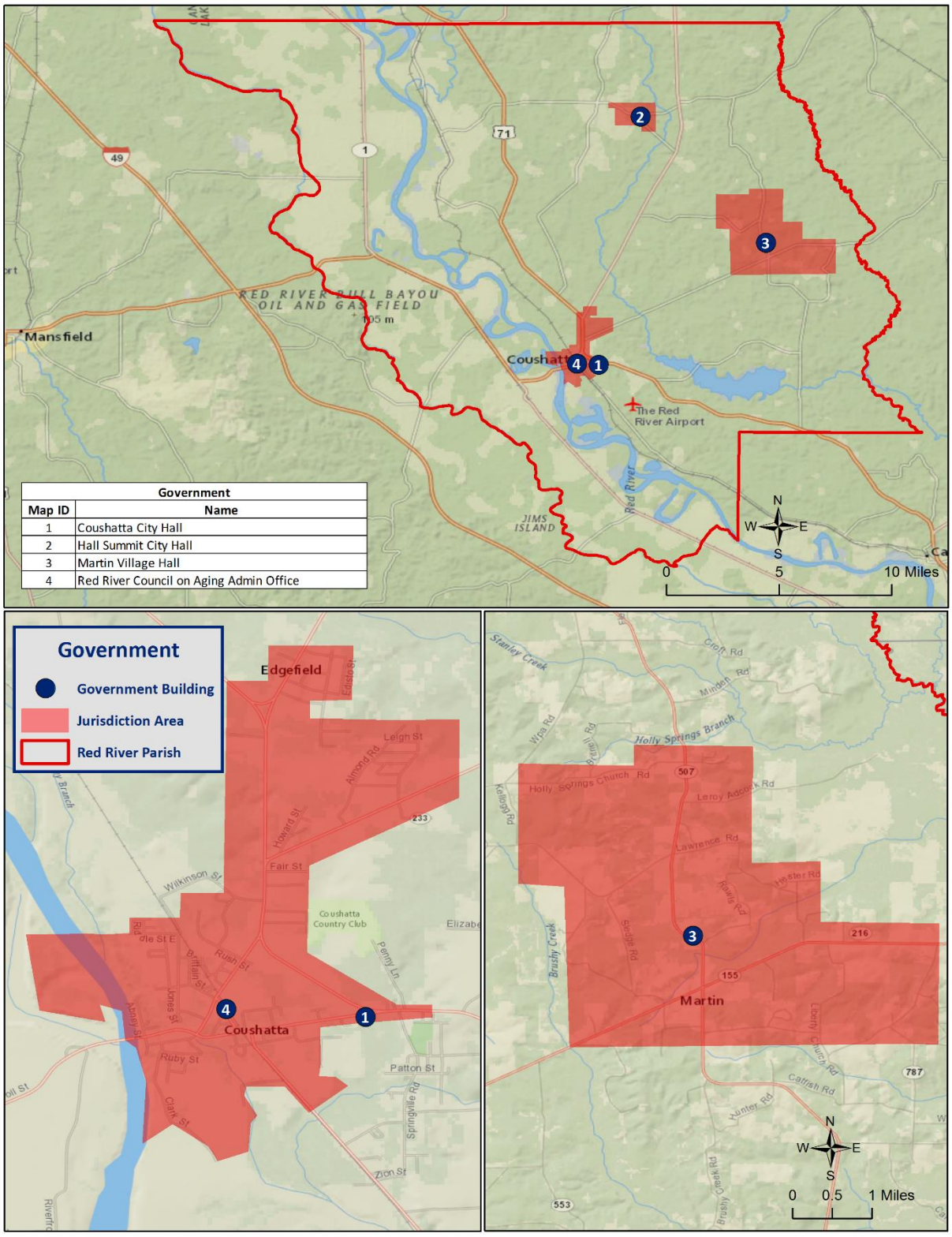


Figure 2-2: Government Buildings in Red River Parish

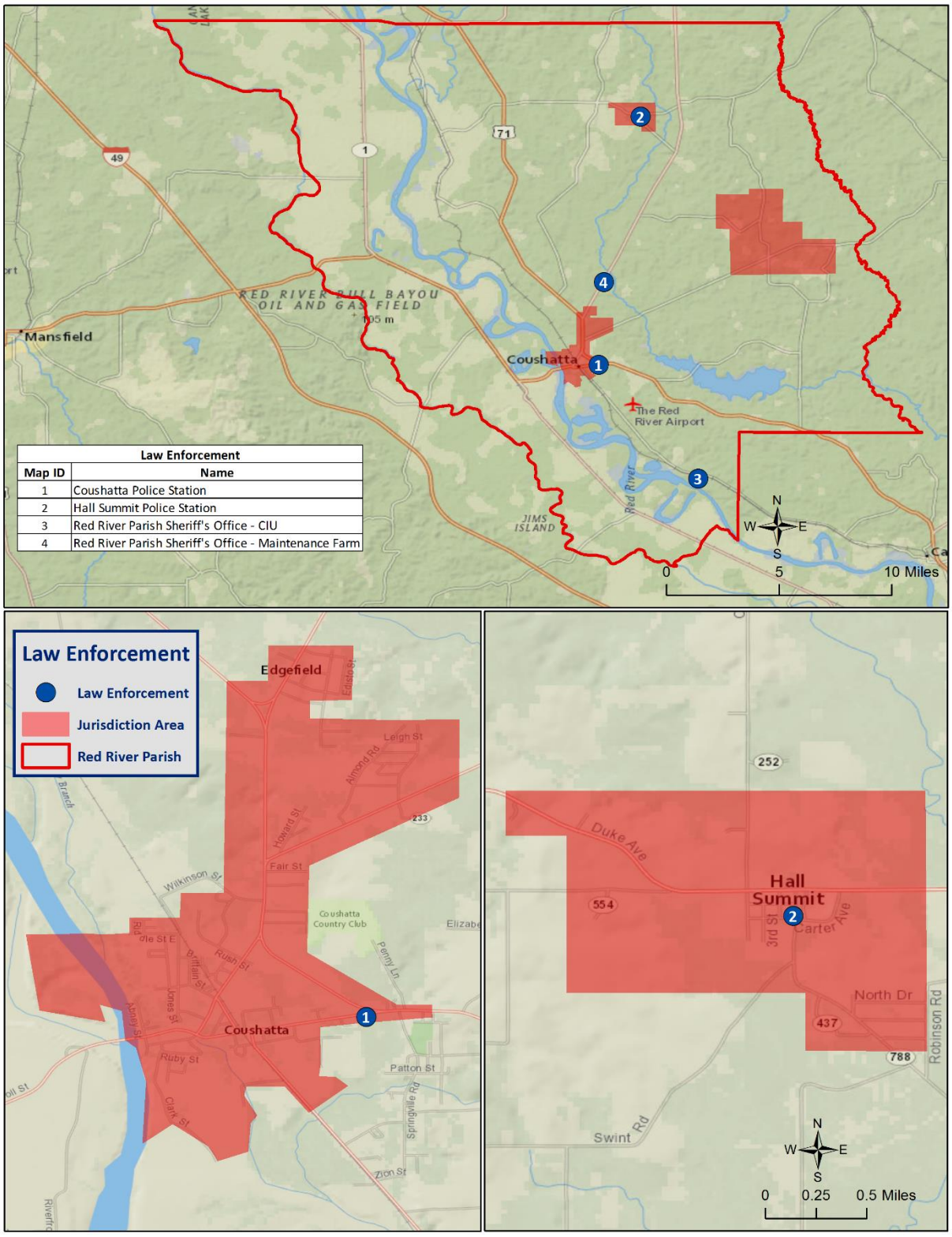


Figure 2-3: Law Enforcement Buildings in Red River Parish

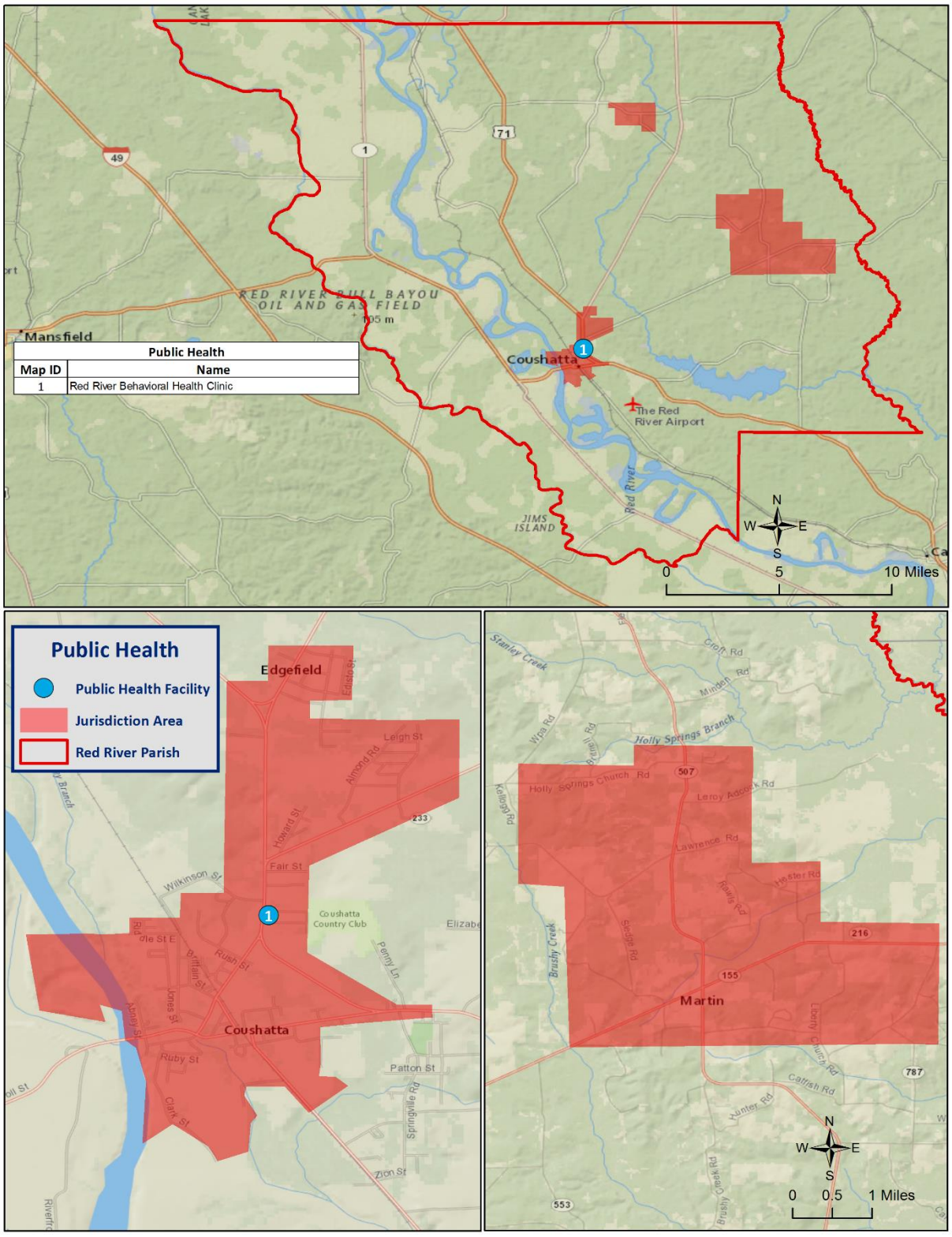


Figure 2-4: Public Health Buildings in Red River Parish

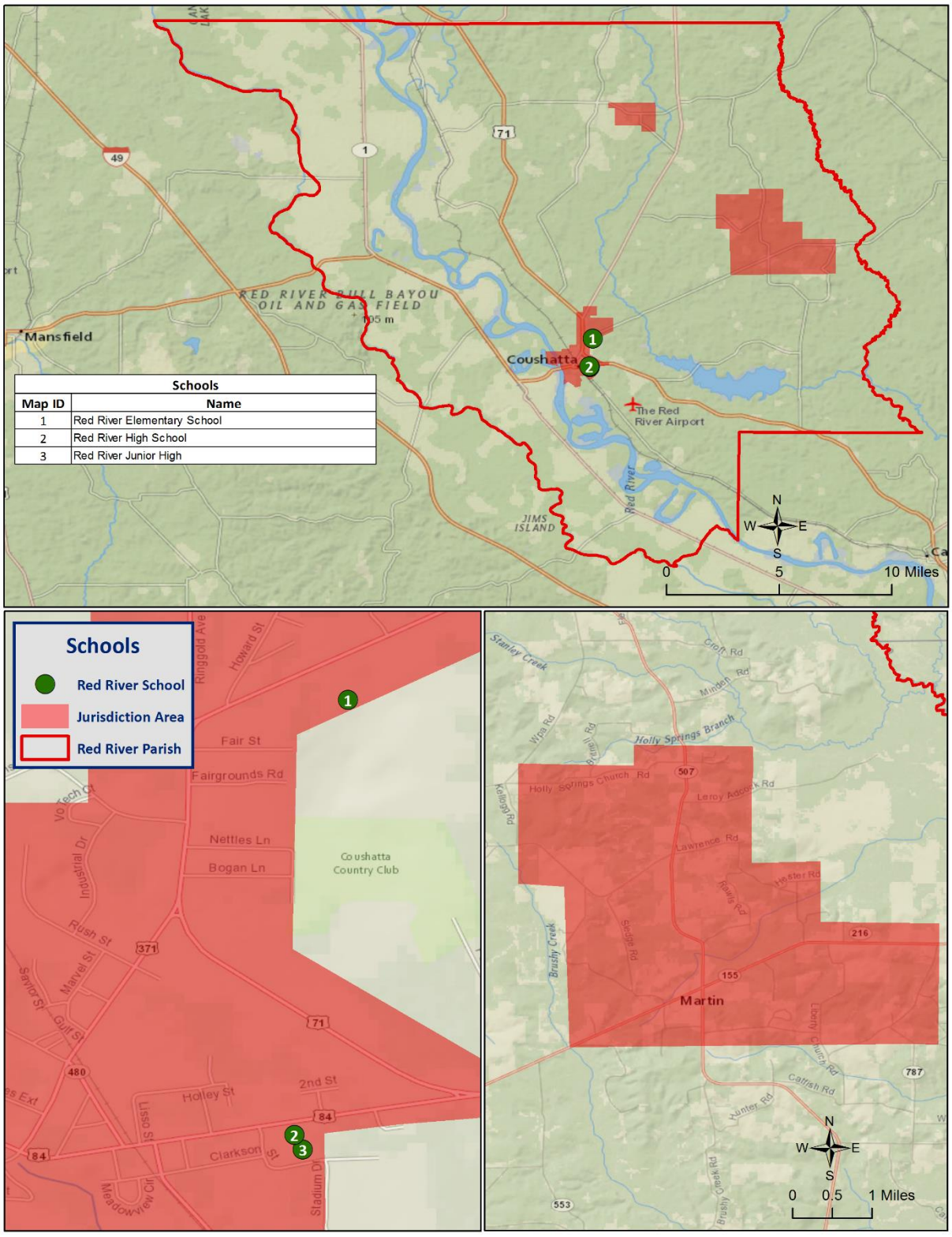


Figure 2-5: School Buildings in Red River Parish

Future Development Trends

Red River Parish experienced a decline in population and a small growth in housing between the years of 2000 and 2014, with population declining from 9,598 in 2000 to a population of 8,669 in 2014. This decline was largely in the incorporated areas of Coushatta and Martin from the years 2000 to 2010, and in the incorporated areas of Edgefield, Hall Summit, and Coushatta from 2010 to 2014. The incorporated areas of Hall Summit and Edgefield experienced a growth in population from the years of 2000 to 2010. From 2010 to 2014, all areas of the parish experienced a decline in population. The future population and number of buildings can be estimated using U.S. Census Bureau housing and population data. The following tables show population and housing unit estimates from 2000 to 2014:

Table 2-5: Population Growth Rate for Red River Parish

Total Population	Red River Parish	Red River (Unincorporated)	Coushatta	Edgefield	Hall Summit	Martin
1-Apr-00	9,598	6,247	2,252	196	267	636
1-Apr-10	9,079	6,007	1,961	218	300	593
1-Jul-14	8,669	5,739	1,869	207	286	568
Population Growth between 2000 – 2010	-5.4%	-3.8%	-12.9%	11.2%	12.4%	-6.8%
Average Annual Growth Rate between 2000 – 2010	-0.5%	-0.4%	-1.3%	1.1%	1.2%	-0.7%
Population Growth between 2010 – 2014	-4.5%	-4.5%	-4.7%	-5.0%	-4.7%	-4.2%
Average Annual Growth Rate between 2010 – 2014	-1.13%	-1.12%	-1.17%	-1.26%	-1.17%	-1.05%

Table 2-6: Housing Growth Rate for Red River Parish

Total Housing Units	Red River Parish	Red River (Unincorporated)	Coushatta	Edgefield	Hall Summit	Martin
1-Apr-00	3,988	2,701	823	95	120	249
1-Apr-10	4,128	2,845	789	93	136	265
1-Jul-14	4,132	2,742	853	80	160	297
Housing Growth between 2000 – 2010	3.5%	5.3%	-4.1%	-2.1%	13.3%	6.4%
Average Annual Growth Rate between 2000 – 2010	0.4%	0.5%	-0.4%	-0.2%	1.3%	0.6%
Housing Growth between 2010 – 2014	0.1%	-3.6%	8.1%	-14.0%	17.6%	12.1%
Average Annual Growth Rate between 2010 – 2014	0.0%	-0.9%	2.0%	-3.5%	4.4%	3.0%

As shown in the previous tables, Red River Parish experienced slight growth in housing units and a decline in population. Housing growth rates grew at 0.4% annually from 2000 to 2010, and at less than 0.1% annually from 2010 to 2014. Population declined at an annual rate of -0.5% from 2000 to 2010, and -1.13% annually from 2010 to 2014. From 2000 to 2010, the incorporated areas of Hall Summit and Edgefield were the only areas to increase in population at 12.4% and 11.2% overall respectively. From 2010 to 2014, all areas in the parish experienced a decline in population with the incorporated area of Edgefield having the largest decline in population at -5% overall.

The incorporated area of Hall Summit experienced the largest increase in housing units from 2000 to 2010 at 13.3%, followed by the incorporated area of Martin at 6.4%. The incorporated areas of Coushatta and Edgefield experienced a decline in housing units during this time period. From 2010 to 2014, Hall Summit continued to grow in housing units by 17.6% overall followed by Martin at 12.1%. The unincorporated areas of Red River Parish and the incorporated areas of Edgefield experienced a decline in housing units during this time period.

Future Hazard Impacts

Hazard impacts were estimated for five years and ten years in the future (2019 and 2024). Yearly population and housing growth rates were applied to parish inventory assets for composite flood and tropical cyclones. Based on a review of available information, it is assumed that population and housing units will grow slightly within Red River Parish from the present until 2024. A summary of estimated future impacts is shown in the table below. Dollar values are expressed in future costs and assume an annual rate of inflation of 1.02%. No changes in development have impacted the community's vulnerability since the plans last update.

Table 2-7: Estimated Future 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	4,132	1,525	1,527	1,529
Value of Structures	$1,238,498,000	457063116.3	481436450.5	507109516.5
# of People	8,669	3,199	3,215	3,231
Tropical Cyclones				
Structures	4,132	4,132	4,137	4,142
Value of Structures	$1,238,498,000	$1,238,498,000	$1,304,542,108	$1,374,108,082
# of People	8,669	8,669	8,712	8,756

Land Use

The Red River Parish Land Use table is provided on the next page. Residential, commercial, and industrial areas account for only 4% of the parish's land use. Agricultural land is the largest category at 230,385 acres, accounting for 56% of parish land. At 130,329 acres, wetlands account for 32% of parish lands, while 21,899 acres of water areas account for 5% of parish lands. The parish also consists of 10,783 acres of forest land areas, accounting for 3% of all parish lands.

Table 2-8: Red River Parish Land Use
(Source: USGS Land Use Map)

Land Use	Acres	Percentage
Agricultural Land, Cropland, and Pasture	230,385	56%
Wetlands	130,329	32%
Forest Land (not including forested wetlands)	10,783	3%
Urban/Development	16,261	4%
Water	21,899	5%

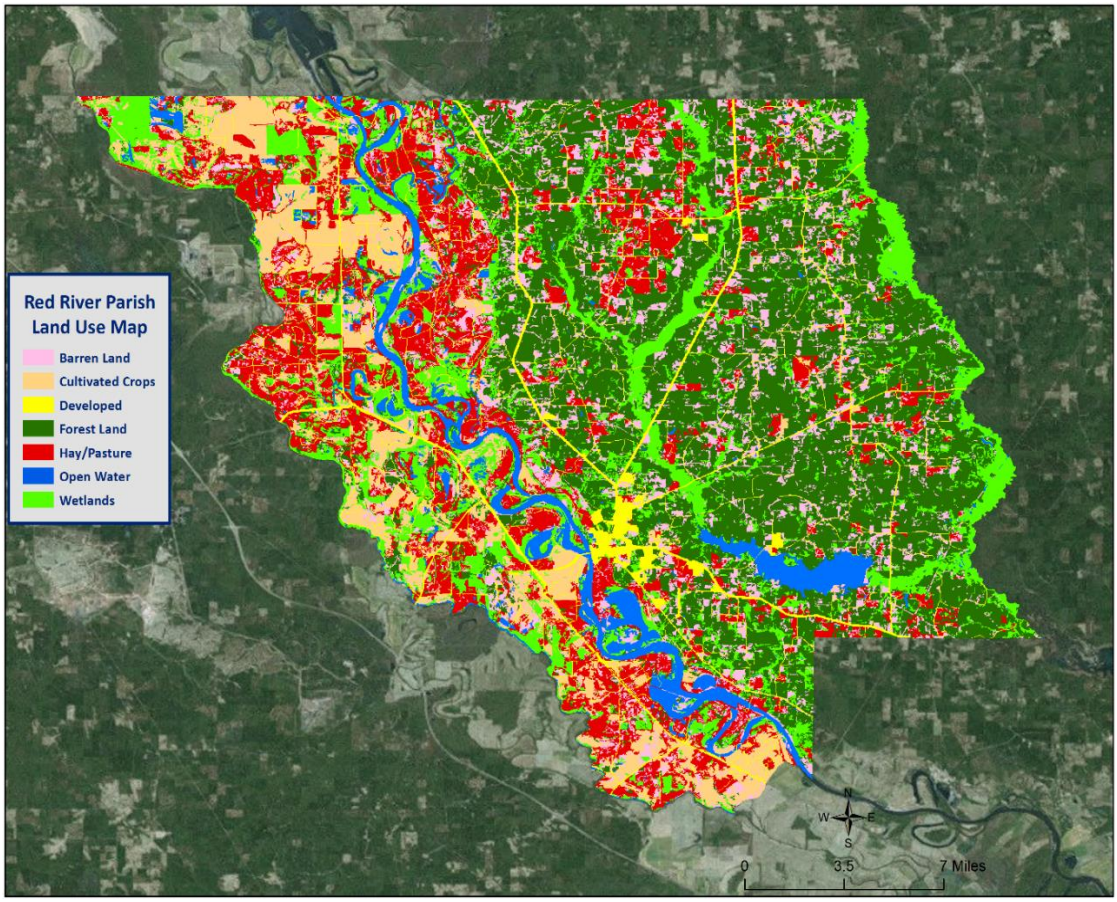


Figure 2-6: Red River Parish Land Use Map
(Source: USGS Land Use Map)

Hazard Identification

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 lack 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. 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 also tend to be associated with other hazards, such as wildfires and/or heat waves. 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.

This hazard is often measured using the Palmer Drought Severity Index (PDSI, also known operationally as the Palmer Drought Index). The PDSI, first developed by Wayne Palmer in a 1965 paper for the U.S. Weather Bureau, measures drought through recent precipitation and temperature data with regard to a basic supply-and-demand model of soil moisture. It is most effective in long-term calculations. Three other indices used to measure drought are the Palmer Hydrologic Drought Index (PHDI), the Crop Moisture Index (CMI), which is derived from the PDSI, and the Keetch-Byram Drought Index (KBDI), created by John Keetch and George Byram in 1968 for the U.S. Forest Service. The KBDI is used mainly for predicting the likelihood of wildfire outbreaks. As a compromise, the PDSI is used most often for droughts since it is a medium-response drought indicator. The objective of the PDSI is to provide measurements of moisture conditions that are standardized so that comparisons using the index can be made between locations and between months. On the next page, *Table 2-9* displays the range and Palmer classifications of the PDSI index. *Figure 2-7* displays the current drought monitor for the State of Louisiana and its parishes.

Table 2-9: Palmer Drought Severity Index Classification and Range

Range	Palmer Classifications
4.0 or more	Extremely Wet
3.0 to 3.9	Very Wet
2.0 to 2.9	Moderately Wet
1.0 to 1.99	Slightly Wet
0.5 to 0.99	Incipient Wet Spell
0.49 to -0.49	Near Normal
-0.5 to -0.99	Incipient Dry Spell
-1.0 to -1.99	Mild Drought
-2.0 to -2.99	Moderate Drought
-3.0 to -3.99	Severe Drought
-4.0 or less	Extreme Drought

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 in addition to the effects of cumulative patterns of previous months. Although weather patterns can change almost overnight from a long-term drought pattern to a long-term wet pattern, as a medium-response indicator, the PDSI responds relatively rapidly. Data compiled by the National Drought Mitigation Center indicates normal conditions exist in Red River Parish at the time this plan went to publication (*Figure 2-7*).

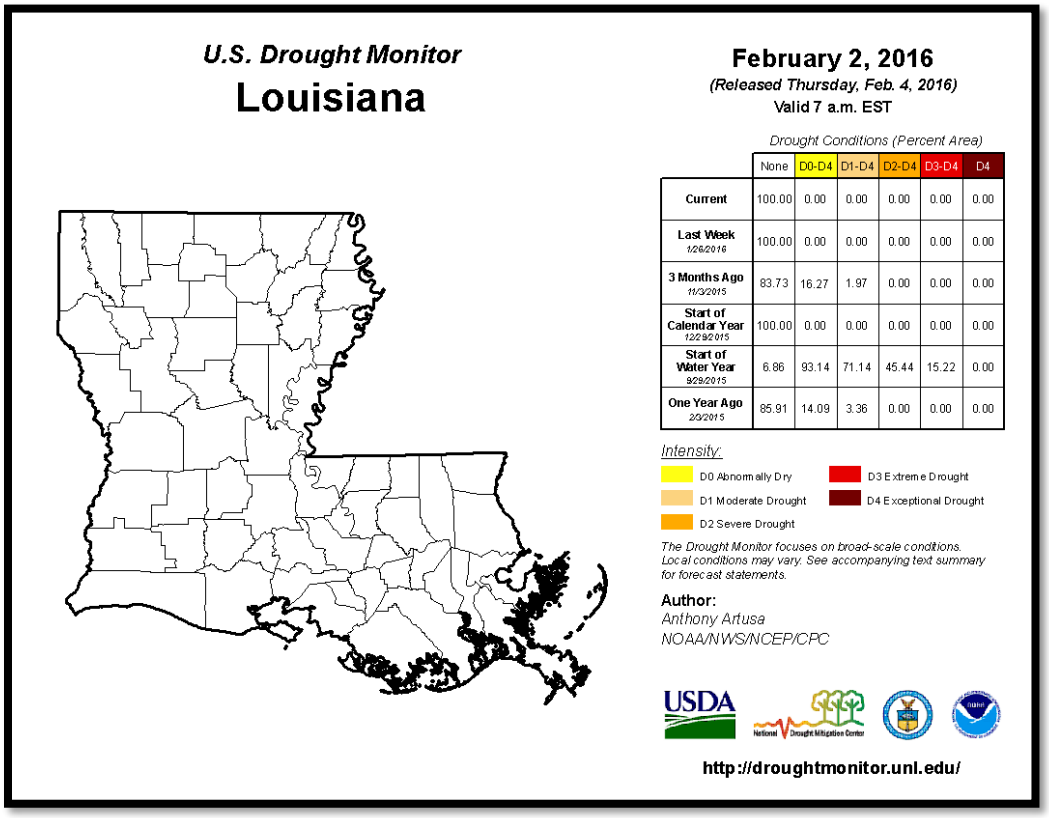


Figure 2-7: United States Drought Monitor for the State of Louisiana and its Parishes (Source: The National Drought Mitigation Center)

Location

Drought typically impacts a region and not one specific parish or jurisdiction. While the entire planning area can experience drought, the major impact of a drought event in Red River Parish is on the agricultural community.

Previous Occurrences / Extents

The SHELDUS database reports a total of one drought event occurring within the boundaries of Red River Parish between the years of 1990 to 2015. *Table 2-10* identifies the date of occurrence, estimated crop damage, and severity of the events that have occurred in Red River Parish. Based on previous occurrences, and in accordance with the Palmer Drought Index, the worst case scenario for drought in Red River Parish would be a severe drought event.

Table 2-10: Drought Events with Crop Damage Totals for Red River Parish (Source: SHELDUS)

Date	Crop Damage	Palmer Classification
June 1998	$1,281,497	Severe Drought

Frequency / Probability

Based on previous occurrences of one drought event in 25 years, the probability of drought occurrence in the planning area in any given year is 4%.

Estimated Potential Losses

According to the SHELDUS database, there has been one drought event that have caused some level of crop damage. The total agricultural damage from these events is $1,281,497, with an average cost of $1,281,497 per drought event. When annualizing the total cost over the 25-year record, total annual losses based on drought is estimated to be $51,260. *Table 2-11* presents an analysis of agricultural exposure that is susceptible to drought by major crop type for Red River Parish.

Table 2-11: Agricultural Exposure by Crop Type for Droughts in Red River Parish (Source: LSU Ag Center 2014 Parish Totals)

Agricultural Exposure by Type for Drought in Red River Parish						
Forestry	Hay	Soybeans	Feed Grains	Cotton	Blueberries	Total
$9,832,412	$4,879,000	$3,521,070	$2,944,425	$1,799,701	$852,500	$23,829,108

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

Earthquakes

An earthquake is a sudden motion or trembling of the Earth caused by an abrupt release of stored energy in the rocks beneath the Earth's surface. The energy released results in vibrations which are known as seismic waves. Ground motion from seismic waves is expressed as peak ground acceleration (PGA), the fastest measured change in speed for a particle at ground level that is moving because of an earthquake. PGA is commonly measured as a percentage of acceleration due to Earth's gravity (%g). This measurement is relied upon to determine seismic load engineering design and construction requirements. Earthquakes are typically described in terms of magnitude and intensity. Magnitude is the measure of the amplitude of the seismic wave and is often expressed by the Richter scale, and intensity is a measure of how strong the shock was felt at a particular location, indexed by the Modified Mercalli Intensity (MMI) scale. The Richter scale is a logarithmic measurement whereby an increase in the scale by one whole number represents a tenfold increase in measured ground motion of the earthquake (and an increase in energy released of more than 30 times). An increase by two whole numbers represents a 102 (or 100-fold) increase in ground motion, and thus more than 302 (or 900) times the energy released. *Table 2-12* shows the rough correlation between the Richter scale, PGA, and the MMI. The relationship between these is approximate and depends upon such specifics as the depth of the focus (the location of the actual rock movement) and distance from the epicenter (the location on the Earth's surface above the earthquake focus) of the earthquake.

Table 2-12: Comparison of Earthquake Magnitudes for PGA, Richter, and MMI
(Source: USGS Earthquake Hazards Program)

COMPARISON OF EARTHQUAKE METRICS			
PGA (%g)	**Magnitude (Richter)**	**Intensity (MMI)**	**Description (MMI)**
<0.17	1.0 - 3.0	I	**I**. Not felt except by a very few under especially favorable conditions.
0.17 - 1.4	3.0 - 3.9	II - III	**II**. Felt only by a few persons at rest, especially on upper floors of buildings. **III**. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	**IV**. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rock noticeably. **V**. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 - 34	5.0 - 5.9	VI - VII	**VI**. Felt by all. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. **VII**. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

Comparison of Earthquake Metrics			
PGA (%g)	**Magnitude (Richter)**	**Intensity (MMI)**	**Description (MMI)**
34 - 124	6.0 - 6.9	VII - IX	**VIII**. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. **IX**. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
>124	7.0 and higher	**VIII** or higher	**X**. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. **XI**. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. **XII**. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

The system of subsidence faults in southern Louisiana developed due to accelerated land subsidence and rapid sediment deposition from the Mississippi River. The system stretches across the southern portion of the state from Beauregard Parish in the west to West Baton Rouge Parish in the east and it includes every parish south of this line. This system is thought to be responsible for many of the recorded earthquakes from 1843 to the present. All of the earthquakes that occurred over this period of time were of low magnitude, resulting mostly in limited property damage (such as broken windows, damaged chimneys, and cracked plaster). While faults throughout the northwestern parishes are thought to be inactive, the New Madrid seismic zone lies just to the north of Louisiana and originates in the region of New Madrid, Missouri. The magnitude of historic earthquakes originating in the New Madrid seismic zone is far greater than that generated by the subsidence fault system in coastal Louisiana. A significant seismic event from the New Madrid seismic zone is more likely to have a greater impact on Louisiana than a seismic event from the subsidence fault system.

Location

An earthquake event is a geological hazard that occurs along fault lines. Red River Parish has no fault lines that run directly through the parish; however, there is a fault line in the adjacent parish of Bienville (*Figure 2-8*).

Previous Occurrences / Extents

Both the SHELDUS and National Climatic Data Center report no earthquake events occurring within the boundaries of Red River Parish between the years of 1990 – 2015. The National Oceanic and Atmospheric Administration's National Geophysical Data Center reports no earthquake event occurring within the boundaries of Red River Parish between the years 1811 – 2014. *Figure 2-8* displays the location and intensity of each earthquake in the parishes surrounding Red River Parish. Based on the previous earthquake events in surrounding parishes, an earthquake with an intensity level of MMI 1 could occur within the planning area. This intensity of an earthquake would only be felt by a very few people.

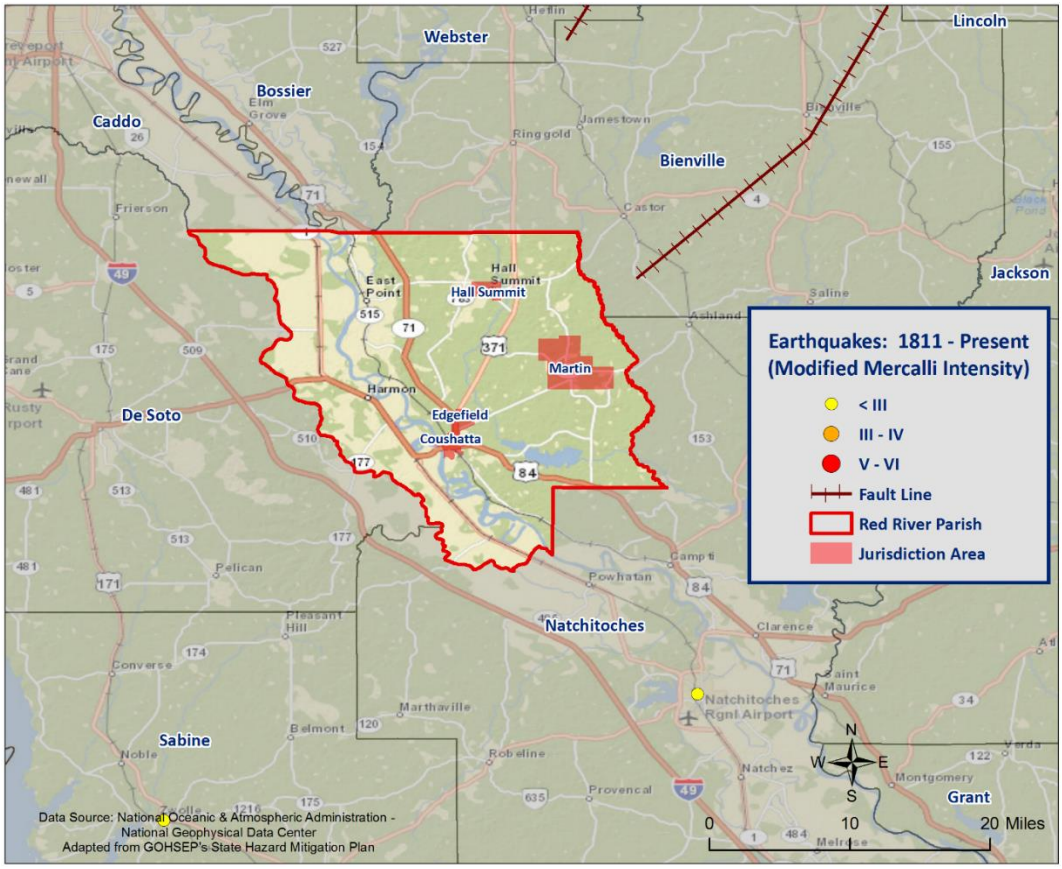


Figure 2-8: Location and Intensity (MMI) of Earthquakes in Red River Parish

Frequency / Probability

Based on historical records, it is determined that an earthquake event has less than a 1% annual chance of occurrence and would have a little to no impact in the Red River Parish planning area; therefore, earthquakes hazards are discounted. As a result, earthquakes are not carried forward into risk assessment.

Expansive Soils

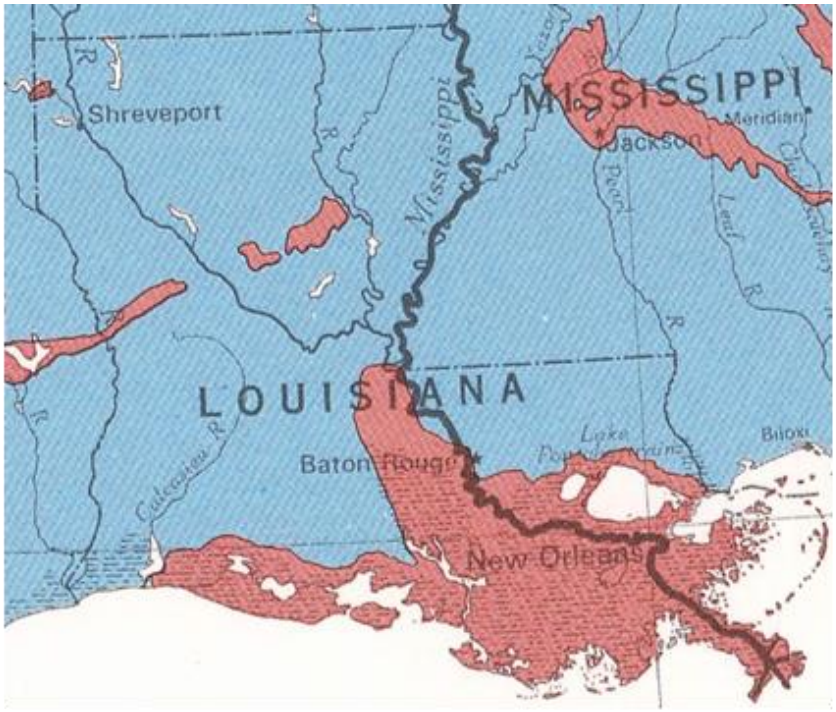
Soils and soft rock that tend to swell or shrink due to changes in moisture content are commonly known as expansive soils. Changes in soil volume present a hazard primarily to structures built on top of expansive soils. The most extensive damage occurs to highways and streets.

"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 of clays resulting from climatic 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, it is evident that the southeastern portion of Louisiana, primarily along the Mississippi River from around East Baton Rouge Parish to the mouth of the Mississippi River, is abundant with high swelling potential clays. Clays in the Quaternary Alluvium of the lower Mississippi River Valley in Louisiana are reported to be of the "montmorillonite type". Clayey soils of the alluvial valley have high "shrink-swell capacity", and foundation problems in the area are associated with changing water levels and the instability of clayey soils. Foundation failures in alluvial deposits of the Mississippi River valley are common. *Figure 2-9* shows the primary locations of swelling clays in Louisiana and *Figure 2-10* shows the areas within the planning area that are at risk to expansive soils.



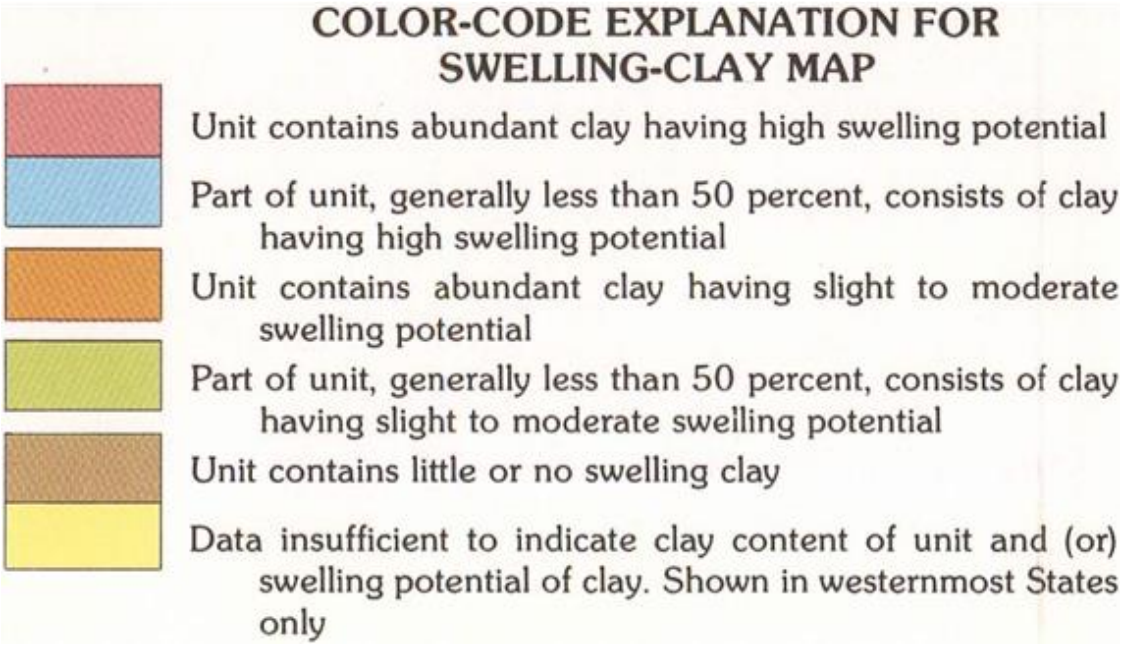


Figure 2-9: Location of Swelling Clays in Louisiana
(Source: "Swelling Clays Map of the Conterminous United States", W.W. Olive, A.F. Chleborad, C.W. Frahme, J. Schlocker, R.R. Schneider, and R.L. Shuster; 1989)

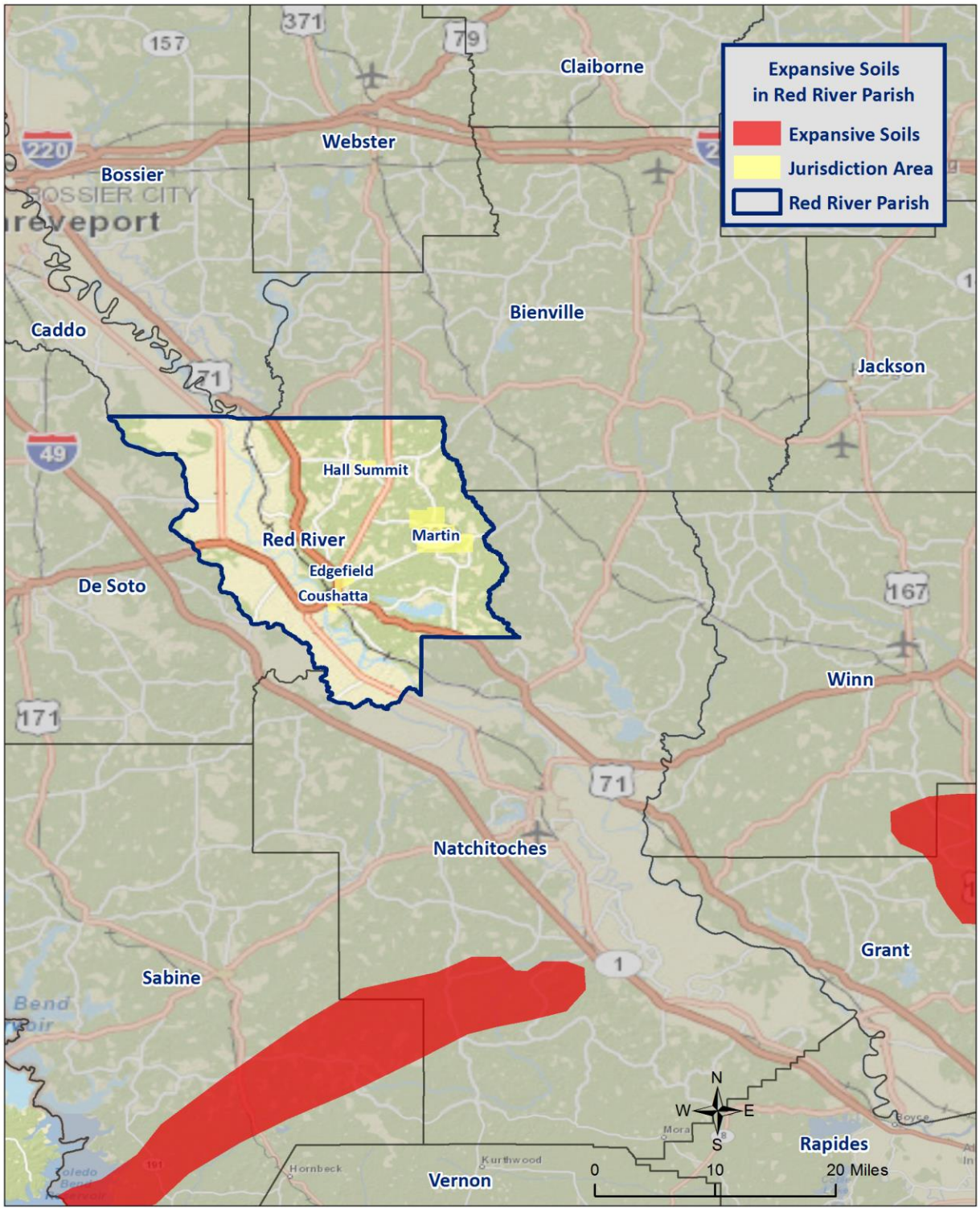


Figure 2-10: Location of Swelling Clays in Red River Parish
(Source: "Swelling Clays Map of the Conterminous United States", W.W. Olive, A.F. Chleborad, C.W. Frahme, J. Schlocker, R.R. Schneider, and R.L. Shuster; 1989)

Based on the map in *Figure 2-10*, there is no risk of expansive soils within Red River Parish.

Previous Occurrences / Extents

There have been no previous occurrences in the planning area.

Frequency / Probability

Based on *Figure 2-10*, expansive soils are located outside of the planning area of Red River Parish and have less than a 1% annual chance of occurrence. It is determined that expansive soils has no impact on the Red River Parish planning area, and it is therefore discounted and 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 Meteorological 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 five 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 (NWS) 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 *Table 2-13*, and *Table 2-14* summarizes the HI risk levels and protective measures. 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 with strong, hot winds present.

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 in relation to their 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, utilities, and railroads. Extreme heat can cause pavement to soften, creating the buckling of roads and highways, which can result in potholes and rutting. These damaged roads can create hazardous conditions, causing motorists to find alternate transportation routes. Old water and sewer lines can deteriorate, increasing the likelihood of line ruptures during extreme heat. The demands on water supplies can result in water rationing, shortages, and restrictions. Extreme heat can also cause strain on several power grids, causing people to minimize the consumption of power during the hottest parts of the day due to overheating. The overwhelming demand of excess electrical power usage can also cause a strain on power capacities, resulting in blackout and /or brown outs. vehicles can overheat, and tires will deteriorate. High temperatures can be partially responsible for the expansion, buckling, or deflection of rails requiring track repairs or speed restrictions to avoid derailments.

Extreme heat can also be detrimental to the agricultural community. Extreme heat stress can reduce plant photosynthetic and transpiration efficiencies and negatively impact plant root development, which collectively can negatively impact yield. Heat injury in plants includes scalding and scorching of leaves and stems, sunburn on fruits and stems, leaf drop, rapid leaf death, and reduction in growth and yield. Extreme heat is particularly impactful when extreme heat is accompanied by drought conditions. The reduced moisture in the soil further exacerbates the effects of extreme temperatures.

The agrarian issues associated with extreme heat are relevant throughout the state, but are particularly significant in rural and agricultural parishes. A reduction of crop yield will diminish the incomes of farmers and producers in the area. If the reduced crop yield lasts over an extended period of time, the resulting reduction in disposable income could have a negative impact on businesses in the affected communities. People wouldn't have any extra money to spend at local establishments, and businesses would be forced to close for good.

Table 2-13: Heat Index Advisor based on Air Temperature (°F) and Relative Humidity (Source: National Weather Service)

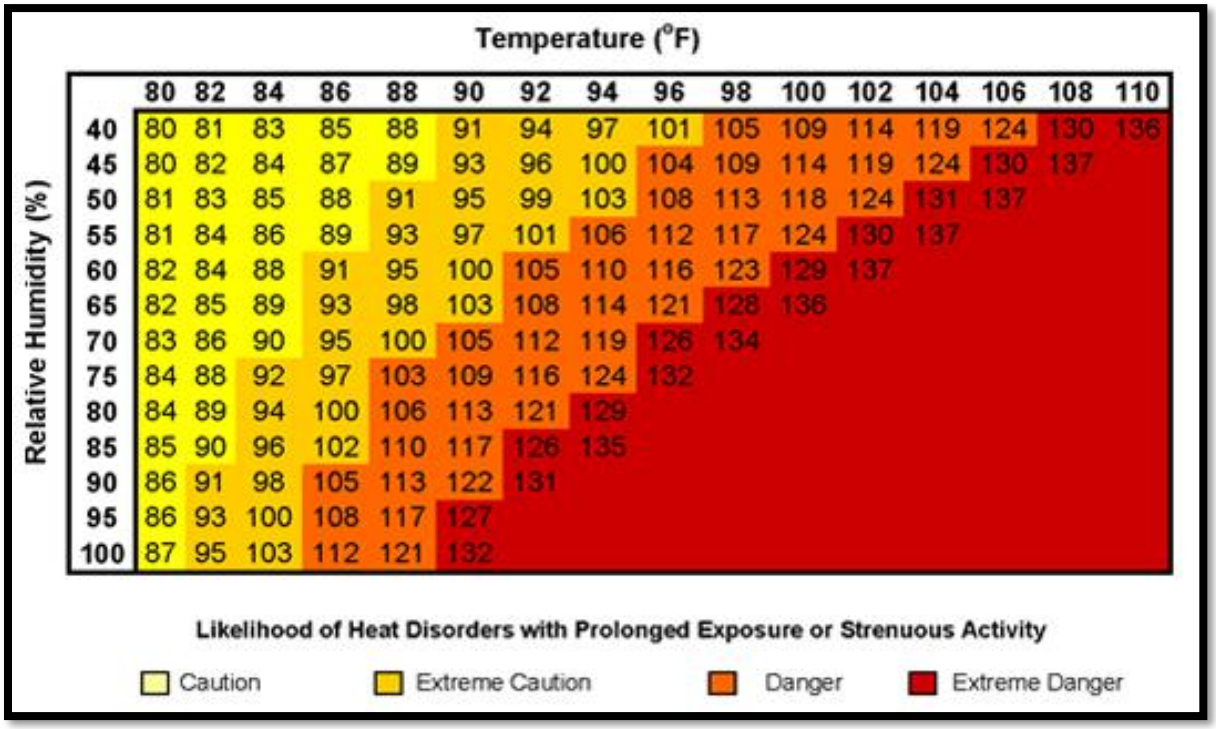


Table 2-14: Summary of Heat Index Risk Levels with Protective Measures (Source: National Weather Service)

Heat Index	Risk Level	Protective Measures
Less than 91°F	Lower (Caution)	Basic heat safety and planning.
91°F to 103°F	Moderate	Implement precautions and heighten awareness.
103°F to 115°F	High	Additional precautions to protect workers.
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures.

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 Red River Parish as all of the adjacent parishes, the entire planning area for Red River Parish is equally at risk for extreme heat.

Previous Occurrences / Extents

Four significant extreme heat events have occurred within the boundaries of Red River Parish between the years of 1990 to 2015. Since 2010, there have been no significant extreme heat events within the Red River Parish planning area. Based on historical data, the worst case scenario for Red River Parish involving extreme heat would be a high risk level event on the HI scale with temperatures ranging from 103 °F to 115 °F.

Table 2-15: Previous Occurrences of Extreme Heat in Red River Parish (Source: NOAA)

Date	Temperature (°F)
July 19, 1994	103
August 9, 1999	103
August 4, 2001	103
July 29, 2006	104

Frequency / Probability

Based on the geographical location of the State of Louisiana, and Red River Parish in particular, extreme heat events occur frequently. The probability of occurrence is estimated at approximately 16%.

Estimated Potential Losses

According to the SHELDUS database, crop damage due to extreme heat in Red River Parish has totaled approximately $626,857 since 1960. To estimate the potential losses of an extreme heat event on an annual basis, the total damages recorded for an extreme event is divided by the total number of years of available extreme heat data in SHELDUS (1960 – 2014). This provides an annual estimated potential loss of $11,608. The following table, based on the 2010 Census data, provides an estimate of potential crop losses for Red River Parish:

Table 2-16: Estimated Annual Crop Losses in Red River Parish for Extreme Heat

Estimated Annual Potential Losses from Extreme Heat for Red River Parish				
Unincorporated Red River Parish (66.2% of Population)	Coushatta (21.6% of Population)	Edgefield (2.4% of Population)	Hall Summit (3.3% of Population)	Martin (6.5% of Population)
$7,681	$2,508	$278	$383	$758

There have been no reported injuries or deaths as a direct result of extreme heat in Red River Parish.

Vulnerability

See Appendix C for parish and municipality agricultural exposure to extreme heat hazards.

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 of partial or complete inundation of two or more acres of normally dry land area or of two 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 urbanization (extent of impervious surfaces), land use (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 ten 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, with low-lying, poorly drained areas being particularly susceptible to flooding during these months.

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

- **Riverine flooding** occurs along a river or smaller stream. It is the result of runoff from heavy rainfall or intensive snow or ice melt. The speed with which riverine flood levels rise and fall depends not only on the amount of rainfall, but even more on the capacity of the river itself, as well as the shape and land cover of its drainage basin. The smaller the river, the faster that 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.
- **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 River, floodwaters from Lake Maurepas and Lake Pontchartrain crept into 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, tsunamis, or gradual sea level rise.

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 flooding:

- **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 a 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 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 general 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 event 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 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 due to the variation of river characteristics (volume, discharge, and topography). 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 temporally fluctuate. 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 day of occurrence (which indicates the population's probable activities at the flood's onset), or other characteristic differences.

The 100-year flood 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 Program (NFIP) Rate Maps. The NFIP and FEMA suggest insurance rates based on Special Flood Hazard Areas (SFHAs), as diagrammed in *Figure 2-11*.

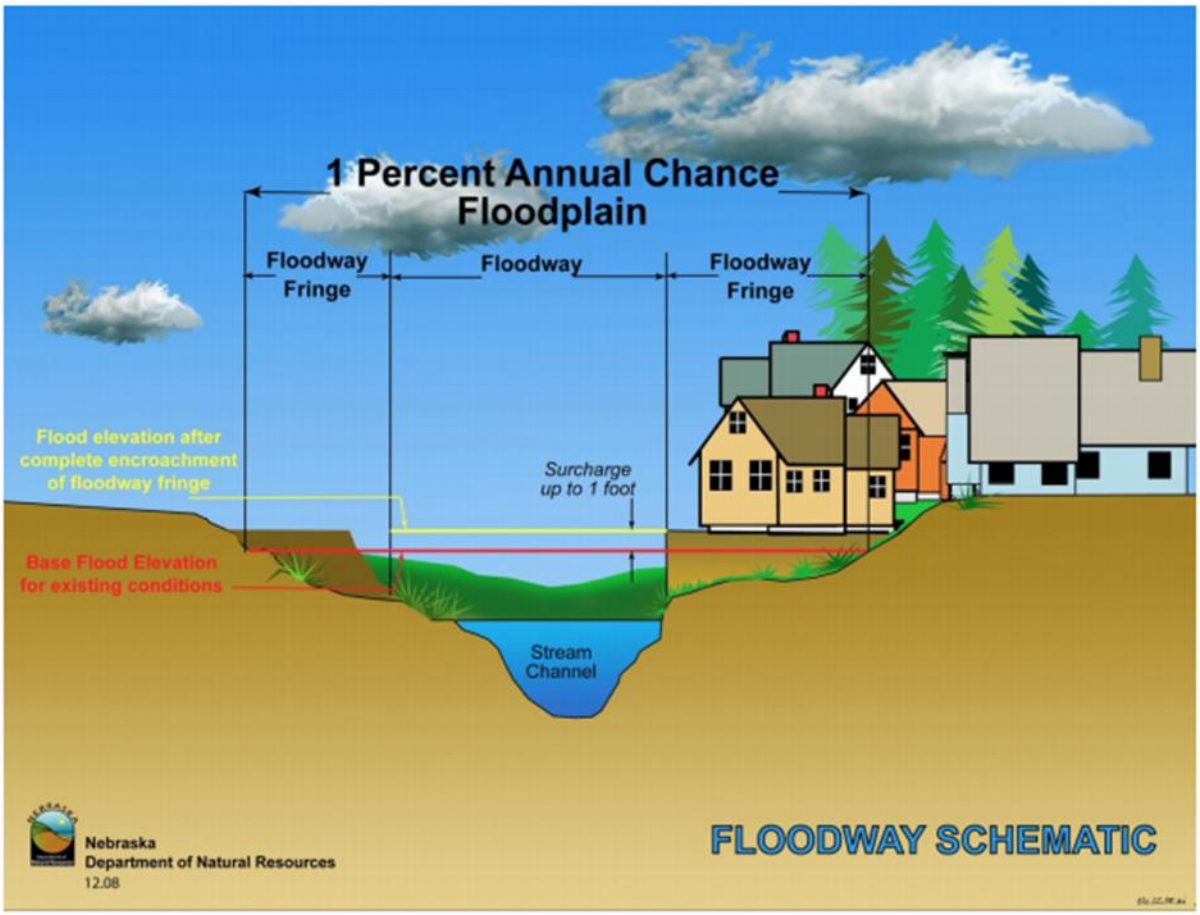


Figure 2-11: Schematic of 100-Year Floodplain. The Special Flood Hazard Area (SFHA) extends to the end of the floodway fringe.
(Source: Nebraska Department of Natural Resources)

A SFHA is the land area covered by the floodwaters of the base flood (red line in *Figure 2-11*), 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. In some situations, deep and fast moving waters can push a building off its 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 can deteriorate 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 are usually 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 severe property damage. Any structure that experiences a flood should be stripped, cleaned, and allowed to dry before being reconstructed. This can be 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. Have incurred flood-related damage on two occasions, in which the cost of the repair, on average, equaled or exceeded 25 percent of the market value of the structure at the time of each such 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.

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

a. It is covered under a contract for flood insurance made available under the NFIP; and
b. It has incurred flood related damage –
    1) For which four or more separate claims payments have been made under 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 two separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

There are no repetitive loss structures located within the Red River Parish planning area (*Figure 2-12).*

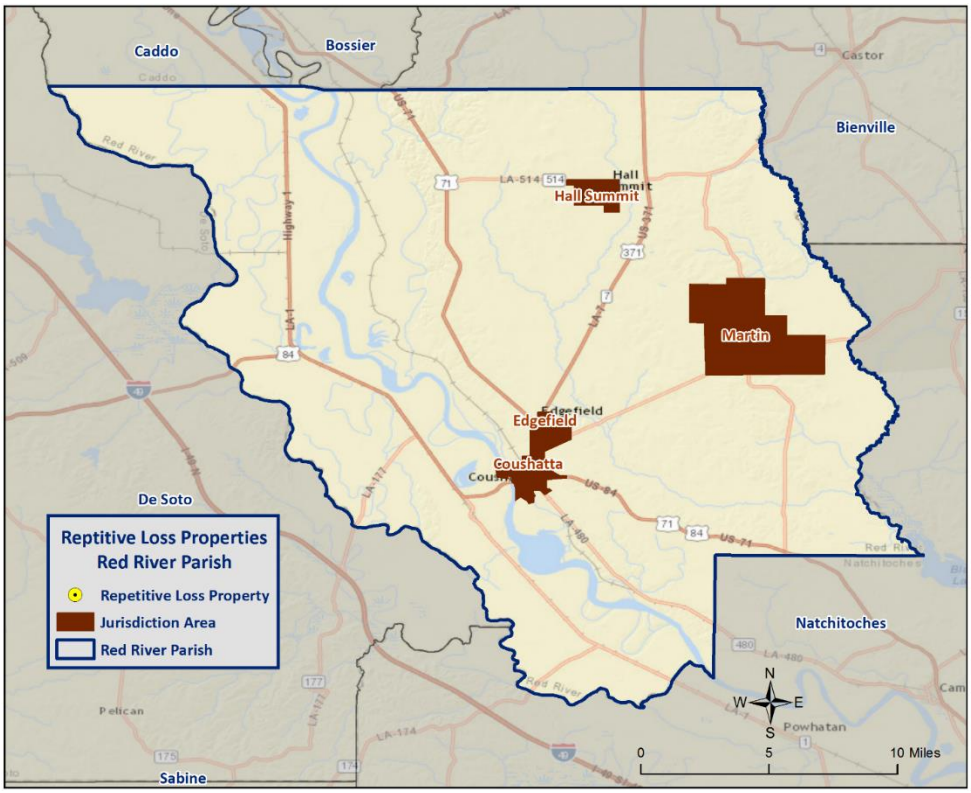


Figure 2-12: Repetitive Loss Properties in Red River Parish

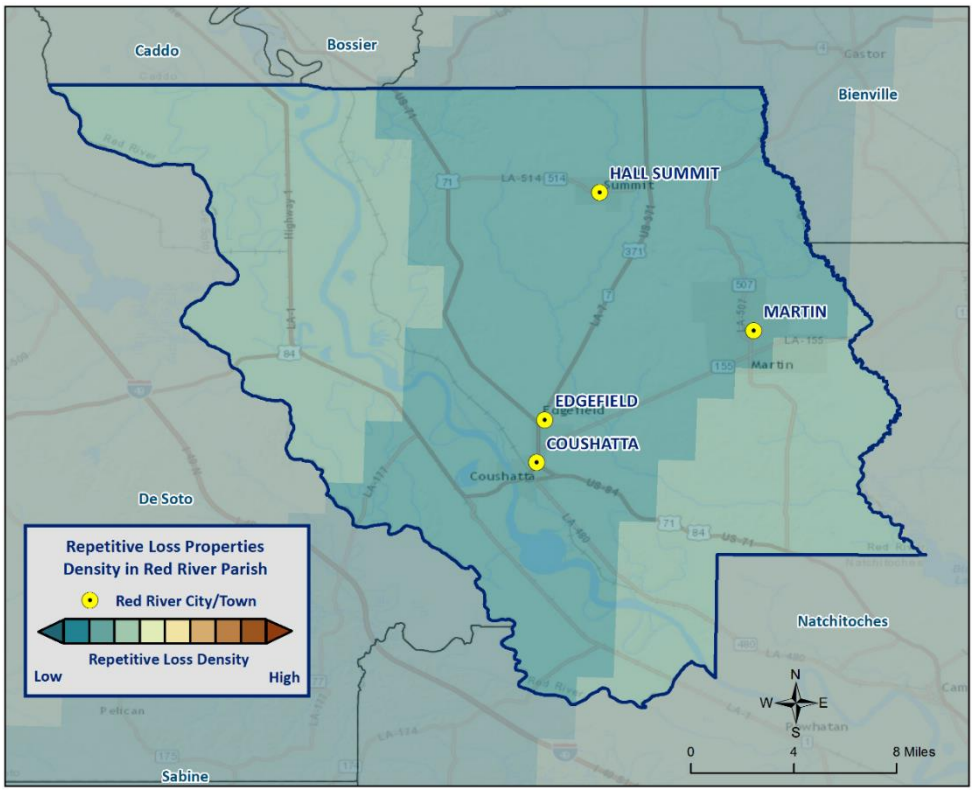


Figure 2-13: Repetitive Loss Property Densities in Red River Parish

National Flood Insurance Program

Flood insurance statistics indicate that Red River Parish has 46 flood insurance policies with the NFIP, with total annual premiums of $54,041. Red River Parish, Coushatta, and Martin are all participants in the NFIP. Edgefield and Hall Summit do not participate in the NFIP. Red River Parish and each of the incorporated jurisdictions will continue to adopt and enforce floodplain management requirements, including regulating new construction Special Flood Hazard Areas, and will continue to monitor activities including local requests for new map updates. Flood insurance statistics and additional NFIP participation details for Red River Parish are provided in the tables below.

Red River Parish and the communities listed above will continue their active participation in the NFIP through various education and outreach activities. These activities will include community outreach on the availability of flood insurance within the parish and incorporated municipalities, as well as flood safe building initiatives throughout the parish. The Parish Floodplain Manager will continue to work in coordination with each community to ensure floodplain management regulations are adopted and enforced. The Parish Floodplain Manager and floodplain manager for the jurisdiction of Coushatta will continue to seek and attend floodplain management and NFIP continuing education.

Table 2-17: Summary of NFIP Policies for Red River Parish

Location	No. of Insured Structures	Total Insurance Coverage Value	Annual Premiums Paid	No. of Insurance Claims Filed Since 1978	Total Loss Payments
Red River Parish (Unincorporated)	37	$5,284,800	$32,963	7	$59,106
Coushatta	9	$3,694,700	$21,078	1	$104,130
Edgefield	0	$0	$0	0	$0
Hall Summit	0	$0	$0	0	$0
Martin	0	$0	$0	0	$0
Total	46	$7,979,500	$54,041	8	$163,236

*While the Village of Martin does not have any active NFIP policies, and the Towns of Edgefield and Hall Summit do not participate in the NFIP, the parish will continue to promote NFIP participation through education and outreach.

Table 2-18: Summary of Community Flood Maps for Red River Parish

CID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Date Joined the NFIP	Tribal
220153#	Coushatta	4/12/1974	4/10/1979	7/2/1981	7/2/1981	No
220372	Martin	11/12/1976	7/9/1981	(NSFHA)	7/9/1981	No
220152	Red River Parish*	9/6/1974	5/15/1985	5/15/85 (M)	5/15/1985	No
-	Edgefield	-	-	-	Not in NFIP	-
-	Hall Summit	-	-	-	Not in NFIP	-

According to the Community Rating System (CRS) list of eligible communities, Red River Parish and the incorporated areas of Coushatta, Edgefield, Hall Summit, and Martin do not participate.

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 two feet of moving water, and can be swept downstream into deeper waters, trapping passengers within the vehicle. Victims of flooding have often put themselves in perilous situations by entering flood waters that they believe to be safe, or by ignoring travel advisories.

Major health concerns are also associated with floods. Flood waters 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. Flood waters 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 Red River Parish

By definition, flooding is caused when an area receives more water than the drainage system can convey. The following is a synopsis of the types of flooding that Red River Parish experiences.

Flash Flooding: Flash flooding is characterized by a rapid rise in water level, high velocity, and large amounts of debris. It is capable of uprooting trees, undermining buildings and bridges, and scouring new channels. Major factors in flash flooding are the high intensity and short duration of rainfall, as well as the steepness of watershed and stream gradients.

Local Drainage or High Groundwater Levels: Locally heavy precipitation may produce flooding in areas other than delineated floodplains or along recognizable drainage channels. If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems.

Backwater Flooding: Backwater flooding is normally associated with riverine flooding and connotes minimal velocity. All low lying areas are at risk. A heavy rainfall event coupled with a swollen river, canal, bayou, or marsh hinders drainage outflow, causing backwater flooding to the same areas susceptible to storm surge.

Riverine Flooding: Riverine flooding is, by definition, river-based. Most of the riverine flooding problems occur when the Red River crests at flood stage levels, causing extensive flooding in low-lying areas.

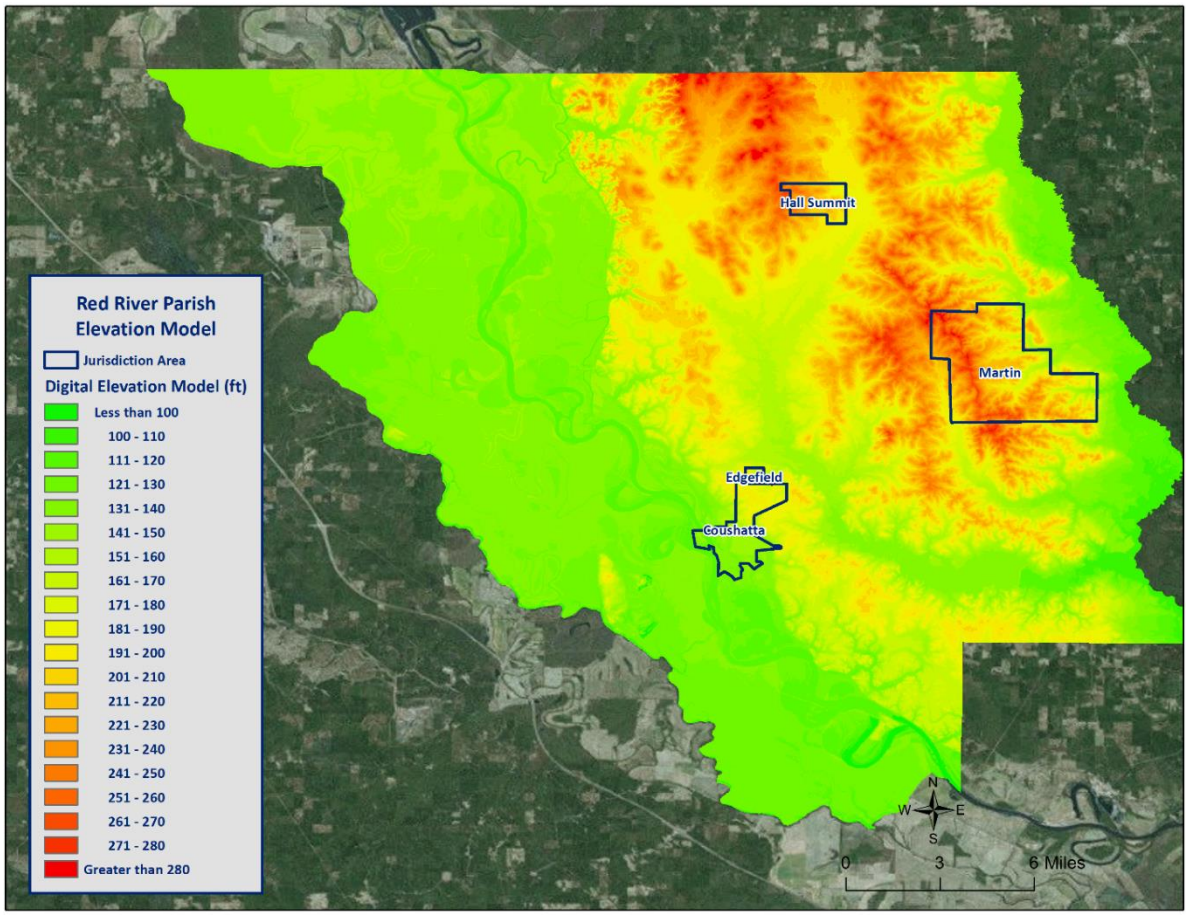


Figure 2-14: Elevation throughout Red River Parish

Looking at the digital elevation model (DEM) for Red River Parish in the figure on the previous page is instructive in visualizing where the low lying and high risk areas are for the parish. Elevations in the parish range from approximately 90 feet to approximately 280 feet. The highest elevations in the parish are approximately 280 feet, located in the northeastern section of the parish. The incorporated areas range in elevation from 141 to 233 feet, with Coushatta averaging 141 feet, Edgefield averaging 175 feet, Hall Summit averaging 223 feet, and Martin averaging 233 feet.

Location

Red River Parish has experienced significant flooding in its history and can expect more in the future. There are portions of five watersheds within Red River Parish: Middle Red-Coushatta, Loggy Bayou, Red Chute, Bayou Pierre, and Black Lake Bayou. Each watershed possesses unique flooding characteristics due to topography, vegetative cover, and soil type. However, riverine flooding from the Red River is more likely to occur at a larger geographic scale than that expected from localized flooding of small creeks. While jurisdictions within Red River Parish might not have SHFAs within their boundaries, recent events throughout the state have demonstrated that even areas outside of SFHAs can be susceptible to flooding. For example, the jurisdictions of Edgefield and Martin do not have any SFHAs within its boundaries; however, localized street flooding can be expected in the area east of Oak Street and west of Edisto Street in Edgefield and the area west of Par Road 219-E to the jurisdiction boundary in Martin. This could result in area streets becoming impassible by many vehicles.

The following are enlarged maps of the incorporated areas showing the areas within each jurisdiction that are at risk of flooding:

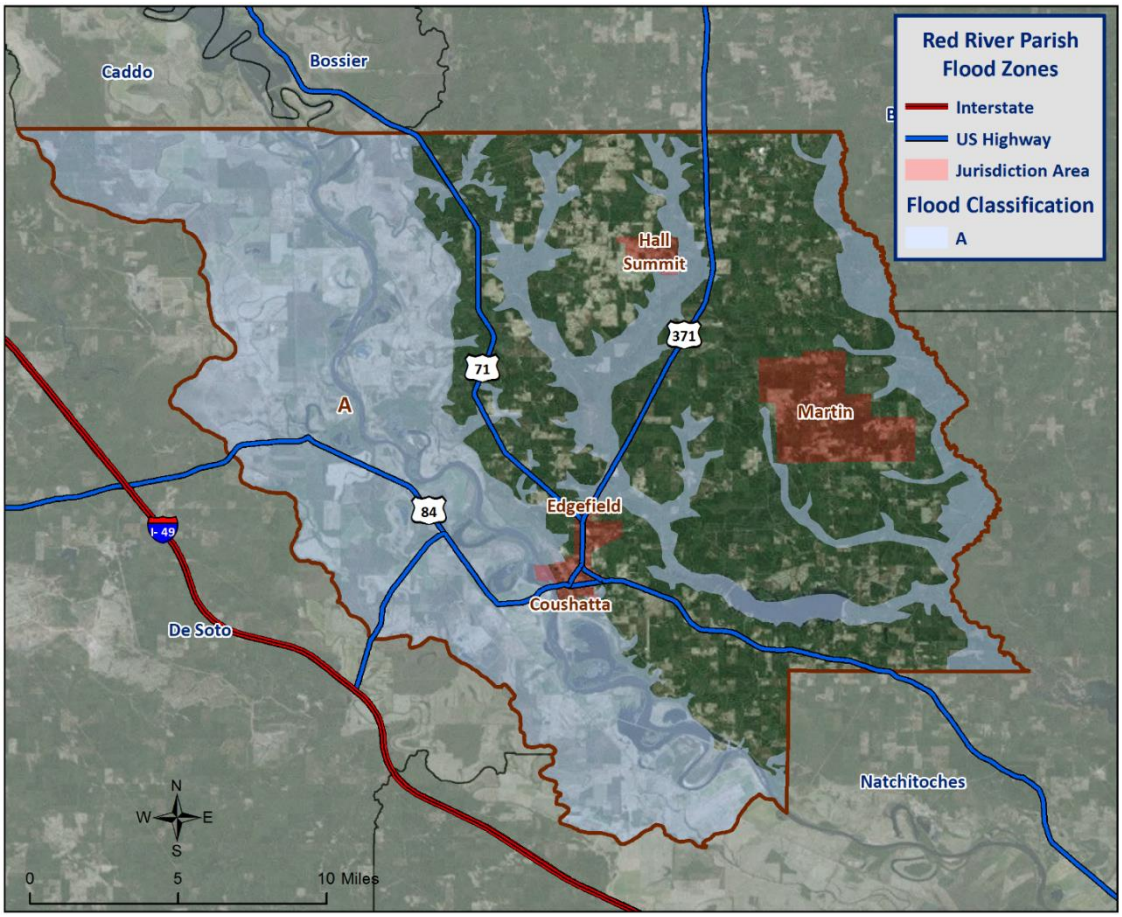


Figure 2-15: Red River Parish Areas within the Flood Zones

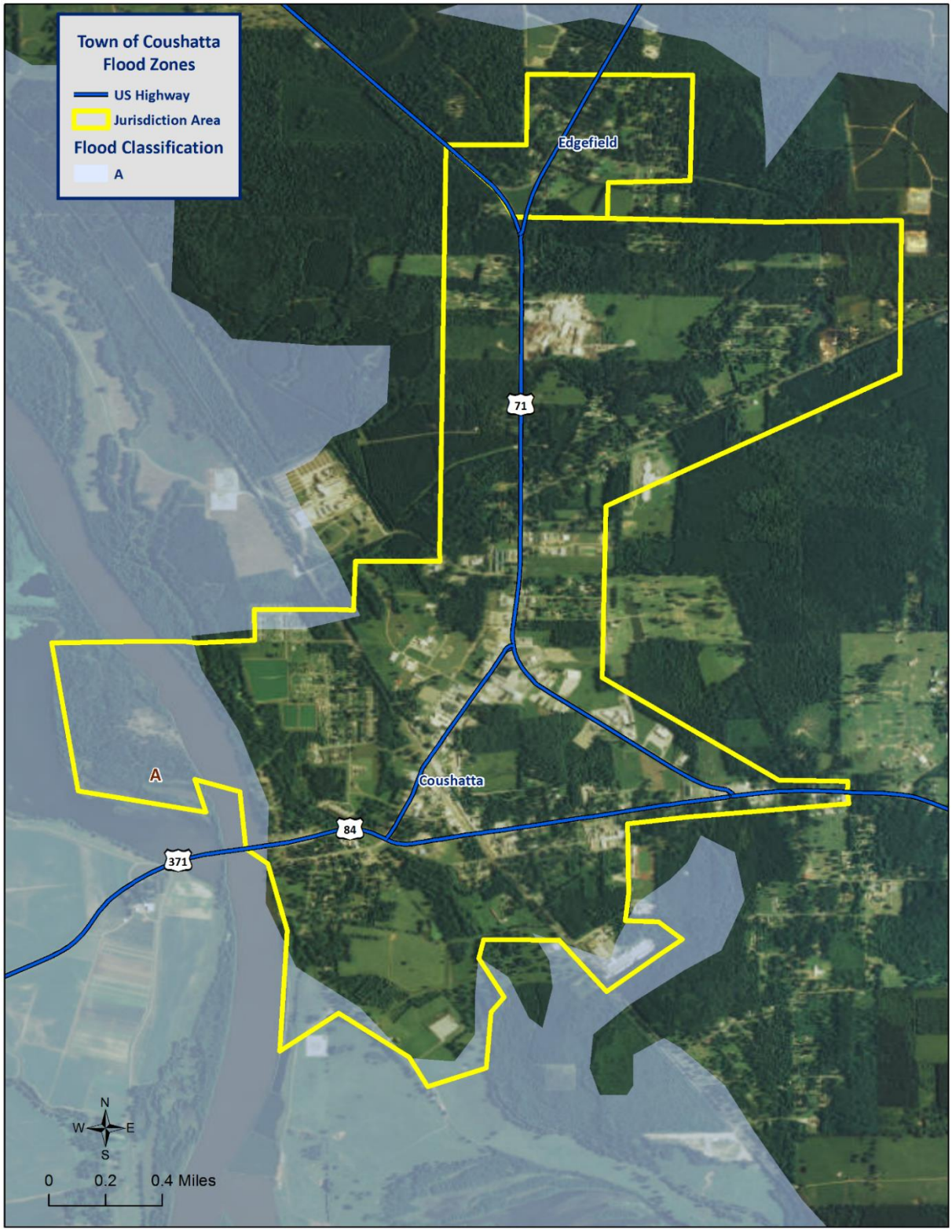


Figure 2-16: Town of Coushatta Areas within the Flood Zones

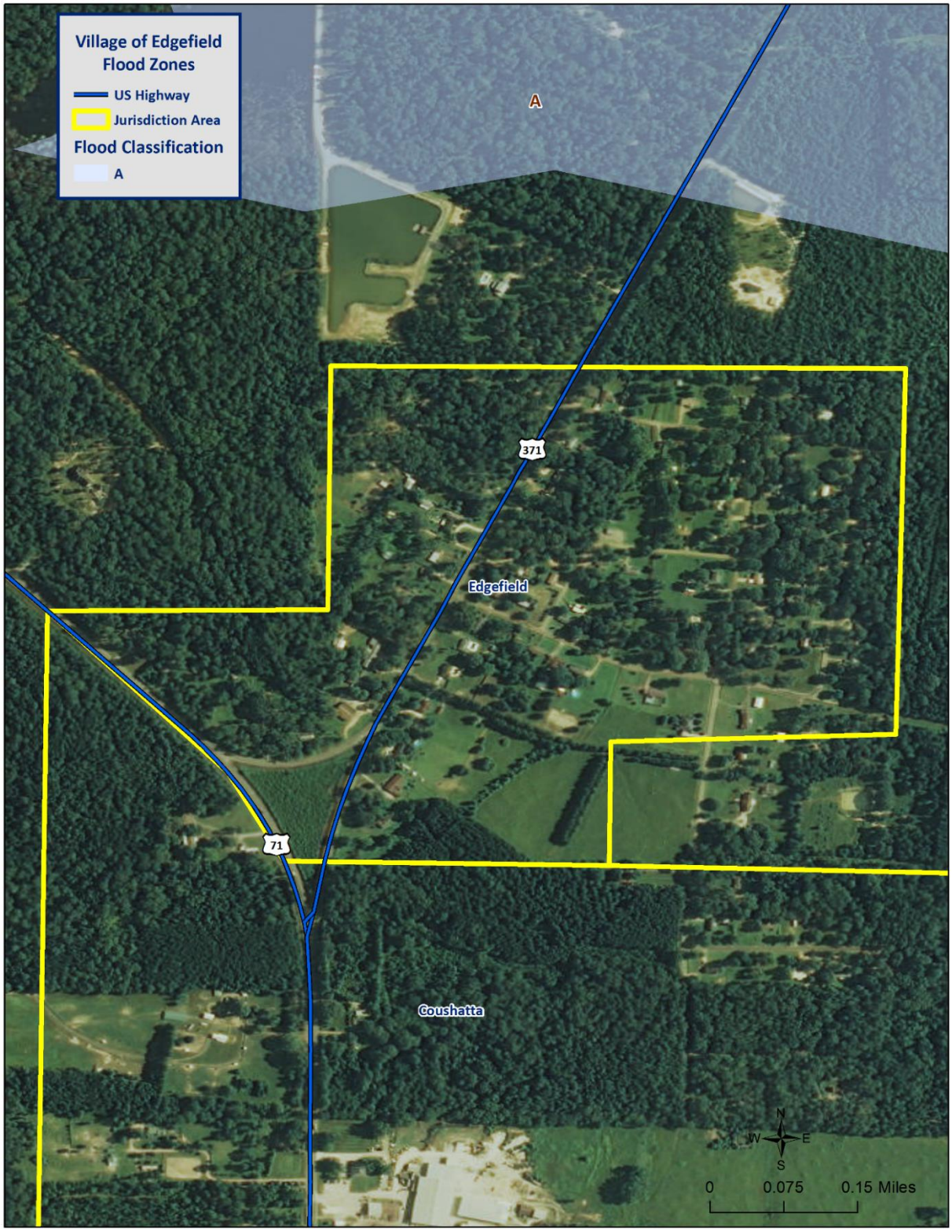


Figure 2-17: Village of Edgefield Areas within the Flood Zones

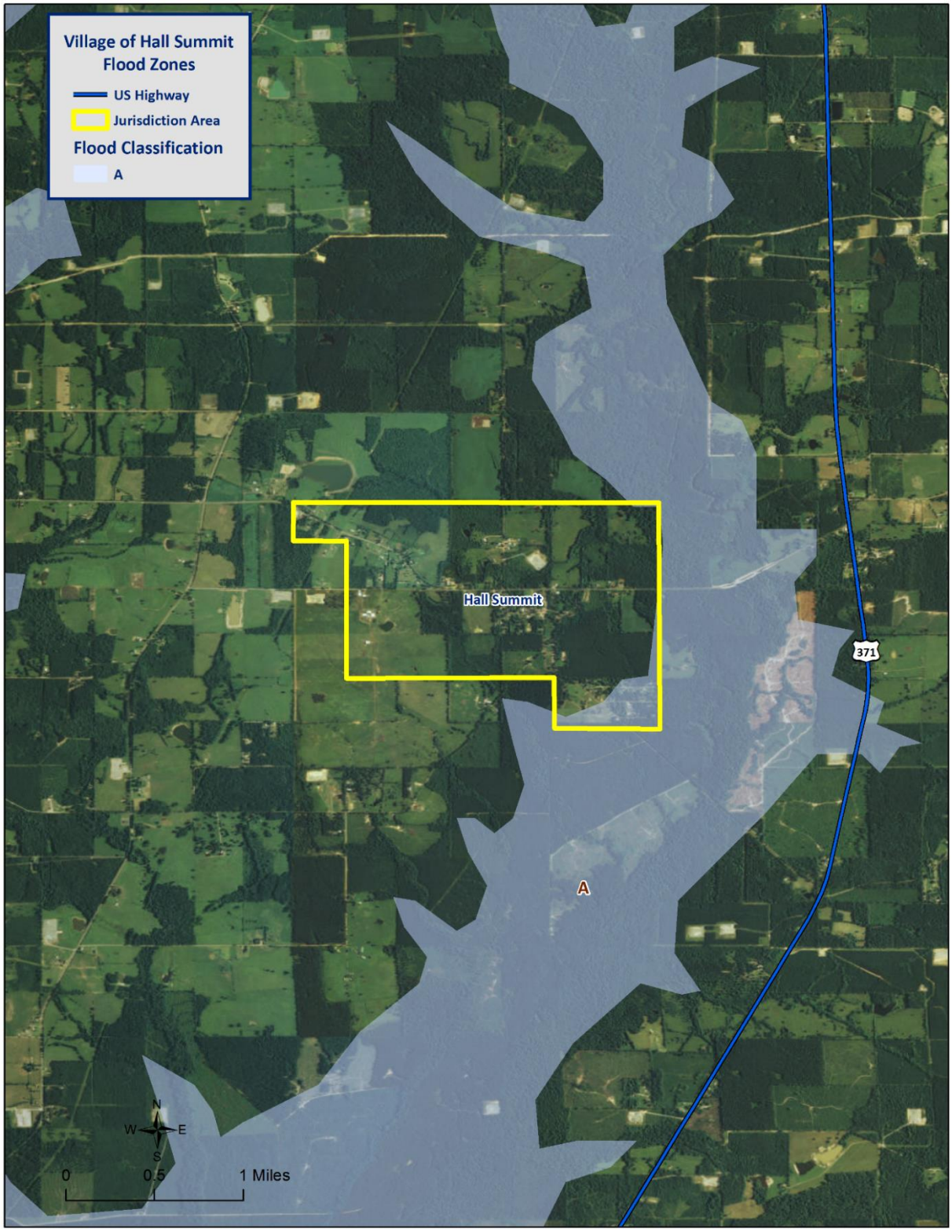


Figure 2-18: Village of Hall Summit Areas within the Flood Zones

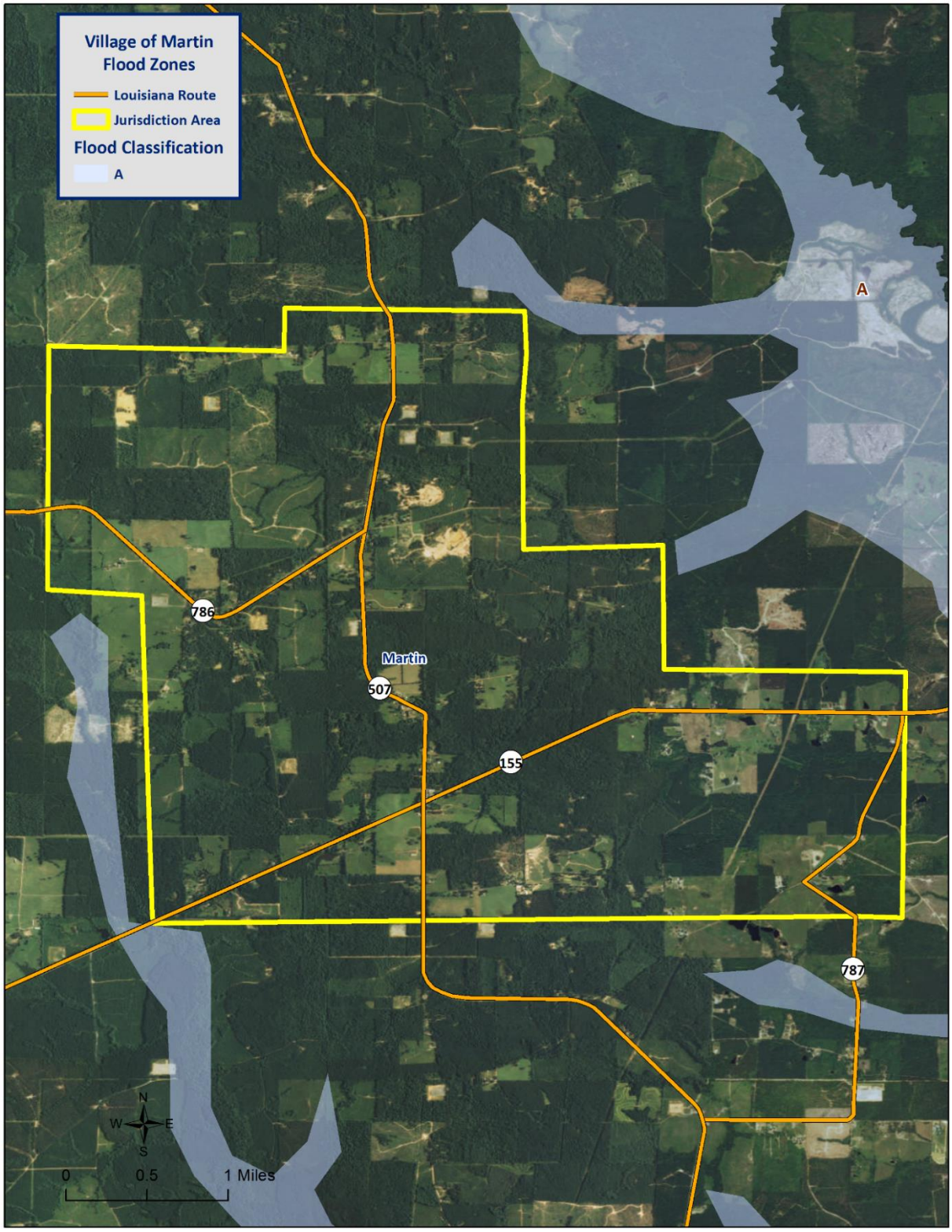


Figure 2-19: Village of Martin Areas within the Flood Zones

Previous Occurrences / Extents

Historically, there have been 14 flooding events that have created significant flooding in Red River Parish between 1990 and 2015. Below is a brief synopsis of the five flooding events that have occurred since 2010, including flooding events that have occurred since the parish's last planning update.

Table 2-19: Historical Floods in Red River Parish with Locations from 2010 - 2015

Date	Extents	Type of Flooding	Estimated Damages	Location
March 11, 2012	A deep upper level trough produced severe thunderstorms, some of which produced damaging winds, isolated tornadoes, and large hail. Numerous streets were flooded and some barricaded in Coushatta.	Flash Flood	$0	COUSHATTA
March 20, 2012	A vigorous upper level trough produced extensive shear and tornadoes. Numerous roads were flooded all throughout Red River Parish.	Flash Flood	$0	PARISHWIDE
May 18, 2015	Excessive heavy rainfall during the month of May resulted in very high river levels on the Red River.	Flood	$0	HOWARD
May 18, 2015	Convection from an upper level disturbance tapped moisture from the Eastern Pacific and Gulf of Mexico, producing excessive heavy rainfall. A culvert was washed out at Brushy Creek Road and Highway 507. Several other parish roads were flooded and closed as well.	Flash Flood	$1,000	GAHAGAN
June 1, 2015	Excessive heavy rainfall during the month of May resulted in very high river levels on the Red River.	Flood	$0	HOWARD

Since 2010, there have been no flooding events in the jurisdictions of Edgefield, Hall Summit, or Martin.

The worst-case scenarios are based on several different types of flooding events. Storm water excesses and riverine flooding primarily affect the low-lying areas of the parish, and flood depths of up to five feet can be expected in the unincorporated areas of the parish. The incorporated areas of Coushatta, Edgefield, Hall Summit, and Martin can expect flood depths of approximately two to four feet.

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 Red River Parish having multiple jurisdictions, it was necessary to assess the historical data found in the National Climatic Data Center for Red River Parish and its jurisdictions to properly determine probability for future flood events. The table below shows the probability and return frequency for each jurisdiction.

Table 2-20: Annual Flood Probabilities for Red River Parish

Jurisdiction	Annual Probability	Return Frequency
Red River Parish (Unincorporated)	24%	4 – 5 years
Coushatta	32%	3 – 4 years
Edgefield	4%	25 years
Hall Summit	8%	12 – 13 years
Martin	4%	25 years

Based on historical record, the overall flooding probability for the entire Red River Parish planning area is 56%, with 14 events occurring over a 25-year period.

Estimated Potential Losses

Using the Hazus 2.2 Flood Model, along with the Parish DFIRM, the 100-year flood scenario was analyzed to determine losses from this worst-case scenario. Below, *Table 2-22* shows the total economic losses that would result from this occurrence. Modeled results for the jurisdiction of Edgefield and Martin indicate that no buildings will incur flood damage from a 100-year flood event. However, localized street flooding can be expected in the area east of Oak Street and west of Edisto Street in Edgefield and the area west of Par Road 219-E to the jurisdiction boundary in Martin. This could result in area streets becoming impassible by many vehicles.

Table 2-21: Estimated Losses in Red River Parish from a 100-Year Flood Event (Source: Hazus 2.2)

Jurisdiction	Estimated Total Losses from 100-Year Flood Event
Red River Parish (Unincorporated)	$18,019,000
Coushatta	$19,000
Edgefield	$0
Hall Summit	$386,000
Martin	$0
Total	$18,424,000

The Hazus 2.2 Flood Model also provides a breakdown by jurisdiction for seven primary sectors (Hazus occupancy) throughout the parish. The losses for each jurisdiction by sector are listed in the tables on the next page. These sectors are comprised of privately owned structures/facilities, as well as locally, state, and federally owned structures/facilities.

Table 2-22: Estimated 100-Year Flood Losses for Unincorporated Red River Parish by Sector (Source: Hazus 2.2)

Red River Parish (Unincorporated)	Estimated Total Losses from 100-Year Flood Event
Agricultural	$85,000
Commercial	$424,000
Government	$16,000
Industrial	$1,179,000
Religious / Non-Profit	$215,000
Residential	$16,100,000
Schools	$0
Total	$18,019,000

Table 2-23: Estimated 100-Year Flood Losses for Coushatta by Sector (Source: Hazus 2.2)

Coushatta	Estimated Total Losses from 100-Year Flood Event
Agricultural	$0
Commercial	$1,000
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$18,000
Schools	$0
Total	$19,000

Table 2-24: Estimated 100-Year Flood Losses for Hall Summit by Sector (Source: Hazus 2.2)

Hall Summit	Estimated Total Losses from 100-Year Flood Event
Agricultural	$0
Commercial	$85,000
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$301,000
Schools	$0
Total	$386,000

Threat to People

The total population within the parish that is susceptible to a flood hazard is shown in the table below:

Table 2-25: Vulnerable Populations Susceptible to a 100-Year Flood Event
(Source: Hazus 2.2)

Number of People Exposed to Flood Hazards			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Red River Parish (Unincorporated)	**6,015**	**3,266**	**54.3%**
Coushatta	**1,964**	**70**	**3.6%**
Edgefield	**218**	**0**	**0.0%**
Hall Summit	**300**	**19**	**6.3%**
Martin	**594**	**0**	**0.0%**
Total	**9,091**	**3,355**	**36.9%**

The Hazus 2.2 Flood Model was also extrapolated to provide an overview of vulnerable populations throughout the jurisdictions in the following tables.

Table 2-26: Vulnerable Populations Susceptible to a 100-Year Flood Event in Unincorporated Red River Parish
(Source: Hazus 2.2)

Red River Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	3,266	54.3%
Persons Under 5 Years	229	7.0%
Persons Under 18 Years	807	24.7%
Persons 65 Years and Over	542	16.6%
White	1,924	58.9%
Minority	1,342	41.1%

Table 2-27: Vulnerable Populations Susceptible to a 100-Year Flood Event in Coushatta
(Source: Hazus 2.2)

Coushatta		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	70	3.6%
Persons Under 5 Years	6	9.0%
Persons Under 18 Years	14	20.1%
Persons 65 Years and Over	9	12.5%
White	20	29.0%
Minority	50	71.0%

Table 2-28: Vulnerable Populations Susceptible to a 100-Year Flood Event in Hall Summit (Source: Hazus 2.2)

Hall Summit		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	19	6.3%
Persons Under 5 Years	2	8.3%
Persons Under 18 Years	3	18.3%
Persons 65 Years and Over	4	20.3%
White	16	84.3%
Minority	3	15.7%

Vulnerability

See Appendix C for parish and municipality buildings that are susceptible to flooding due to proximity within the 100-year floodplain.

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. Consequently, the air masses 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 supercell), 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 of 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 supercell 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 three 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, which warms 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 downdraft 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), has the ability to issue advisory messages based on forecasts and observations. The following are the advisory messages that may be issued, along 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 three to six hours.

- *Severe Thunderstorm Warning*: Issued when severe thunderstorms are imminent. This warning is highly localized and covers parts of one to several parishes (counties).

A variety of hazards might be produced by thunderstorms, including lightning, hail, tornadoes or waterspouts, flash flooding, and high-speed winds called downbursts. Nevertheless, given the criteria, the National Oceanic and Atmospheric Administration (NOAA) characterizes a thunderstorm as severe when it produces one or more of the following:

- Hail of one 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

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

Table 2-29: 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 to tiled roofs, significant risk of injuries
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 2-30: Spectrum of Hailstone Diameters and their Everyday Description (Source: National Weather Service)

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

Hailstorms can cause widespread damage to 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 the following table.

Table 2-31: 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 minutes – 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(~5% 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; associated with extreme temperature gradient	Low-to-Medium	Few minutes – few hours

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 relatively insignificant in the hilly areas of Louisiana where they occur. Nor'easters are cyclonic events that have at most a peripheral effect on Louisiana, and none associated with high winds. Winds associated with hurricanes and tornadoes will be considered in their respective sections.

The following table 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 2-32: Beaufort Wind Scale
(Source: NOAA's SPC)

Beaufort Wind Scale			
Force	**Wind (MPH)**	**WMO Classification**	**Appearance of Wind Effects on Land**
			Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Wind felt on face, leaves 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	N/A
12	74+	Hurricane	N/A

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 three 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 that is struck. The following table outlines the lightning activity level that is a measurement of lightning activity.

Table 2-33: 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 to three must occur within the observation. 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 are a climatological based hazard, the entire planning area for Red River Parish is equally at risk for hailstorms.

Previous Occurrences / Extents

The SHELDUS database reports four significant hailstorm events occurring within the boundaries of Red River Parish between the years of 1990-2015. According to the National Climatic Data Center, hailstorm diameters experienced in Red River Parish have ranged from 0.75 inches to 2.75 inches since 1990. The most frequently recorded hail size has been 1.00 inch diameters. *Figure 2-20* displays the density of hailstorms in Red River Parish and adjacent parishes. Based on the National Climatic Data Center dataset, *Table 2-34* provides an overview of hailstorms that have impacted the Red River Parish planning area since 1990. Red River Parish can expect to experience hail up to 2.75 inches in diameter for future events.

Table 2-34: Previous Occurrences of Hailstorms in Red River Parish (Source: NCDC)

Date	Recorded Hail Size (inches)	Location
December 21, 1990	2.75	UNINCORPORATED AREA
April 28, 1991	1.75	UNINCORPORATED AREA
May 4, 1991	0.90	UNINCORPORATED AREA
January 26, 1994	1.75	MARKHAM

Since 2010, there have been no significant hail storm events in the incorporated areas of Coushatta, Edgefield, Hall Summit, and Martin and the unincorporated areas of Red River Parish.

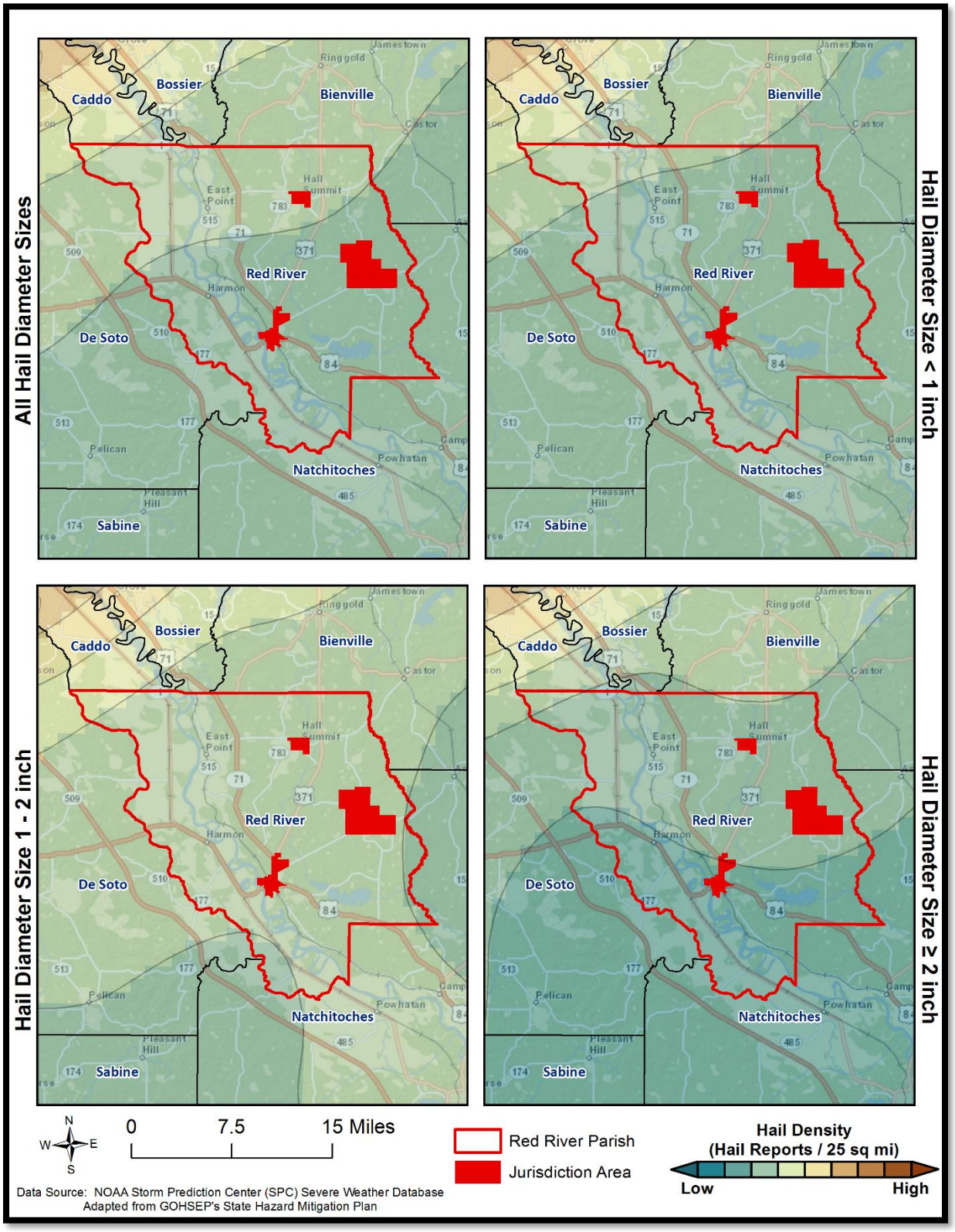


Figure 2-20: Density of Hailstorms by Diameter from 1950-2012
(Source: State of Louisiana Hazard Mitigation Plan 2014)

Frequency

Based on historical data from SHELDUS for the past 25 years, it is estimated the probability of occurrence for a significant hailstorm event is approximately 16%. The probability was determined based on a review of significant hail data that has caused damages in the last 25 years, in which Red River Parish has had four recorded events.

Estimated Potential Losses

According to the SHELDUS database, property damage due to hailstorms in Red River Parish have totaled approximately $246 since 1990. To estimate the potential losses of a hail event on an annual basis, the total damages recorded for wind events was divided by the total number of years of available hail data in SHELDUS (1990 – 2015). This provides an annual estimated potential loss of $10. *Table 2-35* provides an estimate of potential property losses for Red River Parish.

Table 2-35: Estimated Annual Property Losses in Red River Parish from Hailstorms

Estimated Annual Potential Losses from Hailstorms for Red River Parish				
Unincorporated Red River Parish (66.2% of Population)	Coushatta (21.6% of Population)	Edgefield (2.4% of Population)	Hall Summit (3.3% of Population)	Martin (6.5% of Population)
$7	$2	< $1	< $1	$1

There have been no deaths or injuries due to hailstorms from 1990 – 2015 in Red River Parish.

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, the entire planning area for Red River Parish is equally at risk for high winds.

Previous Occurrences / Extents

The SHELDUS database reports a total of 20 thunderstorm wind events occurring within the boundaries of Red River Parish between the years of 1990 to 2015. The significant thunderstorm wind events experienced in Red River Parish have ranged in wind speed from 59 mph to 115 mph. Red River Parish can expect to receive thunderstorm winds up to 115 mph for future high wind events. The table on the next page provides an overview of significant high wind events over the last ten years.

Table 2-36: Previous Occurrences for Thunderstorm High Wind Events

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
COUSHATTA	June 3, 2007	58	$2,854	$0
CROSS RDS	May 13, 2008	61	$16,493	$0
UNINCORPORATED	January 21, 2010	67	$40,712	$0

Since 2010, there have been no significant thunderstorm wind events in the incorporated areas of Coushatta, Edgefield, Hall Summit, and Martin.

Frequency

High winds are a fairly common occurrence within Red River Parish, with an annual chance of occurrence calculated at 80%.

Estimated Potential Losses

Since 1990, there have been 20 significant wind events that have resulted in property damages according to the SHELDUS database. The total property damages associated with those storms have totaled $4,471,802. To estimate the potential losses of a wind event on an annual basis, the total damages recorded for wind events was divided by the total number of years of available wind data in SHELDUS (1990 – 2015). This provides an annual estimated potential loss of $178,872. The following table provides an estimate of potential property losses for Red River Parish:

Table 2-37: Estimated Annual Property Losses in Red River Parish Resulting from High Winds

Estimated Annual Potential Losses from Thunderstorm Winds for Red River Parish				
Unincorporated Red River Parish (66.2% of Population)	Coushatta (21.6% of Population)	Edgefield (2.4% of Population)	Hall Summit (3.3% of Population)	Martin (6.5% of Population)
$118,350	$38,643	$4,289	$5,903	$11,687

There have been no reported injuries or fatalities as a result of a thunderstorm wind event over the 25-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 Red River Parish.

Previous Occurrences / Extents

The SHELDUS database reports a total of one lightning event occurring within the boundaries of Red River Parish between the years of 1990-2015. 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 Red River Parish, which occur on a nearly monthly basis. The planning area can expect to have a lightning density of 11-12 flashes per sq. mile per year. The table below provides an overview of significant lightning strikes over the last 25 years:

Table 2-38: Previous Occurrences of Significant Lightning Strikes in Red River Parish from 1990 – 2015 (Source: NCDC and SHELDUS)

Location	Date	Summary	Property Damage
COUSHATTA	July 22, 2001	Lightning set a storage shed afire. The shed was fully afire in spite of a heavy downpour and could not be saved. Also ruined were two four-wheelers, a lawn mower, two bicycles, and kitchen appliances.	$20,051

Since 2010, there have been no lightning events that have caused property damage or loss of life in the entire Red River Parish planning area.

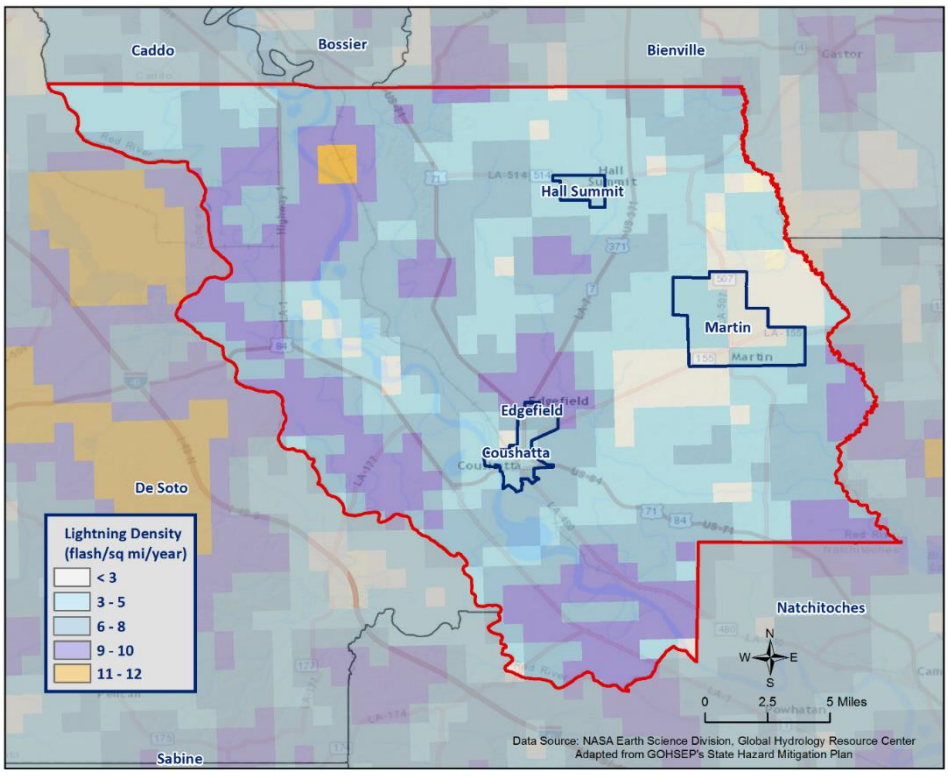


Figure 2-21: Lightning Density Reports for Red River Parish

Frequency

Lightning can strike anywhere and is produced by every thunderstorm, so the chance of lightning occurring in Red River Parish is high. However, lightning that meets the definition that is used by SHELDUS and the NCDC that actually results in damages to property and injury or death is a less likely event. According to SHELDUS, there has been one lightning event that has caused property damages or injuries over the last 25 years, establishing an annual probability of 4%.

Estimated Potential Losses

Since 1990, there has been one significant lightning event that has resulted in property damages according to the SHELDUS database. The total property damages associated with lightning events totaled $20,051. To estimate the potential losses of a lightning event on an annual basis, the total damages recorded for lightning events was divided by the total number of years of available major lightning strike data in SHELDUS (1990 – 2015). This provides an annual estimated potential loss of $20,051. The table below provides an estimate of potential property losses for Red River Parish.

Table 2-39: Estimated Annual Property Losses in Red River Parish from Lightning

Estimated Annual Potential Losses from Thunderstorm Winds for Red River Parish				
Unincorporated Red River Parish (66.2% of Population)	Coushatta (21.6% of Population)	Edgefield (2.4% of Population)	Hall Summit (3.3% of Population)	Martin (6.5% of Population)
$531	$173	$19	$26	$52

There have been no reported injuries or fatalities in Red River Parish as a result of a lightning strikes over the 25-year record.

Vulnerability

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

Tornadoes

Tornadoes (also called twisters or 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 warm air, causing the warm air to rise rapidly. This usually results in a counterclockwise rotation 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 seconds 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 used for hurricane classification, which is based on measured wind speed. *Table 2-40* shows the EF 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 and adjustment between scales can be made using the following tables.

Table 2-40: Comparison of the Enhanced Fujita (EF) Scale to the Fujita (F) Scale

	Enhanced Fujita Scale					
	EF0	**EF1**	**EF2**	**EF3**	**EF4**	**EF5**
Wind Speed (mph)	65-85	86-110	111-135	136-165	166-200	>200
	Fujita Scale					
	F0	**F1**	**F2**	**F3**	**F4**	**F5**
	<73	73-112	113-157	158-206	207-260	>261

Table 2-41: 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 of 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, along 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 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 with crawlspaces, 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 projectiles 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 in locations farther north.

Location

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

Previous Occurrences / Extents

SHELDUS reports a total of three tornadoes or waterspouts occurring within the boundaries of Red River Parish between the years of 1990-2015. The tornadoes experienced in Red River Parish were EF1 on the EF scale, and were F3 on the F scale. The worst case scenario Red River Parish can expect in the future is an EF2 tornado.

The tornado that caused the most damage to property occurred on April 23, 2000. A high precipitation supercell produced a tornado as part of a tornado outbreak across the region. Damage consisted of large pine trees snapped and oak trees blown down. Most damage to residences were from fallen trees. A number of outbuildings were damaged by either fallen trees or wind.

Table 2-42: Historical Tornadoes in Red River Parish with Locations from 1990-2015

Date	Impacts	Property Damage	Location	Magnitude
April 23, 2000	7 mile path with a width of 200 yards. A number of outbuildings were damaged by either falling trees or wind. Most damage to residences were from fallen trees.	$687,387	COUSHATTA	F3
April 26, 2011	3.52 mile path with a width of 125 yards. A couple of barns were destroyed and several homes sustained minor to moderate roof damage.	$157,867	HALL SUMMIT	EF1
January 12, 2013	3.81 mile path with a width of 300 yards. Caused major damage to a home and trees.	$50,811	WILLIAMS	EF1

The incorporated areas of Coushatta, Edgefield, and Martin have not experienced a tornado event from 2010 to the present. Since 2010, the year in which the last update to this hazard mitigation plan was written, Red River Parish has had two tornadoes touch down in Hall Summit as well as the unincorporated areas of the parish. The following is a brief synopsis of these events:

April 26, 2011 – EF1 Tornado in Hall Summit

The National Weather Service conducted a storm survey in Red River Parish near Hall Summit and concluded that damage was the result of an EF1 tornado. A couple barns were destroyed west of town north of State Route 514. Several homes in town sustained minor to moderate roof damage. The tornado crossed 514 east of Hall Summit where numerous trees were snapped onto the road. The tornado continued east crossing 371 knocking over a few trees before lifting east of 371. A sheriff deputy witnessed the tornado crossing the highway east of Hall Summit and was blocked in from falling trees. Maximum winds were estimated at 85-90 mph.

January 12, 2013 – EF1 Tornado in Williams

This tornado was a continuation of the EF1 tornado that first touched down in northeast De Soto Parish. This tornado crossed Bayou Pierre and moved into extreme northwest Red River Parish approximately 15 miles west northwest of Hall Summit causing major damage to a home and trees on Parish Road 410. The tornado then continued northeast into extreme southeast Caddo Parish.

Frequency / Probability

Tornadoes are a sporadic occurrence within Red River Parish, with an annual chance of occurrence calculated at 12% based on the records for the past 25 years (1990 - 2015). The figure on the next page displays the density of tornado touch downs in Red River Parish and neighboring parishes.

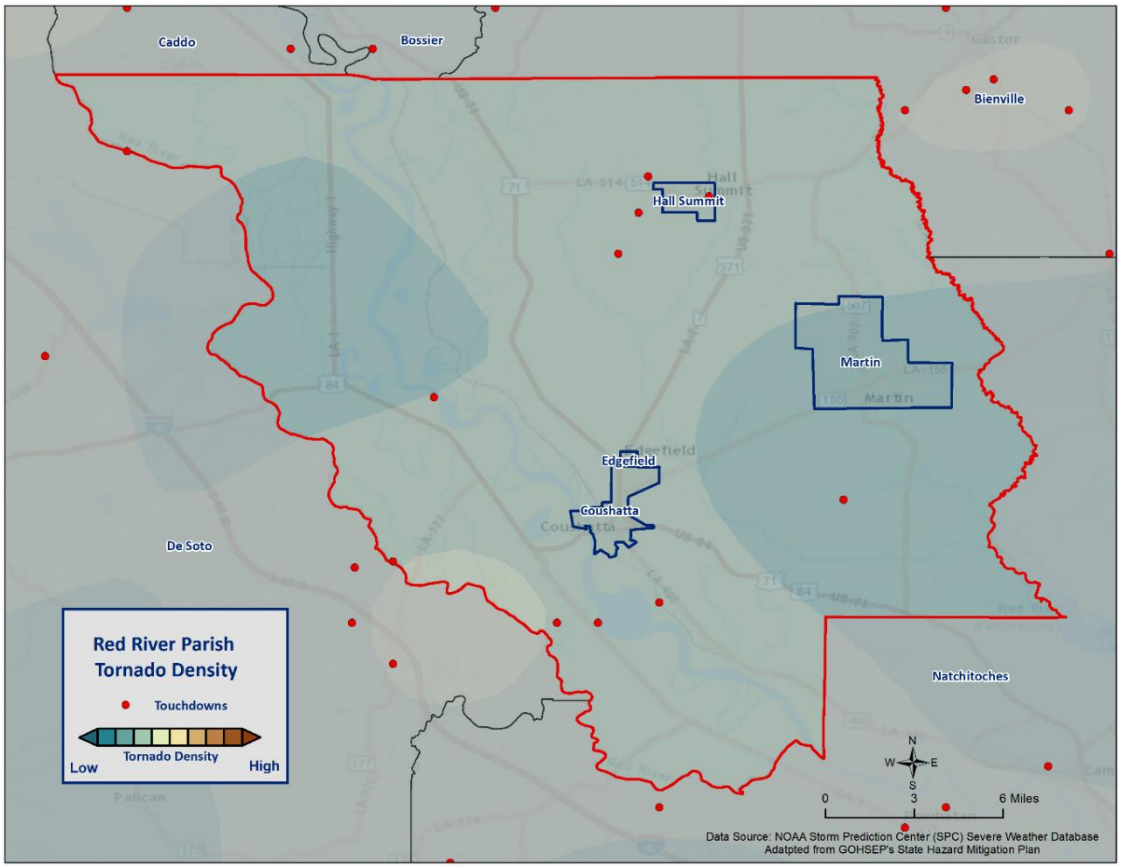


Figure 2-22: Location and Density of Tornadoes to Touch Down in Red River Parish (Source: NOAA/SPC Severe Weather Database)

Estimated Potential Losses

According to the SHELDUS database, there have been three tornadoes that have caused some level of property damage. The total damage from the actual claims for property is $896,065, with an average cost of $298,688 per tornado strike. When annualizing the total cost over the 25-year record, total annual loses based on tornadoes are estimated to be $35,843. To provide an estimated annual estimated potential loss per jurisdiction, the 2010 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. Based on the 2010 Census data, the following table provides an annual estimate of potential losses for Red River Parish.

Table 2-43: Estimated Annual Losses from Tornadoes in Red River Parish

Estimated Annual Potential Losses from Tornadoes for Red River Parish				
Unincorporated Red River Parish (66.2% of Population)	Coushatta (21.6% of Population)	Edgefield (2.4% of Population)	Hall Summit (3.3% of Population)	Martin (6.5% of Population)
$23,715	$7,743	$859	$1,183	$2,342

Table 2-44 presents an analysis of building exposure that is susceptible to tornadoes by general occupancy type for Red River Parish, along with the percentage of building stock that are mobile homes.

Table 2-44: Building Exposure by General Occupancy Type for Tornadoes in Red River Parish (Source: FEMA's Hazus 2.2)

Building Exposure by General Occupancy Type for Tornadoes Exposure Types ($1,000)							
Residential	**Commercial**	**Industrial**	**Agricultural**	**Religion**	**Government**	**Education**	**Mobile Homes (%)**
994,500	162,315	21,159	4,322	28,950	12,422	14,830	17.4%

The parish has experienced no injuries or fatalities from tornadoes during this 25-year period.

In assessing the overall risk to population, the most vulnerable population throughout the parish are those residing in manufacturing housing. Approximately 17.4% of all housing in Red River Parish consists of manufactured housing. Based on location data collected in a previous hazard mitigation project, there are 4 known locations where manufactured housing is concentrated. Each of those 4 locations have an overall number of manufactured houses ranging from one to four. The location and density of manufactured houses can be seen in *Figure 2-23*.

Manufactured housing is more likely to sustain damage from a tornado than any other residential structure. The highest concentration of manufactured home parks is located in the incorporated area of Coushatta (*Table 2-45*). However, this does not influence the risk associated with a tornado event since they strike at random, making all structures and population within the planning area equally vulnerable.

Table 2-45: Manufactured Home Distribution throughout Red River Parish

Location	Number of Manufactured Home Parks	% of Manufactured Home Parks
Unincorporated Area	1	25%
Coushatta	2	50%
Edgefield	0	0%
Hall Summit	1	25%
Martin	0	0%

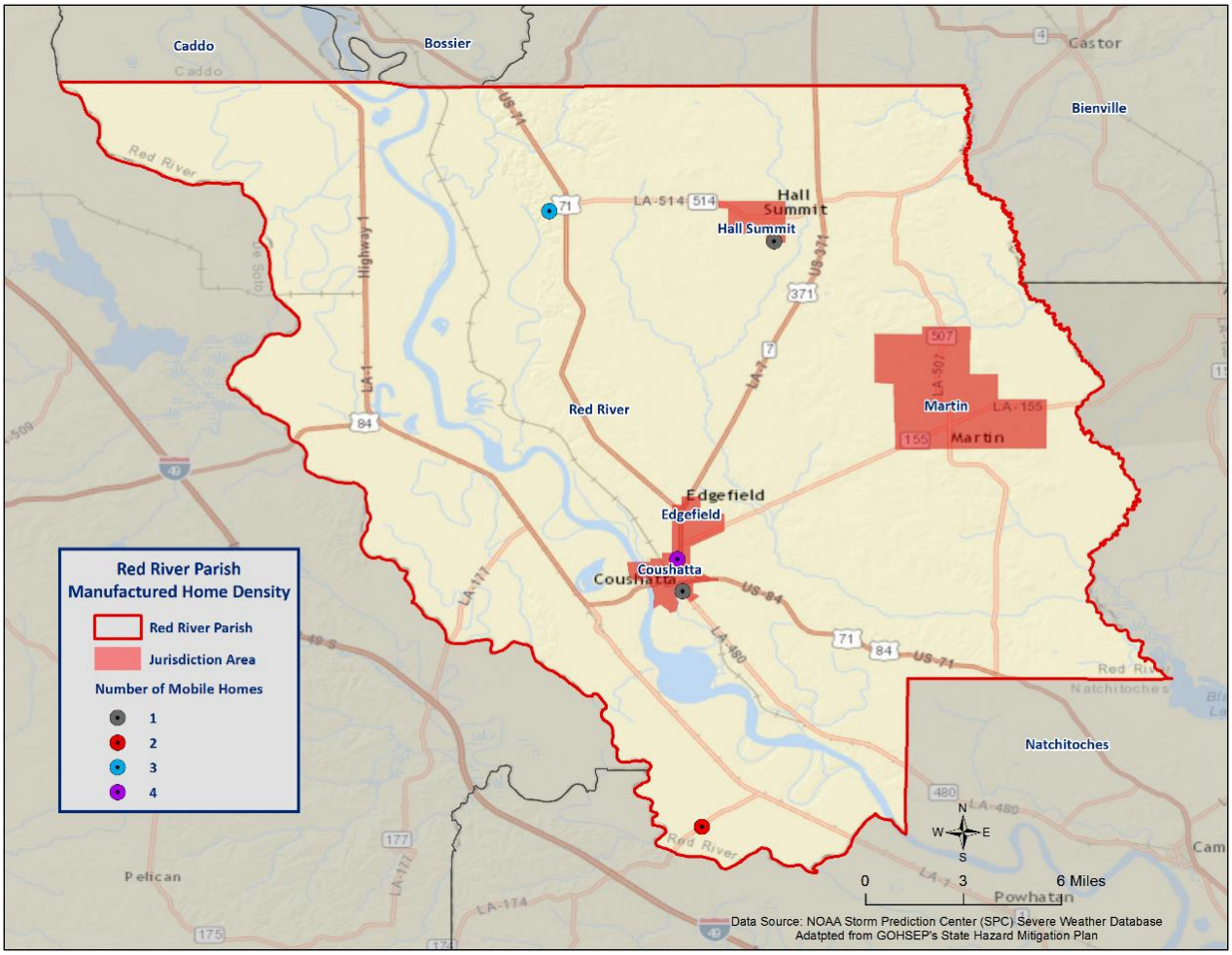


Figure 2-23: Location and Approximate Number of Units in Manufactured Housing Locations throughout Red River Parish

Vulnerability

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

Tropical Cyclones

Tropical cyclones are among the worst hazards that 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 of the formation of low pressure in a perturbation in the westerly motion 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. This results in the formation of a tropical depression (defined when the maximum sustained surface wind speed is 38 mph or less), then a Tropical Cyclone (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). On the next page, *Table 2-46* presents the Saffir-Simpson Hurricane Wind Scale, which categorizes tropical cyclones based on sustained winds.

Table 2-46: Saffir-Simpson Hurricane Wind Scale

Saffir-Simpson Hurricane Wind Scale			
Category	**Sustained Winds**	**Pressure**	**Types of Damage Due to Winds**
Tropical Depression	<39 mph	N/A	N/A
Tropical Cyclone	39-73 mph	N/A	N/A
1	74-95 mph	>14.2 psi	Very dangerous winds will produce some damage. Well-constructed frame homes 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 will likely 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 homes 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	111-129 mph	13.7 -14 psi	Devastating damage will occur. Well-built framed homes 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 may 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 to possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 mph or higher	<13.7 psi	Catastrophic damage will occur. A high percentage of framed homes 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 rains, 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 cyclone 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 five inches of rain while a slow-moving (5 mph) storm could produce totals of around 20 inches. However, no two 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 ten meters in some places) that can inflict a high number 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 near Alluvial City in St. Bernard Parish.

Property can be damaged by the various forces that accompany a tropical cyclone. High winds can directly impact structures in three 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 pressure 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). Mobile homes and buildings in need of maintenance are most subject to wind damage. High winds mean bigger waves. Extended pounding by waves can demolish any poorly or improperly designed structures. The waves also erode sand beaches, roads, and foundations. When foundations are compromised, the building will collapse.

Nine out of ten 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 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 animals, such as snakes, into areas occupied by humans.

Location

Hurricanes are the single biggest threat to the State of Louisiana. With any single hurricane having the potential to devastate multiple parishes at once, the risk of a tropical cyclone has the probability of impacting anywhere within the planning area for Red River Parish. As such, all jurisdictions are equally at risk for tropical cyclones.

Previous Occurrences / Extents

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 three tropical cyclone events occurring within the boundaries of Red River Parish between the years 2002 and 2014 (*Table 2-47*). The tropical cyclone events experienced in Red River Parish include depressions, storms, and hurricanes. As a worst case scenario, Red River Parish can expect to experience hurricanes at the category 1 level in the future.

Table 2-47: Historical Tropical Cyclone Events in Red River Parish from 2002-2014 (Source: SHELDUS)

Date	Name	Storm Type At Time of Impact
September 24, 2005	Rita	Tropical Storm
September 1, 2008	Gustav	Tropical Storm
September 13, 2008	Ike	Tropical Storm

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 in Cameron Parish. 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 five to seven feet above normal overtopped or breached local drainage levees, inundating many small communities. Newspaper accounts indicated that 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, affecting homes and businesses from Slidell to Mandeville and Madisonville. Approximately 1,500 structures were reported as 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. However, the flooding was much more limited in scope than during Hurricane Katrina.

Hurricane Rita was the most powerful hurricane to impact southwestern Louisiana since Hurricane Audrey in 1957. Estimated damages in southwest Louisiana totaled near $4 billion, with the majority of those losses occurring in Cameron and Calcasieu Parishes. Entire towns were destroyed in Cameron Parish, including downtown Cameron, Creole, Holly Beach, and Grand Chenier. An estimated 90 to 95 percent of the homes in the parish were severely damaged or destroyed. Storm surge values were estimated around 15 feet in parts of Cameron Parish.

In Red River Parish, the storm had weakened by the time it affected the area. However, all of Northwest and North Central Louisiana remained on the east side of the eyewall and experienced tropical storm force winds. Damage was sporadic across the region with damage consisting of downed trees and power lines as well as structural damage to homes, businesses and automobiles from downed trees. The damage was particularly extensive along and near the Toledo Bend Reservoir of West Central Louisiana where several structures suffered minor to moderate damage. Many residents lost power during the height of the storm.

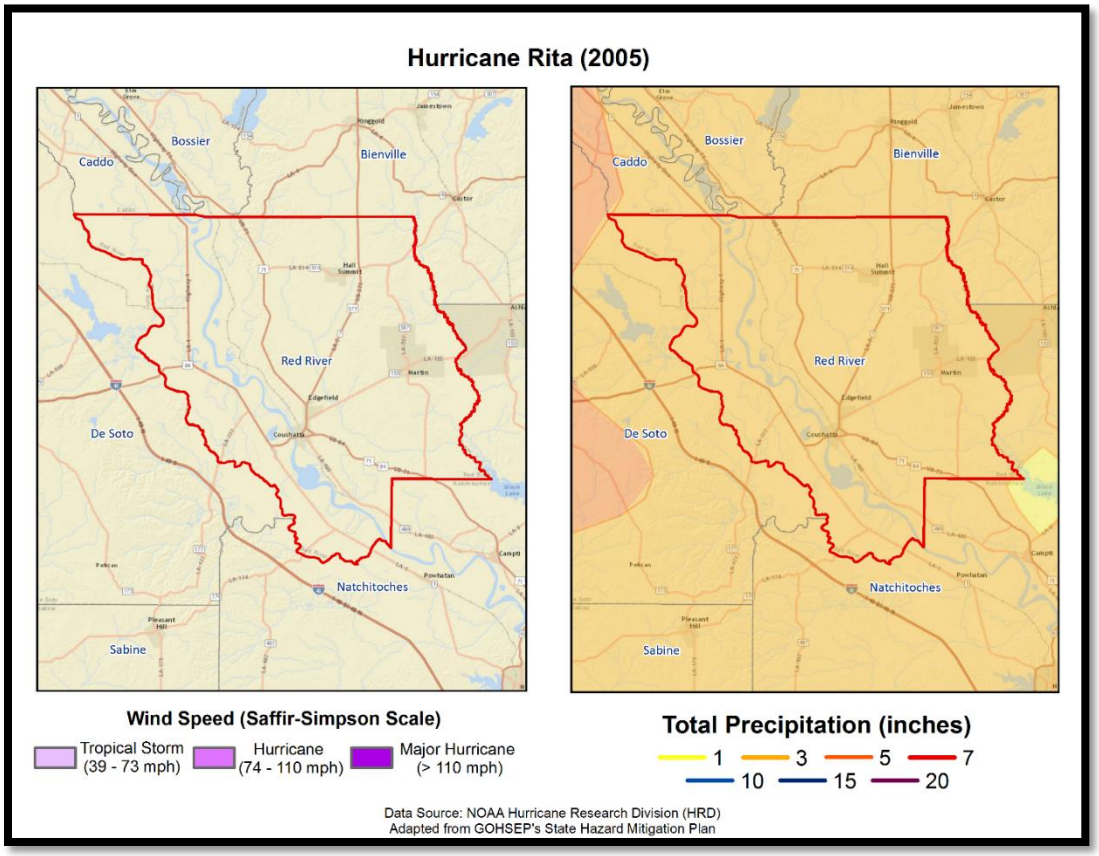


Figure 2-24: Wind Speed and Precipitation Totals in Red River Parish for Hurricane Rita

Hurricane Gustav (2008)

Hurricane Gustav entered the southeast Gulf of Mexico 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 toward Louisiana and made landfall as a Category 2 hurricane near Cocodrie, Louisiana, during the morning of September 1st. 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 2nd.

The highest wind gust recorded was 117 mph (102 kts) at a USGS site at the Houma Navigational Canal and at the Pilot Station East C-MAN near the Southwest Pass of the Mississippi River. The highest sustained wind of 91 mph was recorded 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 four 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. Hurricane force wind gusts occurred also across the inland areas, including the Baton Rouge area and surrounding parishes. A peak wind gust of 91 mph was recorded at the Baton Rouge (Ryan Field) Airport at 1:12 PM CST. This was only one mph less than the highest wind gust recorded during Hurricane Betsy in 1965. After the storm, the electric utility serving most of

southeast Louisiana reported 75 to 100 percent of utility customers were without power, in areas ranging from Lafourche and Terrebonne Parishes northwest through the Baton Rouge area to central Louisiana and southwest Mississippi. 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 were also damaged. Early estimates from Louisiana Economic Development indicated that Gustav caused at least $4.5 billion in property damage in Louisiana, including insured and uninsured losses.

In Red River Parish, numerous trees and power lines were downed. One tree was reported down on a car in Coushatta. With all the downed trees, power outages were widespread across the parish as well.

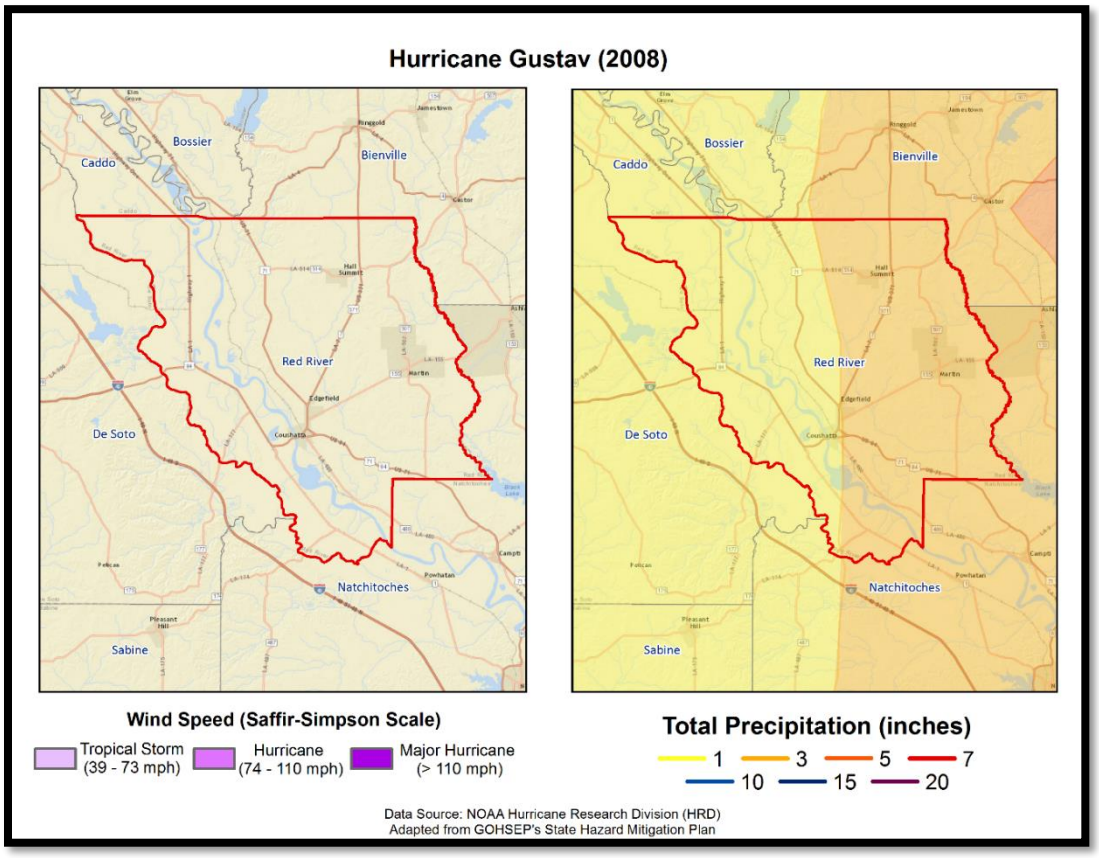


Figure 2-25: Wind Speed and Precipitation Totals in Red River Parish for Hurricane Gustav

Hurricane Ike (2008)

Hurricane Ike caused wind damage, storm surge flooding, and tornadoes across southwest Louisiana. Ike made landfall near Galveston, TX early in the morning on September 13, 2008, as a strong Category 2 hurricane. Sustained hurricane force winds were confined to extreme western Cameron Parish. The highest recorded winds in southwest Louisiana were experienced at Lake Charles Regional Airport, with sustained winds of 53 mph (46 kts) and gusts of 77 mph (67 kts). The lowest pressure reading occurred at Southland Field near Sulphur, LA, with a low of 994.6 millibars. Several tornadoes were reported across southwest Louisiana. The most significant one was near Mamou, where ten to fifteen homes were damaged, including one that lost its roof. Storm surge was a significant event. Water levels ranged from 14 feet in western

Cameron Parish, to eight feet in St. Mary Parish. This resulted in widespread flooding of the same areas that flooded during Hurricane Rita in 2005. Most of Cameron Parish was under water. Over 3,000 homes were flooded. This extended north into Calcasieu Parish, where another 1,000 homes flooded in Lake Charles, Westlake, and Sulphur. In Vermilion Parish, at least 1,000 homes flooded in Pecan Island, Forked Island, Intracoastal City, and Henry. This extended east into Iberia Parish, where another 1,000 homes flooded south of Highway 14 and Highway 90. In St. Mary Parish, some of the worst flooding occurred in Franklin, where a man-made levee failed, flooding over 450 homes. Maximum storm total rainfall ranged from six to eight inches across Cameron, Calcasieu, and Beauregard Parishes. No fatalities were reported in southwest Louisiana. Total property damages, however, were high. Losses were estimated to be almost $420 million across southwest Louisiana. Agricultural losses were over $225 million.

The remnants of Hurricane Ike resulted in tropical storm force winds which downed trees and power lines throughout all of Red River Parish. Power outages were widespread as well with numerous residents without power during the height of the storm and days afterward.

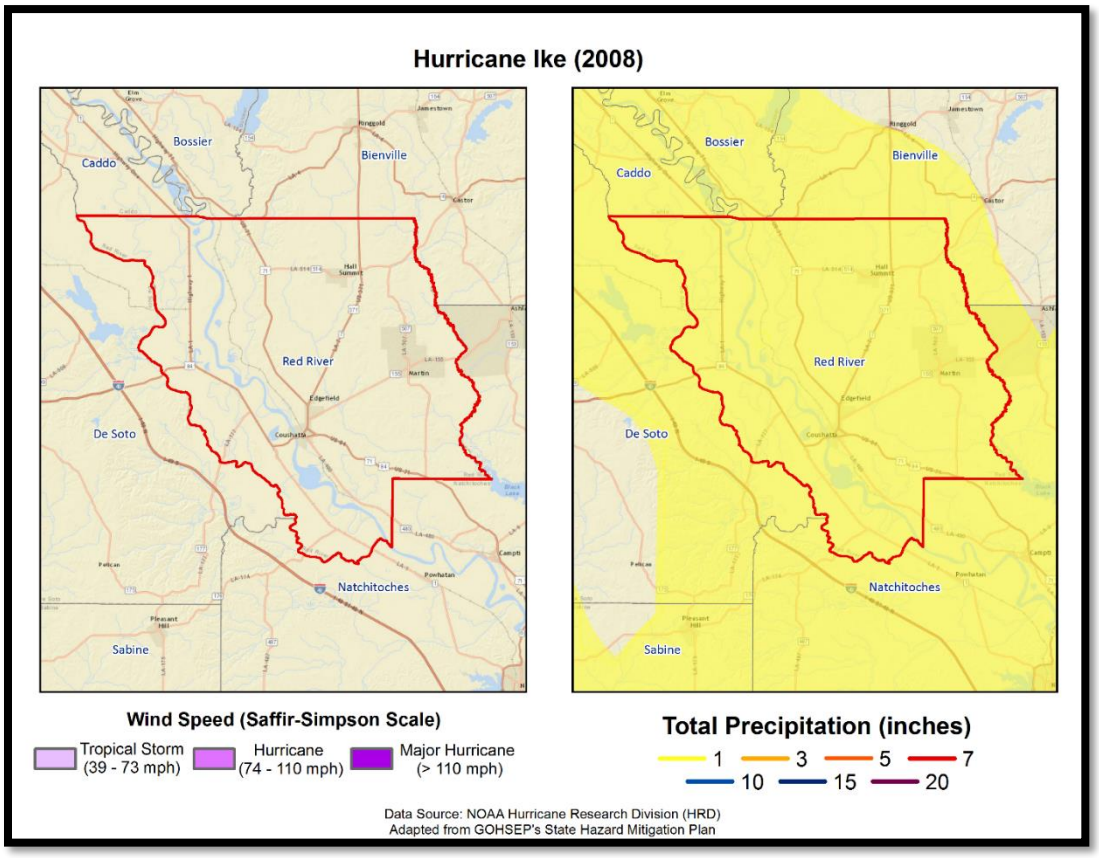


Figure 2-26: Wind Speed and Precipitation Totals in Red River Parish for Hurricane Ike

The following figure displays the wind zones that affect Red River Parish in relation to critical facilities throughout the parish.

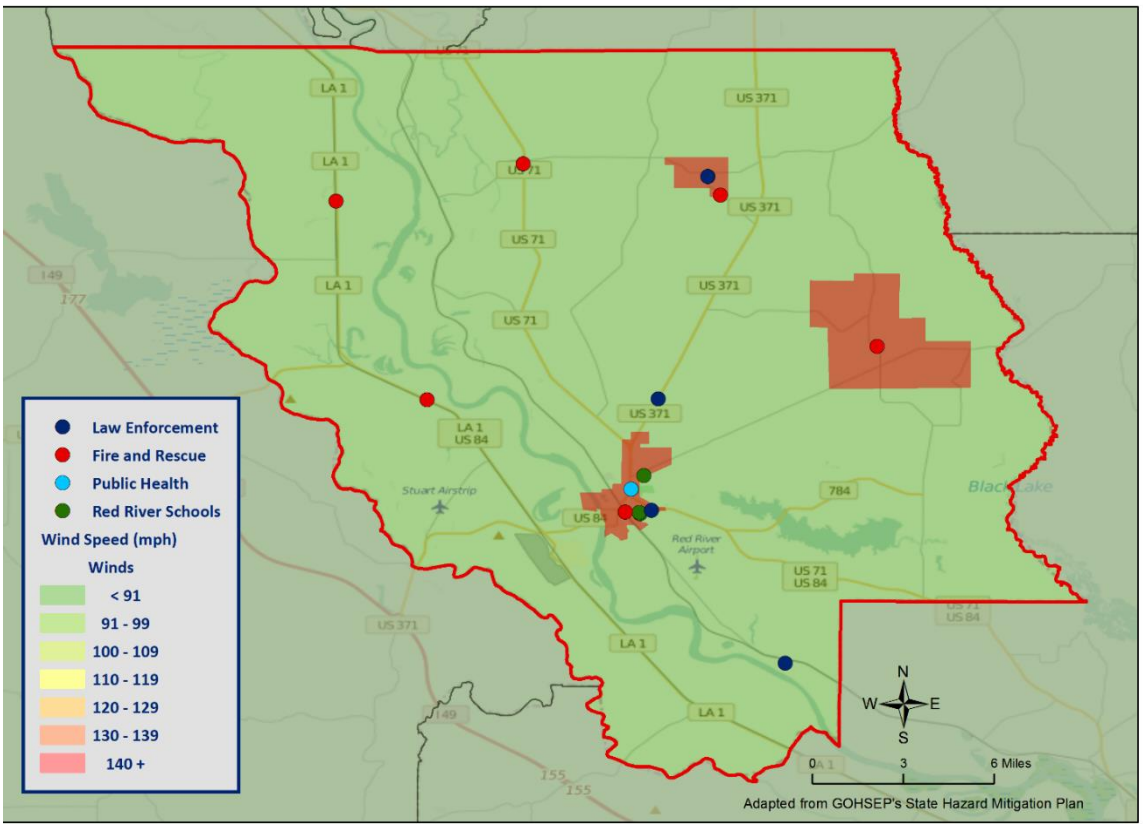


Figure 2-27: Winds Zones for Red River Parish in Relation to Critical Facilities

Frequency / Probability

Tropical cyclones are large natural hazard events that regularly impact Red River Parish. The annual chance of occurrence for a tropical cyclone is estimated at 12% for Red River Parish and its municipalities, with three events occurring within 25 years. The tropical cyclone season for the Atlantic Basin is from June 1st through November 30th, with most of the major hurricanes (Saffir-Simpson Categories 3, 4, & 5) occurring between the months of August and October.

Estimated Potential Losses

Using Hazus 2.2 100-Year Hurricane Model, the 100-year hurricane scenario was analyzed to determine losses from this worst-case scenario. The table on the next page shows the total economic losses that would result from this occurrence.

Table 2-48: Total Estimated Losses for a 100-Year Hurricane Event
(Source: Hazus 2.2)

Jurisdiction	Estimated Total Losses from 100-Year Hurricane Event
Red River Parish (Unincorporated)	$339,803
Coushatta	$110,952
Edgefield	$12,315
Hall Summit	$16,948
Martin	$33,557
Total	$513,575

Total losses from a 100-year hurricane event for each jurisdiction were compared with the total value of assets to determine the ratio of potential damage to total inventory in the table below.

Table 2-49: Ratio of Total Losses to Total Estimated Value of Assets for each Jurisdiction in Red River Parish
(Source: Hazus 2.2)

Jurisdiction	Estimated Total Losses from 100-Year Hurricane Event	Total Estimated Value of Assets	Ratio of Estimated Losses to Total Value
Unincorporated	$339,803	$738,750,000	< 1%
Coushatta	$110,952	$340,551,000	< 1%
Edgefield	$12,315	$32,221,000	<1%
Hall Summit	$16,948	$43,628,000	<1%
Martin	$33,557	$83,348,000	<1%

Based on the Hazus 2.2 Hurricane Model, estimated total losses are less than 1% of the total estimated value of all assets for the unincorporated area of Red River Parish, and the incorporated areas of Coushatta, Edgefield, Hall Summit, and Martin.

The Hazus 2.2 Hurricane Model also provides a breakdown by jurisdiction for seven primary sectors (Hazus occupancy) throughout the parish. The losses for each jurisdiction by sector are listed in the tables on the following pages. These sectors are comprised of privately owned structures/facilities, as well as locally, state, and federally owned structures/facilities.

Table 2-50: Estimated Losses in Unincorporated Red River Parish for a 100-Year Hurricane Event (Source: Hazus 2.2)

Red River Parish (Unincorporated)	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$159
Commercial	$5,518
Government	$452
Industrial	$656
Religious / Non-Profit	$1,060
Residential	$364,977
Schools	$539
Total	$339,803

Table 2-51: Estimated Losses in Coushatta for a 100-Year Hurricane Event (Source: Hazus 2.2)

Coushatta	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$47
Commercial	$1,640
Government	$134
Industrial	$195
Religious / Non-Profit	$315
Residential	$108,460
Schools	$160
Total	$110,952

Table 2-52: *Estimated Losses in Edgefield for a 100-Year Hurricane Event (Source: Hazus 2.2)*

Edgefield	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$5
Commercial	$182
Government	$15
Industrial	$22
Religious / Non-Profit	$35
Residential	$12,039
Schools	$18
Total	$12,315

Table 2-53: Estimated Losses in Hall Summit for a 100-Year Hurricane Event (Source: Hazus 2.2)

Hall Summit	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$7
Commercial	$250
Government	$20
Industrial	$30
Religious / Non-Profit	$48
Residential	$16,567
Schools	$24
Total	$16,948

Table 2-54: Estimated Losses in Martin for a 100-Year Hurricane Event (Source: Hazus 2.2)

Martin	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$14
Commercial	$496
Government	$41
Industrial	$59
Religious / Non-Profit	$95
Residential	$32,803
Schools	$48
Total	$33,557

Threat to People

The total population within the parish that is susceptible to a hurricane hazard is shown in the table below.

Table 2-55: Number of People Susceptible to a 100-Year Hurricane Event in Red River Parish (Source: Hazus 2.2)

Number of People Exposed to Hurricane Hazards in Red River Parish			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Parish (Unincorporated)	**6,015**	**6,015**	**100.0%**
Coushatta	**1,964**	**1,964**	**100.0%**
Edgefield	**218**	**218**	**100.0%**
Hall Summit	**300**	**300**	**100.0%**
Martin	**594**	**594**	**100.0%**
Total	**9,091**	**9,091**	**100.0%**

The HAZUS-MH Hurricane Model was also extrapolated to provide an overview of vulnerable populations throughout the jurisdictions. These populations are illustrated in the following tables:

Table 2-56: Vulnerable Populations in Unincorporated Red River Parish for a 100-Year Hurricane Event (Source: Hazus 2.2)

Red River Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	6,015	100.0%
Persons Under 5 Years	438	7.3%
Persons Under 18 Years	1,530	25.4%
Persons 65 Years and Over	917	15.3%
White	3,546	59.0%
Minority	2,469	41.0%

Table 2-57: Vulnerable Populations in Coushatta for a 100-Year Hurricane Event (Source: Hazus 2.2)

Coushatta		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	1,964	100.0%
Persons Under 5 Years	176	9.0%
Persons Under 18 Years	570	29.0%
Persons 65 Years and Over	246	12.5%
White	569	29.0%
Minority	1,395	71.0%

Table 2-58: Vulnerable Populations in Edgefield for a 100-Year Hurricane Event (Source: Hazus 2.2)

Edgefield		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	218	100.0%
Persons Under 5 Years	13	6.0%
Persons Under 18 Years	51	23.4%
Persons 65 Years and Over	49	22.5%
White	181	83.0%
Minority	37	17.0%

Table 2-59: Vulnerable Populations in Hall Summit for a 100-Year Hurricane Event (Source: Hazus 2.2)

Hall Summit		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	300	100.0%
Persons Under 5 Years	25	8.3%
Persons Under 18 Years	80	26.7%
Persons 65 Years and Over	61	20.3%
White	253	84.3%
Minority	47	15.7%

Table 2-60: Vulnerable Populations in Martin for a 100-Year Hurricane Event (Source: Hazus 2.2)

Martin		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	594	100.0%
Persons Under 5 Years	45	7.6%
Persons Under 18 Years	140	23.6%
Persons 65 Years and Over	91	15.3%
White	570	96.0%
Minority	24	4.0%

Vulnerability

See Appendix C for parish and municipality buildings that are susceptible to tropical cyclones.

Wildfires

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 three 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 two types of crown fires: (a) *passive (or dependent)* crown fires rely on heat transfer from surface fire, whereas (b) *active (or independent)* 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 of ascending hot air and gases rising from the fire. Large fire 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 built environment provide fuel for fires. As development near wildland settings continues, more people and property are exposed to wildfire danger. Figure 2-28 displays the areas of wildland-urban interaction in Red River 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 on the next page summarizes the intensity levels assigned to areas in the Southern Wildfire Assessment Portal.

Table 2-61: 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 two feet long; small amount of very short range spotting possible. Fires are easy to suppress.
3	Moderate Intensity: Flames up to eight 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. The following figure displays the areas of wildland-urban interface and intermix in Red River Parish and its jurisdictions.

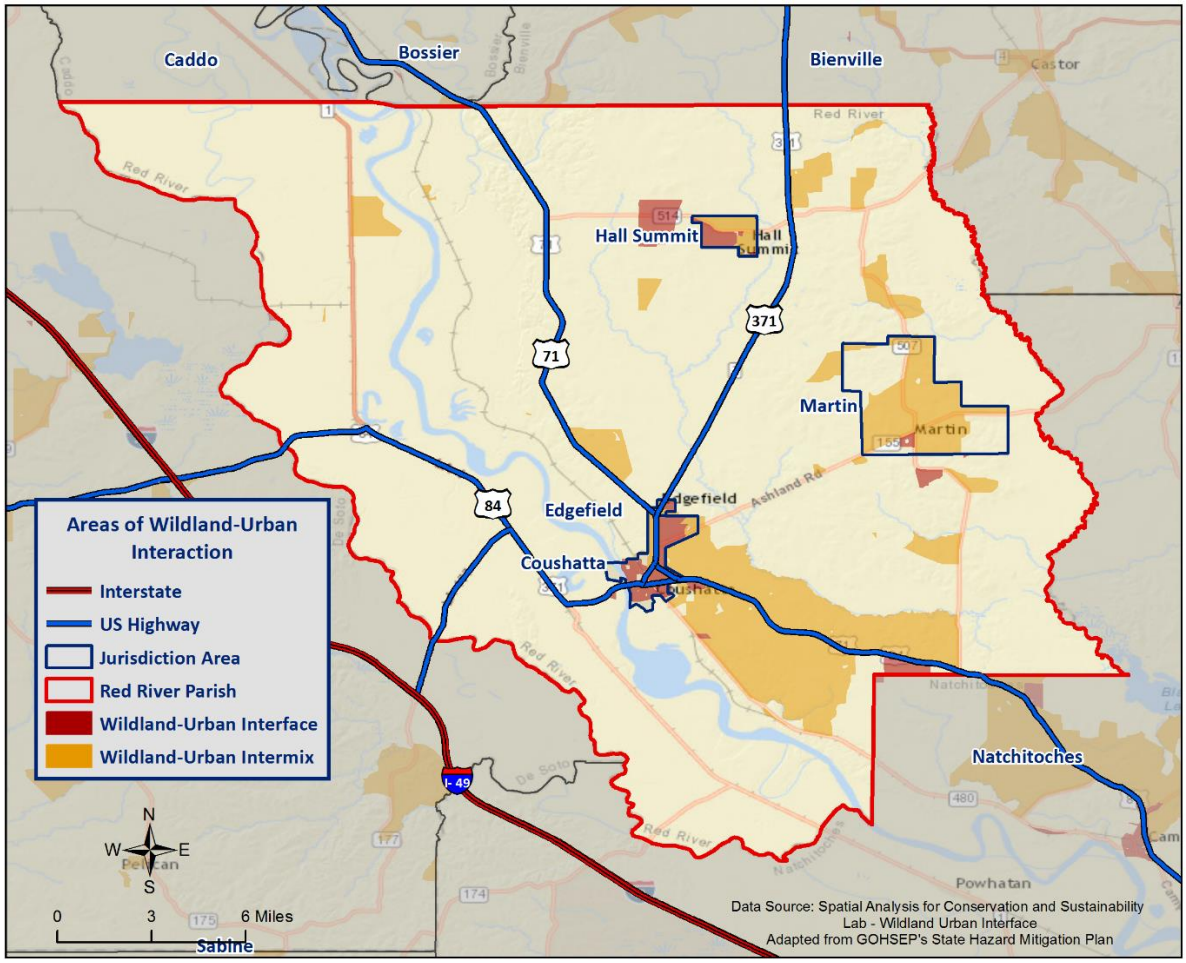


Figure 2-28: Wildland-Urban Interaction in Red River Parish

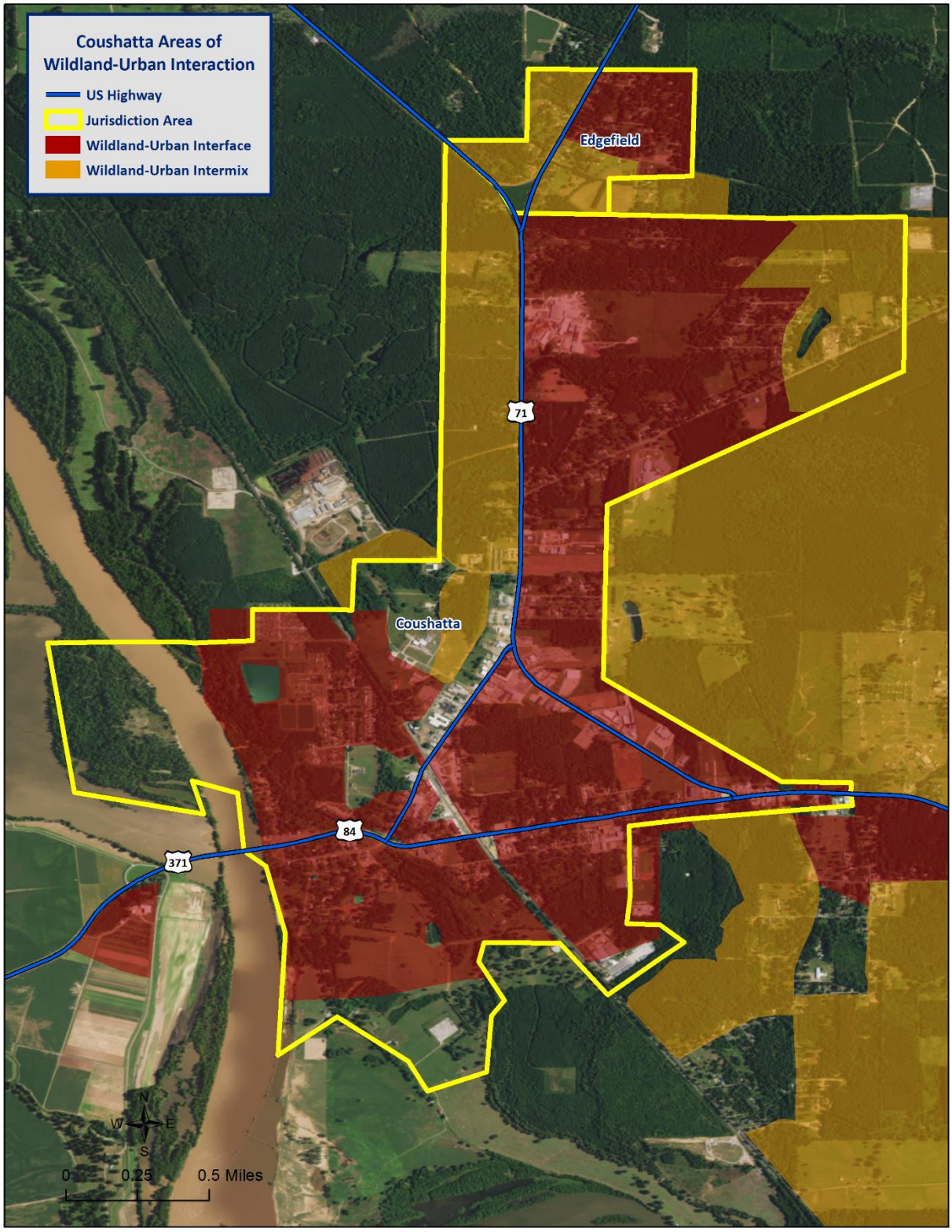


Figure 2-29: Wildland-Urban Interaction in Coushatta

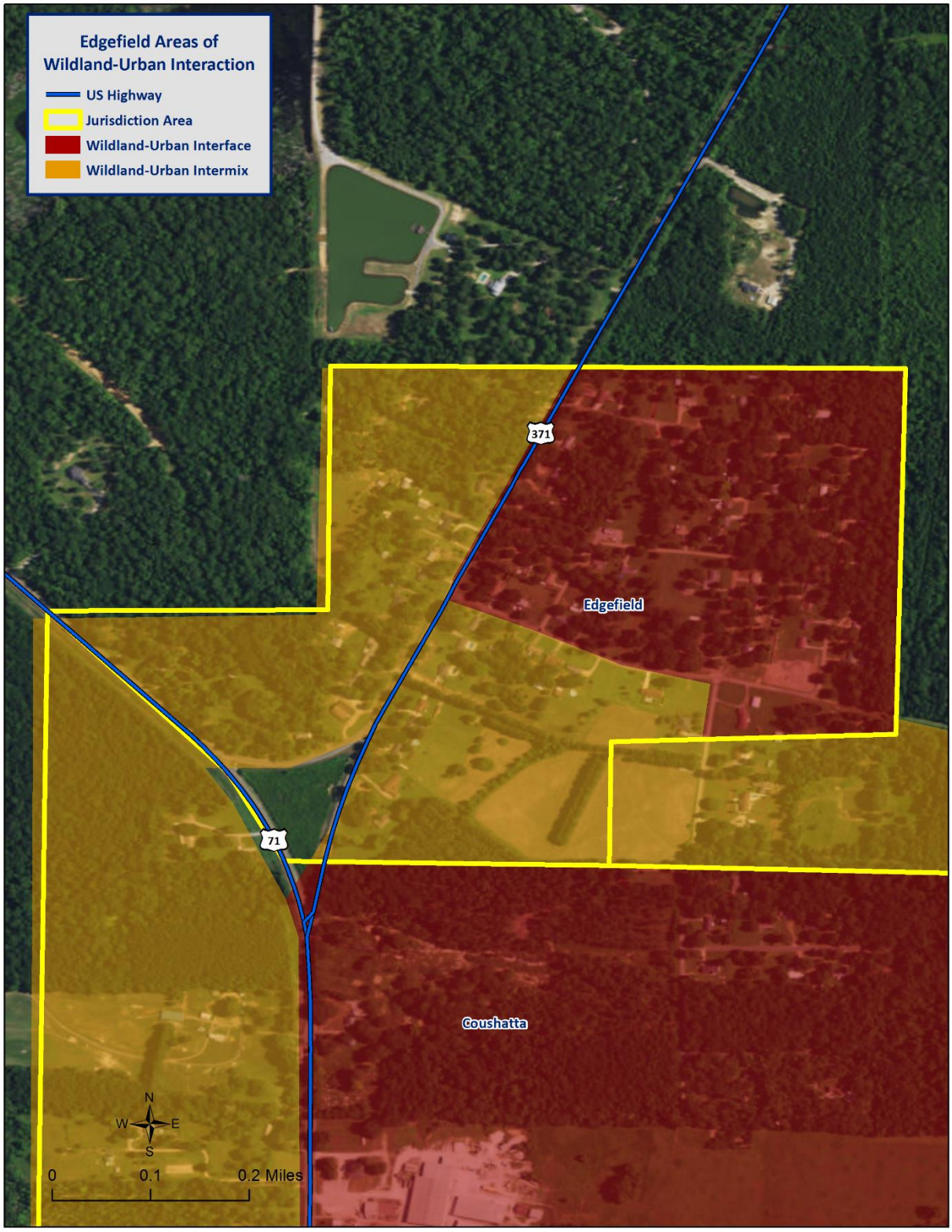


Figure 2-30: Wildland-Urban Interaction in Edgefield

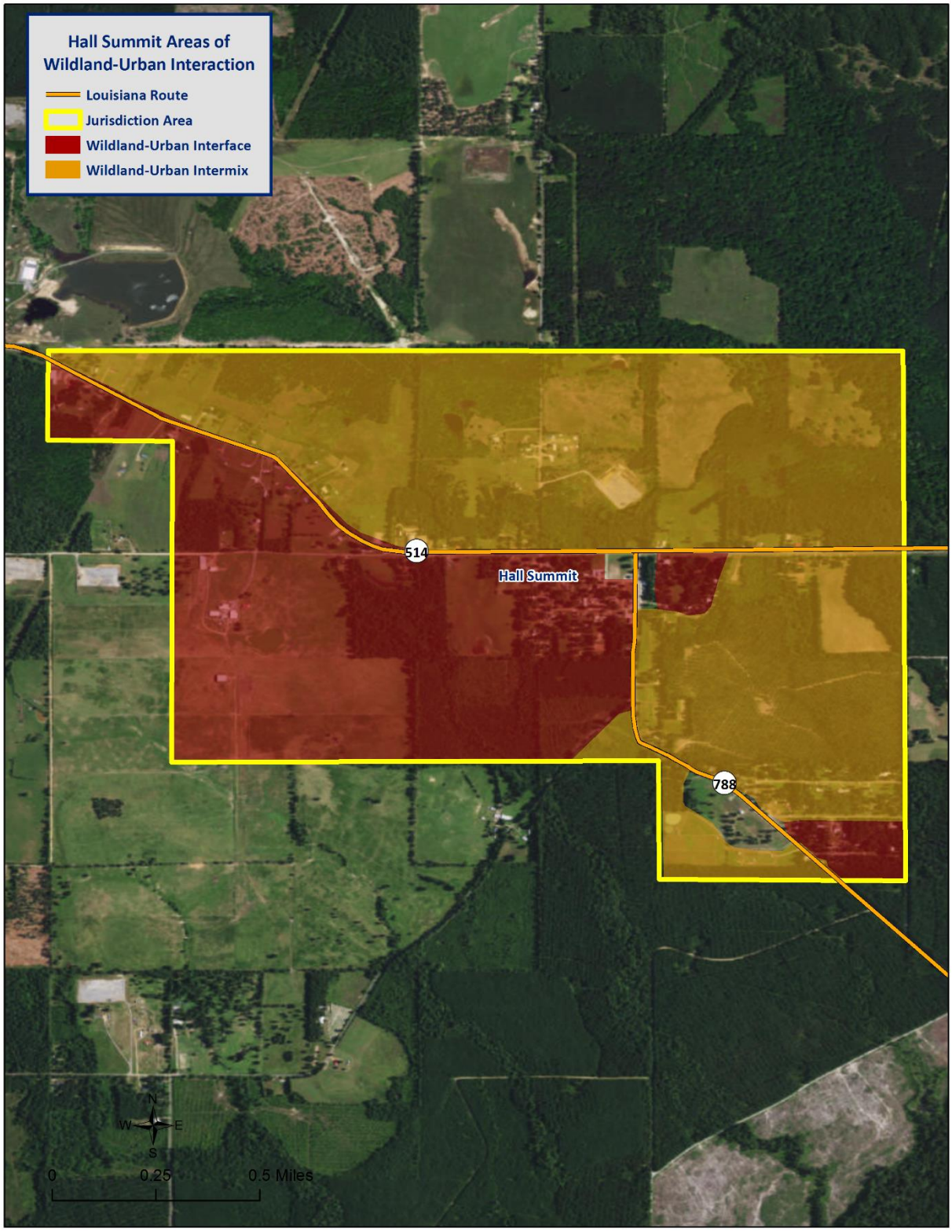


Figure 2-31: Wildland-Urban Interaction in Hall Summit

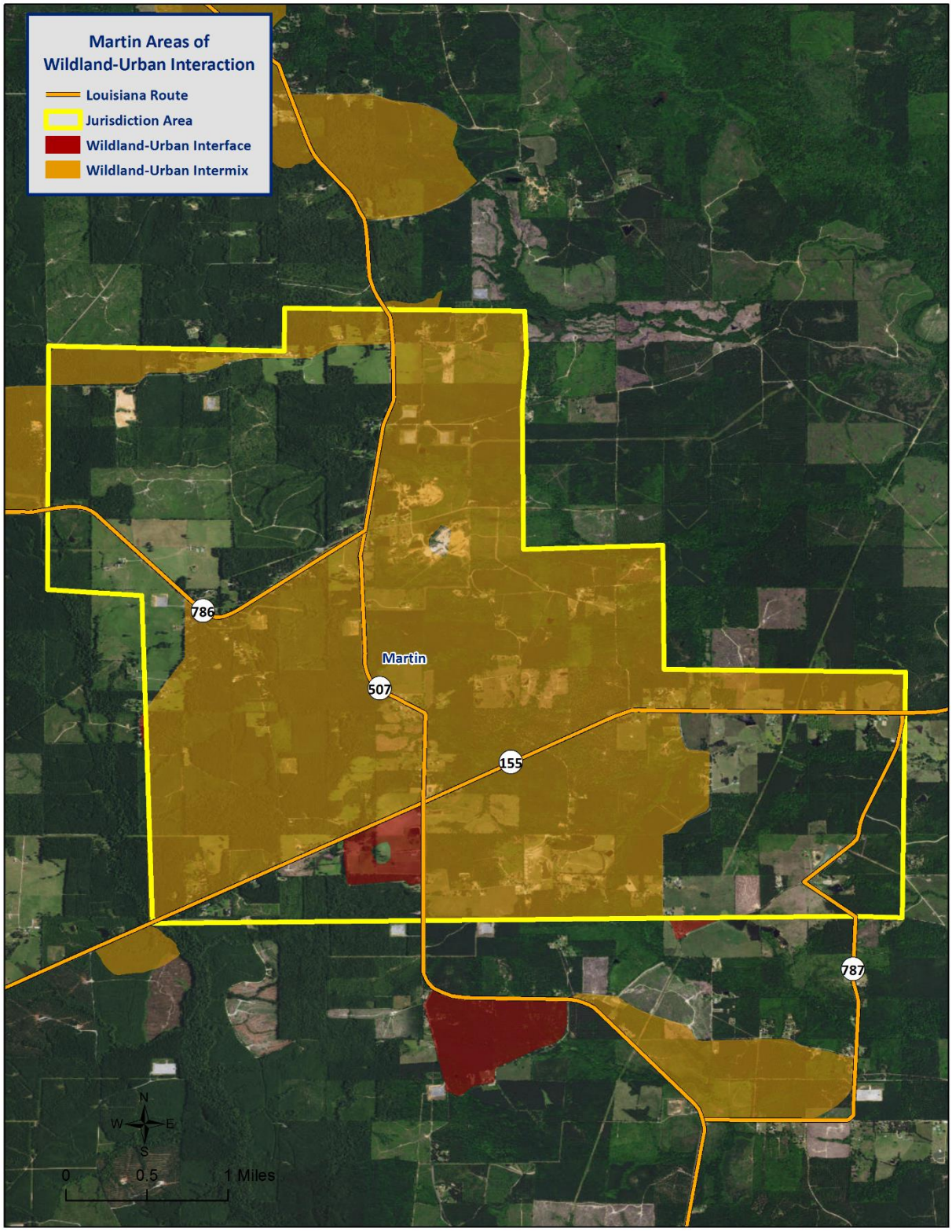


Figure 2-32: Wildland-Urban Interaction in Martin

Previous Occurrences / Extents

There have been no occurrences of a wildfire event within the Red River Parish planning area from the years 1990 to 2015.

Based on the Southern Group of State Foresters Risk Assessment Portal, the following table outlines the intensity that each jurisdictional area within Red River Parish could potential experience due to a wildfire event.

Table 2-62: Potential Wildfire Intensity Levels for Red River Parish
(Source: Southern Wildfire Assessment Portal)

Potential Wildfire Intensity	
Red River Parish (Unincorporated)	Highest Intensity Level 5
Coushatta	Low Intensity Level 2
Edgefield	Moderate to High Intensity Level 3.5
Hall Summit	Moderate to High Intensity Level 3.5
Martin	Low Intensity Level 2

Frequency / Probability

With no recorded events in 25 years, wildfire events within the boundaries of Red River Parish have an annual chance of occurrence calculated at less than 1% based on the SHELDUS dataset.

Estimated Potential Losses

There have been no wildfire events that have caused property damage, crop damage, injuries, or fatalities in Red River Parish. In assessing the overall risk to population, the most vulnerable population throughout the parish consists of those residing in areas of wildland-urban interaction. Figure 2-28 displays the areas of wildland-urban interaction in Red River Parish.

Using Hazus 2.2, along with wildland-urban interaction areas, the following table presents an analysis of total building exposure that is located within the wildland-urban interaction areas.

Table 2-63: Total Building Exposure by Wildland-Urban Interaction Areas
(Source: Hazus 2.2)

Jurisdiction	Estimated Total Building Exposure
Red River (Unincorporated)	$539,116,000
Coushatta	$333,581,000
Edgefield	$32,221,000
Hall Summit	$46,698,000
Martin	$81,879,000
Total	$1,033,495,000

Hazus 2.2 also provides a breakdown by jurisdiction for seven primary sectors (Hazus occupancy) throughout the parish. Utilizing this information with the wildland-urban interaction areas allows for identifying the total exposure by jurisdiction. The total exposure for each jurisdiction by sector is listed in the following tables. These sectors are comprised of privately owned structures/facilities, as well as locally, state, and federally owned structures/facilities.

Table 2-64: Estimated Exposure for Unincorporated Red River Parish by Sector (Source: Hazus 2.2)

Red River Parish (Unincorporated)	Estimated Total Building Exposure by Sector
Agricultural	$730,000
Commercial	$23,807,000
Government	$5,922,000
Industrial	$8,500,000
Religious / Non-Profit	$13,974,000
Residential	$486,183,000
Schools	$0
Total	$539,116,000

Table 2-65: Estimated Exposure for Coushatta by Sector (Source: Hazus 2.2)

Coushatta	Estimated Total Building Exposure by Sector
Agricultural	$1,358,000
Commercial	$110,350,000
Government	$5,618,000
Industrial	$8,416,000
Religious / Non-Profit	$7,420,000
Residential	$189,281,000
Schools	$11,138,000
Total	$333,581,000

Table 2-66: Estimated Exposure for Edgefield by Sector
(Source: Hazus 2.2)

Edgefield	Estimated Total Building Exposure by Sector
Agricultural	$0
Commercial	$0
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$32,221,000
Schools	$0
Total	$32,221,000

Table 2-67: Estimated Exposure for Hall Summit by Sector
(Source: Hazus 2.2)

Hall Summit	Estimated Total Building Exposure by Sector
Agricultural	$472,000
Commercial	$900,000
Government	$796,000
Industrial	$858,000
Religious / Non-Profit	$882,000
Residential	$39,098,000
Schools	$3,692,000
Total	$46,698,000

Table 2-68: Estimated Exposure for Martin by Sector
(Source: Hazus 2.2)

Martin	Estimated Total Building Exposure by Sector
Agricultural	$0
Commercial	$9,416,000
Government	$44,280
Industrial	$0
Religious / Non-Profit	$0
Residential	$72,463,000
Schools	$0
Total	$81,923,280

Threat to People

The total population within the parish that is located within a wildland-urban interaction area is shown in the table below:

Table 2-69: Populations Located within a Wildland-Urban Interaction Area
(Source: 2010 U.S. Census Data)

Number of People Located in Wildland-Urban Interaction Areas.			
Location	**# in Community**	**# in Area**	**% in Area**
Red River (Unincorporated)	**6,015**	**2,568**	**42.7%**
Coushatta	**1,964**	**1,952**	**99.4%**
Edgefield	**218**	**218**	**100.0%**
Hall Summit	**300**	**289**	**96.3%**
Martin	**594**	**463**	**77.9%**
Total	**9,091**	**5,490**	**60.4%**

The 2010 U.S. Census data was also extrapolated to provide an overview of populations located within wildland-urban interaction areas throughout the jurisdictions. That data is illustrated in the following tables:

Table 2-70: Population in Unincorporated Red River Parish Located within a Wildland-Urban Interaction Area
(Source: 2010 U.S. Census Data)

Red River Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	2,568	42.7%
Persons Under 5 Years	180	7.0%
Persons Under 18 Years	634	24.7%
Persons 65 Years and Over	426	16.6%
White	1,513	58.9%
Minority	1,055	41.1%

Table 2-71: Population in Coushatta Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Coushatta		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	1,952	99.4%
Persons Under 5 Years	175	9.0%
Persons Under 18 Years	392	20.1%
Persons 65 Years and Over	245	12.5%
White	565	29.0%
Minority	1,387	71.0%

Table 2-72: Population in Edgefield Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Edgefield		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	218	100.0%
Persons Under 5 Years	13	6.0%
Persons Under 18 Years	38	17.4%
Persons 65 Years and Over	49	22.5%
White	181	83.0%
Minority	37	17.0%

Table 2-73: Population in Hall Summit Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Hall Summit		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	289	96.3%
Persons Under 5 Years	24	8.3%
Persons Under 18 Years	53	18.3%
Persons 65 Years and Over	59	20.3%
White	244	84.3%
Minority	45	15.7%

Table 2-74: Population in Martin Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Martin		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	463	77.9%
Persons Under 5 Years	35	7.6%
Persons Under 18 Years	74	16.0%
Persons 65 Years and Over	71	15.3%
White	444	96.0%
Minority	19	4.0%

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 fall within the wildfire-urban interface and/or intermix.

Winter Storms

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. Once the cold air mass crosses Louisiana, and the temperature drops, 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 storm events that affect the state of Louisiana are ice storms, freezes, and snow events. Of the winter storm 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.

In a typical winter storm event, homes and buildings are damaged by ice accumulation, either directly by the weight of the ice on the roofs or by trees and/or limbs falling on buildings. While it is not very prevalent, this type of damage can occur in Louisiana, particularly in north Louisiana. Effects of winter weather more likely to occur in Louisiana, especially southern Louisiana, include extreme temperatures which can cause waterlines to freeze and sewer lines to rupture. This is especially true with elevated or mobile homes, since cold air is able to access more of the building's infrastructure. Winter storms can also have a devastating effect on agriculture, particularly on crops (like citrus) that are dependent on warm weather. Long exposures to low temperatures can kill many kinds of crops, and ice storms can weigh down branches and fruit.

Winter storms are not only a direct threat to human health through conditions like frostbite and hypothermia, but they are also an indirect threat to human health due to vehicle accidents and loss of power and heat, which can be disrupted for days. However, these impacts are rarely seen in Louisiana. As people use space heaters and fireplaces to stay warm, the risk of household fires and carbon monoxide poisoning increases.

Winter storm events occur throughout Louisiana usually during the colder calendar months of December, January, and February. Severe weather events do not occur with the same frequency across all parts of Louisiana. The northern quarter of Louisiana has historically experienced the most severe winter events between 1987 and 2012. The central, and to an even greater extent the southern parts of the state, such as Ascension Parish, have experienced the fewest severe winter events. The table on the next page shows the Sperry-Piltz Ice Accumulation Index which is utilized to predict the potential damage to overhead utility systems from freezing rain and ice storms.

Table 2-75: Sperry-Piltz Ice Accumulation Index

Ice Damage Index	Damage and Impact Descriptions
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structure. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Location

Because a winter storm is a climatological based hazard and has the same probability of occurring in Red River Parish as all of the adjacent parishes, the entire planning area for Red River Parish is equally at risk for winter storms.

Previous Occurrences / Extents

According to SHELDUS, there have been ten reported winter storm events that have occurred within the boundaries of Red River Parish between the years of 1990 and 2015. The following table provides a brief synopsis of each event. Based on historic data, Red River Parish can expect an ice damage index of 2 on the Sperry-Piltz Ice Accumulation Index.

Table 2-76: Previous Occurrences for Winter Storm Events

Date	Synopsis	Property Damage	Crop Damage
March 12, 1993	Winds of 40 mph with gusts to 55 mph were common across the central and southeast coastal zones of Louisiana. These winds were associated with a rapidly strengthening extratropical storm which moved quickly through the southeast Louisiana coastal waters. There were numerous press reports of large trees, power lines, and power poles being blown down by these strong winds.	$0	$227,828

Date	Synopsis	Property Damage	Crop Damage
February 10, 1994	A severe ice storm developed over Louisiana. Freezing rain spread across much of the north third of Louisiana and at times was accompanied by thunderstorms which produced the most severe icing problems. The greatest damage occurred on elevated objects. The combination of gusty winds and icing of one to two inches thick snapped power lines, power poles, or caused tree limbs to snap which subsequently broke power lines. The weight from ice accumulations was also heavy enough to collapse a number of chicken houses.	$1,540,359	$0
December 22, 1998	A shallow dome of arctic air spread across northern Louisiana while low pressure formed in the northern Gulf of Mexico pulling warm moist air northward over the top of the cold air. The result as widespread freezing rain, sleet, and freezing drizzle. The ice accumulated mainly across exposed surfaces such as trees and powerlines as well as bridges and overpasses. Over a quarter million people were without power, some for over a week. I-20, I-220, and I-49 were shut down for a period.	$85,433	$0
December 12, 2000	An arctic air mass spilled southward out of the central plains and into the lower Mississippi Valley. This cold surface air mass was overrun by a warm and humid air mass which combined with a strong upper level storm across west Texas. The result was widespread freezing rain. Ice accumulations on average of one inch were common north and west of a line from Mansfield and Arcadia to Farmerville LA. An estimated 235,000 residents lost power from snapped power lines. Upwards of 29 transmission lines atop “H” shaped steel towers were snapped due to the weight of the ice.	$4,124,321	$0
January 7, 2010	Bitterly cold temperatures swept into the region during the evening hours of January 7th with a hard freeze being observed nearly through the morning hours of January 10th. During this period of time…overnight and early morning low temperatures were well into the teens with daytime high temperatures struggling to make it to the freezing mark. The cold temperatures froze water pipes of many homes throughout the parish. Some city and parish water lines burst as well resulting in many residents either without water for a short period of time or with reduced water pressure.	$40,712	$0
January 5, 2014	An arctic air mass infiltrated the region early on Sunday, January 5th with falling temperatures and strong northwest winds. Temperatures fell through much of the day on January 5th behind the front with winds approaching 30 mph at times, making it feel much colder with very cold	$0	$0

Date	Synopsis	Property Damage	Crop Damage
	wind chills. Low temperatures the morning of the 6th and the morning of the 7th were some of the coldest temperatures Northwest Louisiana had seen since 1996. The extreme cold resulted in many underground water lines freezing and bursting.		
January 23, 2014	Light rain began during the morning hours on the 23rd as moisture began to override the shallow cold air mass close to the surface. As the day continued, the depth of the cold air became deeper and deeper with some sleet and snow flurries reported near the Interstate 20 corridor of Northeast Texas and Northern Louisiana. By late afternoon, the change over from light rain to brief periods of sleet and eventually all snow began. Snow came down moderately heavy at times reducing visibilities to near one mile. A weather observer in Coushatta reported approximately one inch of snow fall.	$0	$0
February 11, 2014	During the onset of precipitation, a mixture of rain and sleet was the predominant precipitation type with some sleet accumulations exceeding one inch across portions of Northwest Louisiana. There was even a brief transition of moderate snow across portions of the region as well. During the evening and overnight hours, the transition turned to predominantly freezing rain with some hefty accumulations noted across the region. Ice accumulations of one quarter of an inch were common across much of Northwest Louisiana.	$0	$0
February 23, 2015	A cold dome of arctic air spilled out of the Central and Southern plains, into the Lower Mississippi Valley. The flow aloft contained embedded disturbances moving towards the region from West Texas. These disturbances provided the necessary lift to generate widespread winter precipitation in the form of freezing rain and sleet. Accumulations were mainly less than one tenth of an inch across the region.	$0	$0
March 4, 2015	A cold, arctic air mass entered the region from the northwest during the late afternoon and early evening hours of March 4th. The flow aloft was from the west southwest and disturbances embedded in this flow produced the lift necessary for precipitation to overspread the region. The precipitation began as a cold rain but quickly transitioned to sleet during the late night hours with the precipitation transitioning over to a mixture of sleet and snow during the morning hours of the 5th. Freezing rain amounts were mainly less than one tenth of an inch with sleet amounts near one half to one inch with snow amounts ranging from trace amounts to near one inch accumulations.	$0	$0

Based on previous winter storm events, the worst-case scenario for Red River Parish and the incorporated areas of Coushatta, Edgefield, Hall Summit, and Martin is approximately one to two inches of snow accumulation and approximately one inch of ice accumulation.

Frequency / Probability

With ten recorded events in 25 years, winter storm events within the boundaries of Red River Parish have an annual chance of occurrence calculated at 40% based on the SHELDUS dataset.

Estimated Potential Losses

Since 1990, there have been ten reported winter weather events that have resulted in property and/or crop damages according to the SHELDUS database. The total property damages associated with these storms have totaled $5,790,825. To estimate the potential losses of a winter weather event on an annual basis, the total damage recorded for winter weather events was divided by the total number of years of available winter weather data in SHELDUS (1990 – 2015). This provides an annual estimated potential loss of $231,633. To assess potential losses to the participating jurisdictions, the 2010 Census population was used to assign the estimated potential losses proportionally across the jurisdictions. The following table provides an estimate of potential property losses for Red River Parish based on the 2010 Census data:

Table 2-77: Estimated Annual Losses from Winter Weather Events in Red River Parish

Estimated Annual Potential Losses from Winter Weather in Red River Parish				
Unincorporated Red River Parish (66.2% of Population)	**Coushatta (21.6% of Population)**	**Edgefield (2.4% of Population)**	**Hall Summit (3.3% of Population)**	**Martin (6.5% of Population)**
$153,258	$50,041	$5,555	$7,644	$15,135

From 1990 - 2015, there have been no injuries or fatalities as a result of winter weather in Red River Parish.

Vulnerability

See Appendix C for parish and municipality building exposure to winter weather hazards.

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 severe 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 can 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.

Location

Red River Parish is awaiting a response from the U.S. Army Corps of Engineers on dam locations within the Red River Parish Planning area. Currently, a data deficiency exists for dam failure in Red River Parish.

Previous Occurrences / Extents

There have been no reported dam failures in Red River Parish from 1990 to 2015. Dam information including the extent of dam failures has been requested from the USACE. Red River Parish is awaiting a response from the USACE, and will continue to work to update this information as new data is received.

Frequency / Probability

Based on the 25-year record, it is determined that a dam failure has less than a 1% annual chance of occurrence in the Red River Parish planning area. Red River Parish is awaiting a response from the USACE, and will continue to work to update this information as new data is received.

Levee Failure

Levees and floodwalls are flood control barriers constructed of earth, concrete, or other materials. For the purposes of this plan, levees are distinguished from smaller flood barriers (such as berms) by their size and extent. Berms are barriers that only protect a small number of structures, or at times only a single structure. Levees and floodwalls are barriers that protect significant areas of residential, commercial, or industrial development; at a minimum, they protect a neighborhood or small community. Levee failure involves the overtopping, breach, or collapse of the levee. Levee failure is especially destructive to nearby development during flood and hurricane events.

The northern half of Louisiana is protected by levees on the Ouachita River, under the authority of the Vicksburg District of the United States Army Corp of Engineers (USACE). The Vicksburg District encompasses 68,000 mi^2 in the states of Arkansas, Mississippi and Louisiana. They manage seven drainage basins, including the Yazoo, Pearl, Big Black, Red, Ouachita, and Mississippi Rivers; 12 locks and dams on the Pearl, Red, and Ouachita Rivers; 1,808 miles of levees, including 468 miles along the Mississippi River; and multiple lakes with 1,709 miles of shoreline.

Coastal and southern Louisiana are protected by an extensive levee system under the authority of the New Orleans District of the USACE. This system includes 30,000 mi^2 of Louisiana south of Alexandria, including 961 miles of river levees in the Mississippi River and Tributaries Project, 449 miles of river levees in the Atchafalaya Basin, and 340 miles of hurricane-protection levees. Other levees have been built along stretches of rivers throughout Louisiana by local levee districts and private citizens. The data regarding these non-federal levees are managed by the individual entity responsible for construction and subsequent maintenance and are not kept in a consistent format for comprehensive hazard analysis.

The effects of a levee failure on property is similar to that of a flood, as discussed in the flooding section. One major difference is that the velocity of the water is increased in the area of the breach, so the potential for property damage is higher in these areas.

A levee failure occurs during high water events, so the populace is normally alerted to the potential danger. Levees are normally monitored during these events and the population in danger is alerted to a possible levee failure. However, if people consider themselves safe once a levee has been breached and do not evacuate, the results could be deadly.

Location

Red River Parish is awaiting a response from the U.S. Army Corps of Engineers on levee locations within the Red River Parish Planning area. Currently, a data deficiency exists for levee failure in Red River Parish.

Previous Occurrences / Extents

There have been no reported levee failures in Red River Parish from 1990 to 2015. Levee information including the extent of a levee failure has been requested from the U.S. Army Corps of Engineers. Red River Parish is awaiting a response from the USACE, and will continue to update this information as new data is received.

Frequency / Probability

Based on the 25-year record, it is determined that a levee failure has less than a 1% annual chance of occurrence in the Red River Parish planning area. Red River Parish is awaiting a response from the USACE, and will continue to work to update this information as new data is received.

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3. Capability Assessment

This section summarizes the results of the Red River Parish 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's infrastructure, as well as relevant changes in its law since the last plan update, in order to suggest a mitigation strategy.

Through this assessment, Red River 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

Red River 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, objectives, 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. They take an integrated and strategic look holistically at hazard mitigation in Red River Parish to propose ways to continually 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 Red River Parish and its jurisdictions are shown in the table on the following page.

Table 3-1: Red River Parish Planning and Regulatory Capabilities

Planning and Regulatory						
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.						
	Red River Parish	Coushatta	Edgefield	Hall Summit	Martin	Comments
Plans	Yes / No					
Comprehensive / Master Plan	No	No	No	No	No	
Capital Improvements Plan	No	Yes	No	No	No	
Economic Development Plan	Yes	Yes	No	No	No	
Local Emergency Operations Plan	Yes	Yes	No	Yes	No	
Continuity of Operations Plan	No	No	No	No	No	
Transportation Plan	No	No	No	No	No	
Stormwater Management Plan	Yes	No	No	No	No	
Community Wildfire Protection Plan	No	No	No	No	No	
Other plans (redevelopment, recovery, coastal zone management)	No	No	No	No	No	
Building Code, Permitting and Inspections	Yes / No					
Building Code	Yes	Yes	No	No	No	
Building Code Effectiveness Grading Schedule (BCEGS) Score	Yes	Yes	No	No	No	Martin- State & Parish
Fire Department ISO/PIAL rating	Yes	Yes	Yes	Yes	No	
Site plan review requirements	Yes	Yes	Yes	Yes	No	
Land Use Planning and Ordinances	Yes / No					
Zoning Ordinance	No	Yes	Yes	No	No	Edgefield- residential only
Subdivision Ordinance	Yes	Yes	Yes	Yes	No	Edgefield-check the courthouse
Floodplain Ordinance	Yes	Yes	No	No	Yes	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	No	Yes	No	No	No	
Flood Insurance Rate Maps	Yes	Yes	No	No	Yes	
Acquisition of land for open space and public recreation uses	No	Yes	No	Yes	No	
Other	No	No	No	No	No	

Building Codes, Permitting, Land Use Planning and Ordinances

The Red River Parish Police Jury provides oversight for building permits and codes, and all parish ordinances where applicable.

As of the 2016 update, Red River Parish and its jurisdictions ensure that all adopted building codes are enforced and in compliance relating to the construction of any structure within the boundaries of the parish. Building permits are required prior to beginning any type of construction or renovation projects, installation of electrical wiring, plumbing or gas piping, moving manufactured/modular or portable buildings, and reroofing or demolitions.

The Red River Parish Police Jury is also responsible for enforcing the Parish Ordinances relating to health and safety, property maintenance standards, and condemnation of unsafe structures.

The Red River Parish Police Jury meets regularly to consider any proposed ordinance changes, and to take final actions on proposed changes.

While local capabilities for mitigation can vary from community to community, Red River Parish as a whole has a system in place to coordinate and share these capabilities through Red River Parish Government 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, Red River 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 table below shows examples of resources in place in Red River Parish and its jurisdictions.

Table 3-2: Red River Parish Administrative and Technical Capabilities

Administration and Technical						
Identify whether your community has the following administrative and technical capabilities. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, indicate so in your comments.						
	Red River Parish	Coushatta	Edgefield	Hall Summit	Martin	Comments
Administration	Yes / No					
Planning Commission	Yes	Yes	No	No	No	
Mitigation Planning Committee	Yes	Yes	No	No	No	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	No	Yes	No	Yes	No	
Mutual Aid Agreements						
Staff	Yes / No; FT/PT; % Hazard Mitigation					
Chief Building Official	Yes	Yes	No	No	No	
Floodplain Administrator	Yes	Yes	No	No	No	Martin - Relies on Parish
Emergency Manager	Yes	Yes	No	No	No	
Community Planner	No	Yes	No	No	No	
Civil Engineer	No	Yes	No	No	No	
GIS Coordinator	No	Yes	No	No	No	
Grant Writer	No	Yes	No	Yes	No	
Other	No	No	No	No	No	
Technical	Yes / No					
Warning Systems / Service (Reverse 911, outdoor warning signals)	No	Yes	No	No	No	
Hazard Data & Information	No	Yes	No	No	No	
Grant Writing	No	Yes	No	Yes	No	
Hazus Analysis	No	No	No	No	No	
Other	No	No	No	No	No	

Financial capabilities are the resources that Red River 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/no cost actions, such as outreach efforts, to substantial action costs such acquisition of flood prone properties.

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

Table 3-3: Red River Parish Financial Capabilities

Financial						
Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.						
	Red River Parish	Coushatta	Edgefield	Hall Summit	Martin	Comments
Funding Resource	Yes / No					
Capital Improvements project funding	No	Yes	No	Yes	No	
Authority to levy taxes for specific purposes	Yes	Yes	No	Yes	Yes	
Fees for water, sewer, gas, or electric services	Yes	Yes	Yes	Yes	Yes	Martin- Electric
Impact fees for new development	No	Yes	No	No	No	
Stormwater Utility Fee	No	No	No	No	No	
Community Development Block Grant (CDBG)	No	Yes	Yes	Yes	No	Edgefield-never get it
Other Funding Programs	No	Yes	Yes	No	No	Edgefield-LGAP, CWEF

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.

Red River Parish and its jurisdictions have existing education and outreach programs to implement mitigation activities, as well as to communicate risk and hazard related information to its communities. The existing programs are as follows:

Table 3-4: Red River Parish Education and Outreach Capabilities

Education and Outreach						
Identify education and outreach programs and methods, already in place that could be used to implement mitigation activities and communicate hazard-related information.						
	Red River Parish	Coushatta	Edgefield	Hall Summit	Martin	
Program / Organization	Yes / No					
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	No	No	No	No	No	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	No	Yes	No	Yes	No	
Natural Disaster or safety related school program	No	No	No	No	No	
Storm Ready certification	No	No	No	No	No	
Firewise Communities certification	No	No	No	No	No	
Public/Private partnership initiatives addressing disaster-related issues	No	Yes	No	No	No	
Other	No	No	No	No	No	

In some cases, the jurisdictions rely on Red River Parish OHSEP and/or Red River 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 in the aforementioned existing regulatory mechanisms, programs, and resources within each jurisdiction, Red River Parish and its jurisdiction remains committed to expanding and improving on the existing capabilities within the parish. All participating jurisdictions 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 help to 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 Red River 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:

- Town of Coushatta
- Village of Edgefield
- Village of Hall Summit
- Village of Martin

Flood Insurance and Community Rating System

Red River Parish is not a participant in the Community Rating System (CRS), nor are any of its jurisdictions. Obtaining the CRS rating for the parish and participating jurisdictions is recognized as an eventual goal 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.

Under the Federal Emergency Management Agency (FEMA), the National Flood Insurance Program (NFIP) administers the Community Rating System. 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 ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction (see *Figure 3-1*). 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.

During the last update, 38 Louisiana communities participated in the CRS program. Mandeville, Shreveport, and Jefferson and East Baton Rouge Parishes had the best classifications in the state, class 7. As of the 2016 update, Jefferson, East Baton Rouge, and Terrebonne Parishes all lead the state with best classifications, class 6.

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

SFHA (Zones A, AE, A1–A30, V, V1–V30, AO, and AH): Discount varies depending on class.

SFHA (Zones A99, AR, AR/A, AR/AE, AR/A1–A30, AR/AH, and AR/AO): 10% discount for Classes 1–6; 5% discount for Classes 7–9.*

Non-SFHA (Zones B, C, X, D): 10% discount for Classes 1–6; 5% discount for Classes 7–9.

* In determining CRS Premium Discounts, all AR and A99 Zones are treated as non-SFHAs.

Figure 3-1: CRS Discounts by Class (Source: FEMA)

As of May 2012, 310 communities in the State of Louisiana participate in the Federal Emergency Management Agency's NFIP. Of these communities, 41 (or 13%) participate in the Community Rating System (CRS). Of the top fifty 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 two 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 1st of each year. That report must be made available to the media and the public.

Second, the parish must annually recertify 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.

In 2011[1], the National Flood Insurance Program (NFIP) completed a comprehensive review of the Community Rating System that will result in the release of a new CRS Coordinator's Manual.

The changes to the 2013 CRS Coordinator's Manual are the result of a multi-year program evaluation that included input from a broad group of contributors in order to evaluate the CRS and refine the program to meet its stated goals.

The upcoming changes will drive new achievements in the following six 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 to 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 2013 CRS Coordinator's Manual changes will impact each CRS community differently. Some communities will see an increase in the points they receive since points for certain activities have increased (e.g., Activity 420 Open Space Preservation). Other communities will receive fewer points for certain activities (e.g., Activity

[1] https://www.fema.gov/national-flood-insurance-program-community-rating-system

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 the activities 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 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 to understand how and when the 2013 manual will impact their community.

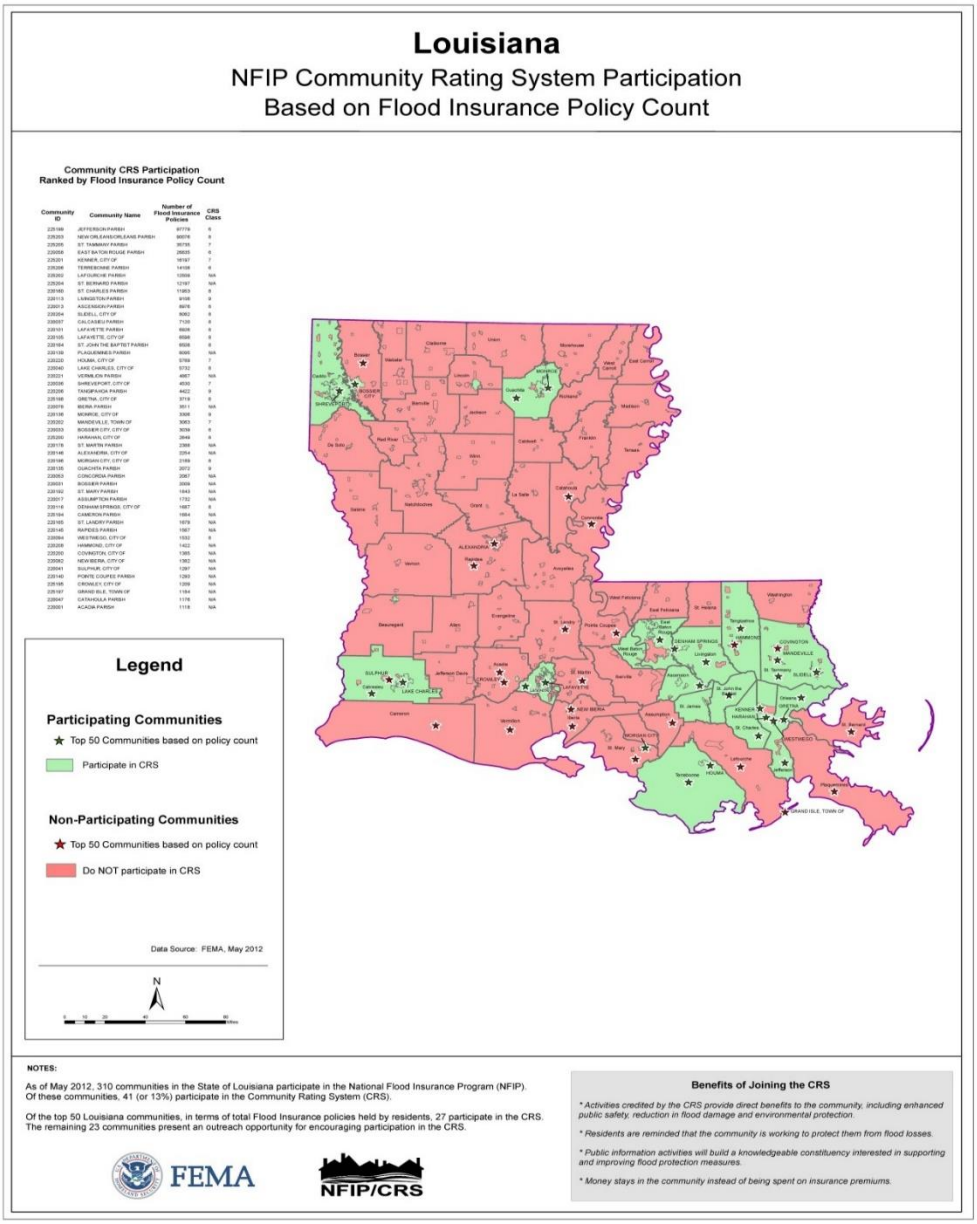

Figure 3-2: Louisiana CRS NFIP Participation
(Source: FEMA[2])

[2] http://www.fema.gov/media-library-data/20130726-2128-31471-9581/ks_ky_la_crs_may_2012_508.zip

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're in the CRS for the wrong reason." The other benefits that are more difficult to measure in 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 programs 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 can be found at www.fema.gov/nfip/crs.shtm

NFIP Worksheets

Parish and participating jurisdiction NFIP worksheets can be found in Appendix E: State Required Worksheets

4. Mitigation Strategy

Introduction

Red River Parish's Hazard Mitigation Strategy has a common guiding principle and is the demonstration of the parish's and participating jurisdictions' commitment to reduce risks from hazards. The strategy also serves as a guide for parish and local decision makers as they commit resources to reducing the effects of hazards.

Red River Parish confirmed the goals, objectives, actions, and projects over the period of the Hazard Mitigation Plan Update process. The mitigation actions and projects in this 2016 update are a product of analysis and review of the Red River Parish Hazard Mitigation Plan Steering Committee, under the coordination of the Red River Parish Office of Homeland Security and Emergency Preparedness. The committee was presented a list of projects and actions, new and from the 2011 plan, for review from February 2016 – July 2016.

An online public opinion survey was conducted of Red River Parish residents between February and October 2016. The survey was designed to capture public perceptions and opinions regarding natural hazards in Red River Parish. In addition, the survey sought to collect information regarding the methods and techniques preferred by the respondents for reducing the risks and losses associated with local hazards.

This activity was created in an effort to confirm that the goals and action items developed by the Red River Parish Hazard Mitigation Plan Steering Committee are representative of the outlook of the community at large. However, because there were no responses to the survey, this public feedback could not be incorporated into the plan. The full Red River Parish survey can be found at the following link:

https://www.surveymonkey.com/r/RedRiverParish

During the public meeting in June, the committee provided a status of the projects from 2011 and the proposed actions for the 2016 update. Committee members then agreed on the submission of each project based on feasibility for funding, ease of completion and other community specific factors. The actions were later prioritized.

Goals

The goals represent the guidelines that the parish and its communities want to achieve with this plan update. To help implement the strategy and adhere to the mission of the Hazard Mitigation Plan, the preceding section of the plan update was focused on identifying and quantifying the risks faced by the residents and property owners in Red River Parish from natural and manmade hazards. By articulating goals and objectives based on the previous plans, 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 municipal level – and to be undertaken by the state for its own property and assets. By doing so, Red River Parish and its jurisdictions can make progress toward reducing identified risks.

For the purposes of this plan update, goals and action items are defined as follows:

- **Goals** are general guidelines that explain what the parish wants to achieve. Goals are expressed as broad policy statements representing desired long-term results.
- **Action Items** are the specific steps (projects, policies, and programs) that advance a given goal. They are highly focused, specific, and measurable.

The current goals of the Red River Parish Hazard Mitigation Plan Update Steering Committee represent long-term commitments by the parish and its jurisdictions. After assessing these goals, the committee decided that the current three goals remain valid.

The goals are as follows:

- Mitigate both critical and non-critical structures and infrastructure around Red River Parish to reduce the impact of hazards
- Pursue opportunities to educate the public on the hazards that can impact Red River Parish
- Maintain a continuity of government before, during, and after a disaster

The Mitigation Action Plan focuses on actions to be taken by Red River Parish and its jurisdictions. All of the activities in the Mitigation Action Plan will be focused on helping the parish and its municipalities in developing and funding projects that are not only cost effective, but also meet the other DMA 2000 criteria of environmental compatibility and technical feasibility.

The Hazard Mitigation Plan Steering Committee and each jurisdiction reviewed and evaluated the potential action and project lists in which consideration was given to a variety of factors. Such factors include determining a project's eligibility for federal mitigation grants, as well as its ability to be funded. This process required evaluation of each project's engineering feasibility, cost effectiveness, and environmental and cultural factors.

2016 Mitigation Actions and Update on Previous Plan Actions

The Red River Parish Hazard Mitigation Plan Steering Committee and participating jurisdictions each identified actions that would reduce and/or prevent future damage within Red River Parish and their respective communities. In that effort, each jurisdiction focused on a comprehensive range of specific mitigation actions. These actions were identified in thorough fashion by the consultant team, the committee, and the individual jurisdictions by way of frequent and open communications and meetings held throughout the planning process.

As outlined in the Local Mitigation Planning Handbook, the following are eligible types of mitigation actions:

- **Local Plans and 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.

The established and agreed upon parish and jurisdiction actions relative to the parish-wide goals are below. Additionally, action updates from the previous plan updates can be found in the following tables. Any mitigation actions carried over from the previous plan will be completed within the next 6-60 months.

Red River 2011 Hazard Mitigation Action Update

Red River Parish					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R1: Emergency Generators	Purchase emergency generators for vulnerable parish-wide facilities; including the Red River Parish Fire District Building, the Red River Parish Municipal Building, Edgefield Town Hall, Hall Summit Town Hall, Coushatta Town Hall, Riverdale Academy, Martin Village Hall, and Veterans of Foreign Wars (VFW) Hall, to ensure each location can remain open during and after all hazard events.	HMGP, PDM, local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP	Hurricane/Tropical Storms, Thunderstorms, Tornados, Winter Storm	Carried Over
R2: Back-Up Generators	Purchase back-up generators for vulnerable water systems for unincorporated communities; including Halfway-Carroll, Bayou Pierre, Fairview, Hickory Grove, and Union, to ensure each location remains operational during hazard events.	HMGP, PDM, EMPG, local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP	Hurricane/Tropical Storms, Thunderstorms, Tornados, Winter Storm	Carried Over
R3: Back-up Generators	Provide back-up generators for the following water systems: 1) Town of Coushatta; 2) Halfway-Carroll; 3) Social Springs; 4) Bayou Pierre; 5) Hickory Grove; 6) Fairview; 7) Union, and 8) Hall Summit	HMGP, PDM, local operating budgets	Red River Parish OHSEP, participating municipalities	Hurricane/Tropical Storms, Thunderstorms, Tornados, Winter Storm	Carried Over
R4: Back-Up Power System	Provide generators/back-up power systems for critical facilities (including but not limited to lift stations, police, EMS, Fire and other first responder facilities) throughout Red River Parish	HMGP, PDM, local operating budgets, TDEM	Red River Parish OHSEP, Red River Parish Police Jury, local municipalities	Earthquake, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over

Red River Parish					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R5: Flood Prone Project	Pursue voluntary acquisition or elevation project for flood prone properties located in the Henry's BBQ Road area.	HMGP, PDM, FMA, RFC, SRL	Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
R6: Flood Prone Property	Acquire flood prone properties (including Repetitive Loss and Severe Repetitive Loss Properties).	HMGP, FMA, PDM, RFC, SRL	Red River Parish OSHEP, Red River Parish Police Jury, participating municipalities	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Ongoing
R7: Flood Proofing and Hardening	Flood-proof/harden critical structures within the Parish to help promote continuation of critical services during a storm event, including the Red River Elementary School	HMGP, PDM, local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP, participating jurisdictions, Red River Parish School Board	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
R8: Wind Retrofit	Complete a wind retrofit for the Red River Courthouse and Red River Municipal Building that includes adding shutters to the windows of these structures.	HMGP, PDM, local operating budgets	Red River Parish OHSEP	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R9: Wind Retrofit	Complete a wind retrofit at vulnerable parish-wide facilities; including Riverdale Academy and the VFW Hall.	HMGP, PDM	RRPPJ OHSEP	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R10: Storm Harden and Retrofit	Storm harden/retrofit critical facilities throughout Red River Parish. Actions can include but are not limited to window shutters, roof straps, flood proofing, roll-up door reinforcement.	HMGP, PDM, FMA, local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP, participating municipalities	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R11: Pipelines	Bury underground, secure or otherwise harden exposed or vulnerable pipelines.	HMGP, PDM, local operating budgets, CTPP	Red River Parish OHSEP, local municipalities, private industry	Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R12: Storm Drainage Improvement	Implement storm drainage improvement projects that will help minimize damage to Parish-wide assets; especially along Springville Road Bridge, Postelle Road Ditch, Yearwood Road, and Catfish Bend Road	HMGP, PDM, FMA, local operating budgets	Red River Parish OHSEP, Red River Parish Public Works	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
R13: Drainage Improvements	Pursue drainage improvements throughout Red River Parish. Actions can include but are not limited to installing/upgrading culverts and headwalls as well as enlarging storm water ditches and canals.	HMGP, PDM, FMA, local operating budgets	Red River Parish OHSEP, participating municipalities	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storms, Thunderstorms	Carried Over

Red River Parish					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R14: Bridge Upgrades	Replace and/or upgrade bridges, culverts and other crossings throughout Red River Parish.	HMGP, PDM, local operating budgets	Red River Parish OHSEP, participating municipalities	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R15: Elevation	Elevate future construction and existing flood prone structures and infrastructure throughout Red River Parish.	HMGP, PDM, FMA, RFC, SRL	Red River Parish OHSEP, participating municipalities	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
R16: Elevation	Elevate existing structures in flood prone areas, especially along Yearwood Road and Catfish Bend Road.	HMGP, PDM, local operating budgets	Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
R17: Tornado Drill	Perform at least one tornado drill per year at all schools and tornado shelters	Local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP, School Districts	Tornado	Carried Over
R18: Retrofitting	Retrofit existing structures or construct new structures to act as safe rooms during tornados.	HMGP, PDM, local operating budgets	Red River Parish OHSEP	Tornados	Carried Over
R19: Tornado Safe Rooms	Convert the Red River Elementary School, Red River Junior High School, Red River Senior High School, Louisiana National Guard Amory, VoTech and Riverdale Buildings into community based tornado safe rooms.	HMGP, PDM, local operating budgets	Red River Parish Police Jury OHSEP, Red River Parish Police Jury, participating municipalities, School Districts	Tornados	Carried Over
R20: Maintain Function	Mitigate damage to utilities in order to maintain function during and after a hazard event. Actions can include but are not limited to: · Burying utility lines underground · Provide frangible links/break away connections on utility poles · Harden utility poles by converting from wood to concrete or metal utility poles. · Increasing the easement area/clearance of utility lines/poles from trees lines		Red River Parish OHSEP, Red River Parish Police Jury, participating municipalities, local utility companies	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R21: Improve Retention Ponds	Construct or improve existing detention/retention ponds where appropriate to collect storm water to reduce flooding.	HMGP, PDM, FMA, RFC, SRL, local operating budgets	Red River Parish Police Jury, Red River Parish Public Works, local municipalities	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storm, Thunderstorms	Carried Over

Red River Parish					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R22: Construct Retention Ponds	Construct water retention ponds to collect storm water run-off for use as an alternate water source where appropriate throughout Red River Parish.	HMGP, PDM, CTPP, local operating budgets	Red River Parish OHSEP, Red River Parish Police Jury, local municipalities	Drought, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R23: State of Louisiana Wellhead Protection Program	Participate in the "State of Louisiana Wellhead Protection Program." Arrange a meeting with the water districts for parish-wide participation by including unincorporated areas of the parish and other jurisdictions in the program.	Local operating budgets, water district funding	Red River Parish Police Jury, Municipal Water Districts	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
R24: Drought Awareness Program	Initiate a drought awareness program as part of the water conservation campaign. Create a brochure to be mailed to residents of participating jurisdictions	HMGP, PDM, local operating budgets	Red River Parish OHSEP	Drought	Carried Over
R25: Earthquake Drill	Perform at least one earthquake drill per year at all schools and government buildings	Local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP, Red River Parish School Board	Earthquake	Carried Over
R26: Water Distribution Program	Develop and implement water distribution program for vulnerable populations during periods of extreme heat	Local operating budgets	Red River Parish OHSEP	Extreme Heat	Carried Over
R27: Community Rating System	Identify and implement all necessary actions to initiate participation in the NFIP Community Rating System (CRS)	HMGP, PDM, FMA, local operating budgets	Red River Parish Police Jury	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Ongoing
R28: Update Flood Ordinance	Update flood ordinance and permitting processes in participating jurisdictions to strengthen the ability to enforce standards.	HMGP, PDM, local operating budgets	Red River Parish Police Jury, participating municipalities	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Ongoing
R29: Structure Hardening	Harden existing structures to be used as community based shelters, including but not limited to the following: Red River Parish Civil Defense, Red River Parish Municipal Building, Edgefield Town Hall, Hall Summit Town Hall, Coushatta Town Marshall, Riverdale Academy, Martin Village Hall, and VFW Hall.	CDBG, HMGP, PDM, local operating budgets	RRPPJ OHSEP, participating municipalities	Hurricane/Tropical Storm	Carried Over
R30: Public Education and Community Awareness	Develop a public education and community awareness "No Burn" program" detailing the benefits to residents, farmers, and businesses within the parish and local communities. Target areas of high risk through seminars, homeowner meeting, direct	HMGP, local operating budgets	RRPPJ, Fire District	Wildfire	Ongoing

Red River Parish					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
	mailings, newsletters, fire condition signs and other means of visual notification of high fire danger				
R31: Underground Electrical Infrastructure	Place electrical/other key infrastructure underground to minimize the risk of a loss of electrical service	HMGP, PDM, local operating budgets	Red River Parish Police Jury, Red River Public Works	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R32: Public Educational Brochures	Provide the public with educational brochures for the hazards identified as part of the 2011 Plan Update	HMGP, PDM, local operating budgets, EMPG	Red River Parish OHSEP, local municipalities, GOHSEP, FEMA	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Tornado, Wildfire, Winter Storm	Ongoing
R33: Structure Retrofitting	Retrofit existing structures to act as cooling stations in times of extreme heat	HMGP, PDM, local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP, local municipalities	Extreme Heat	Carried Over
R34: Areas of Defensibility	Develop areas of defensible space to prevent damage due to wildfires	HMGP, EMPG, PDM, local operating budgets	Red River Parish OHSEP, local fire departments	Wildfire	Carried Over
R35: Water Conservation Management Plan	Develop and enact water conservation or drought management plans, ordinances or strategies to be used during times of drought.	HMGP, PDM, local operating budgets	Red River Parish Police Jury	Drought	Carried Over
R36: Minimize Damage to Structures	Minimize damage to structures and infrastructure from falling trees. Actions include but are not limited to the following: · Pursue and coordinate a dangerous tree and limb removal program to protect infrastructure and critical facilities from damage. This includes working with private homeowners for voluntary removal of hazardous trees and limbs on private property.· Coordinate contracting to remove and/or trim trees that endanger structures, infrastructure, and vital roadways.	FEMA PA, HMGP, local operating budgets	Red River Parish Police Jury, Red River Parish Public Works, participating municipalities	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
R37: Enforce Burn Ban Ordinances	Work with State Fire Marshall, Parish, and local fire departments to enforce burn ban ordinances during times of drought to prevent wildfire.	HMGP, Local operating budgets	Red River Parish, State Fire Marshall, local fire departments	Wildfire	Carried Over

Red River Parish					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R38: Geographic Information System	Develop a regional Geographic Information System (GIS) database to support future hazard mitigation planning	HMGP, PDM, EMPG	Red River Parish Police Jury, participating municipalities	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Thunderstorm, Tornado, Wildfire, Winter Storm	Carried Over
R39: Purchase Technological Equipment	Purchase voice, internet, pagers, cellular, digital recording, video monitoring, satellite, equipment in accordance with NIMS typing	EMPG	Red River Parish OHSEP	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Tornado, Wildfire, Winter Storm	deleted
R40: Training Program	Create a program that recruits and trains volunteers to provide support in safeguarding the parish before, during and any disaster or in the event of a large scale emergency.	Local operating budgets, CTPP	Red River Parish OHSEP, local first responders	Dam/Levee Failure, Earthquake, Flooding, Hail, Hurricane/Tropical Storms, Thunderstorms, Tornados, Wildfire, Winter Storm.	Carried Over
R41: Pre-Planning Meetings	Conduct pre-planning meetings immediately following notification of a severe weather event to determine if adequate staffing and equipment are on hand.	Local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hail, Hurricane/Tropical Storm, Thunderstorm, Tornado, Winter Storm	completed
R42: Promulgate an Ordinance	Promulgate an ordinance in the Red River Police Jury Meeting and participating jurisdiction City Council meetings to restrict outdoor water usage during drought advisories. Prohibit and enforce against the unauthorized use of water from fire water hydrants	Local operating budgets	Red River Parish OHSEP, participating municipalities	Drought	Ongoing
R43: Educational Materials	Develop and distribute educational materials and maps of known expansive soils problem areas in the Parish	HMGP, local operating budgets	Red River Parish OHSEP	Expansive Soils	Ongoing
R44: Building Codes	Review building codes to ensure adequate hail protection for future development and critical facilities and revise as necessary.	HMGP, PDM	Red River Parish and participating jurisdictions	Hailstorm	Ongoing
R45: Right of Way Cleaning	Right-of-way cleaning to minimize power outages due to winter storms	Local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP	Winter Storm	Ongoing

Red River Parish					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R46: Retrofit Structures	Retrofit existing structures and/or construct new structures to act as shelters during and after Hurricanes/Tropical Storms	HMGP, PDM	Red River Parish Police Jury, Red River Parish OHSEP, participating municipalities, GOHSEP	Hurricane/Tropical Storm	Carried Over
R47: Emergency Response Structures	Assess the vulnerability of other government/ emergency response structures in participating jurisdictions	CTGP	Red River Parish and participating jurisdictions	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Thunderstorm, Tornado, Wildfire, Winter Storm	Carried Over
R48: Surface Transportation	Assess the vulnerability of surface transportation infrastructure in participating jurisdictions	CTGP	RRPPJ Public Works	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Thunderstorm, Tornado, Wildfire, Winter Storm	Carried Over
R49: Electrical Transmission Infrastructure	Assess the vulnerability of electrical transmission infrastructure in participating jurisdictions	CTGP	RRPPJ, Public Works	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Thunderstorm, Tornado, Wildfire, Winter Storm	Carried Over
R50: Gather Expansive Soils Damage Data	Conduct a study that will focus effort on gathering data on the extent/magnitude of Expansive Soil damage or impacts in Red River Parish.	HMGP, PDM, local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP	Expansive Soils	Carried Over
R51: Hydrology Study	Conduct a Hydrology Study or other study mechanism that will detail the inundation levels and impact area for the dams and levees included in the Risk Assessment.	HMGP, PDM, local operating budgets	Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure	Carried Over

City of Coushatta					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
C1: Wind Retrofit	Complete a wind retrofit for the City Marshall Building	HMGP, PDM, FMA, local operating budgets	City of Coushatta, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
C2: Community Rating System	Identify and implement all necessary actions and steps to initiate participation in the NFIP Community Rating System	HMGP, PDM, FMA, local operating budgets	City of Coushatta, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
C3: Back-Up Generators	Provide generators/back-up power systems for critical facilities (including but not limited to lift stations, police, EMS, Fire and other first responder facilities) throughout Coushatta	HMGP, PDM, local operating budgets, TDEM	City of Coushatta, Red River Parish OHSEP, Red River Parish Police Jury	Earthquake, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
C4: Flood Prone Property	Acquire flood prone properties (including Repetitive Loss and Severe Repetitive Loss Properties	HMGP, FMA, PDM, RFC, SRL	City of Coushatta, Red River Parish OSHEP, Red River Parish Police Jury	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Ongoing
C5: Storm Hardening/ Retrofitting	Storm harden/retrofit critical facilities throughout Coushatta. Actions can include but are not limited to window shutters, roof straps, flood proofing, roll-up door reinforcement.	HMGP, PDM, FMA, local operating budgets	City of Coushatta, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
C6: Pipelines	Bury underground, secure or otherwise harden exposed or vulnerable pipelines.	HMGP, PDM, local operating budgets, CTPP	City of Coushatta, Red River Parish OHSEP, private industry	Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
C7: Drainage Improvements	Pursue drainage improvements throughout Coushatta. Actions can include but are not limited to installing/upgrading culverts and headwalls as well as enlarging storm water ditches and canals	HMGP, PDM, FMA, local operating budgets	City of Coushatta, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storms, Thunderstorms	Carried Over
C8: Upgrade Bridges	Replace and/or upgrade bridges, culverts and other crossings throughout Coushatta.	HMGP, PDM, local operating budgets	City of Coushatta, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
C9: Elevate Construction	Elevate future construction and existing flood prone structures and infrastructure throughout Coushatta	HMGP, PDM, FMA, RFC, SRL	City of Coushatta, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
C10: Safe Rooms	Retrofit existing structures or construct new structures to act as safe rooms during tornados.	HMGP, PDM, local operating budgets	City of Coushatta, Red River Parish OHSEP	Tornados	Carried Over

City of Coushatta					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
C11: Maintain Function	Mitigate damage to utilities in order to maintain function during and after a hazard event. Actions can include but are not limited to: · Burying utility lines underground · Provide frangible links/break away connections on utility poles · Harden utility poles by converting from wood to concrete or metal utility poles. · Increasing the easement area/clearance of utility lines/poles from trees lines		City of Coushatta, Red River Parish OHSEP, Red River Parish Police Jury, local utility companies	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
C12: Improve Retention Ponds	Construct or improve existing detention/retention ponds where appropriate to collect storm water to reduce flooding.	HMGP, PDM, FMA, RFC, SRL, local operating budgets	City of Coushatta, Red River Parish Police Jury, Red River Parish Public Works	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storm, Thunderstorms	Carried Over
C13: Public Educational Brochures	Provide the public with educational brochures for the hazards identified as part of the 2011 Plan Update	HMGP, PDM, local operating budgets, EMPG	City of Coushatta, Red River Parish OHSEP, GOHSEP, FEMA	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Tornado, Wildfire, Winter Storm	Ongoing
C14: Retrofit Structures	Retrofit existing structures to act as cooling stations in times of extreme heat.	HMGP, PDM, local operating budgets	City of Coushatta, Red River Parish Police Jury, Red River Parish OHSEP	Extreme Heat	Carried Over
C15: Areas of Defensible Space	Develop areas of defensible space to prevent damage due to wildfires	HMGP, EMPG, PDM, local operating budgets	City of Coushatta, Red River Parish OHSEP, local fire departments	Wildfire	Carried Over
C16: Water/Drought Conservation Management Plans	Develop and enact water conservation or drought management plans, ordinances or strategies to be used during times of drought.	HMGP, PDM, local operating budgets	City of Coushatta, Red River Parish Police Jury	Drought	Carried Over
C17: Minimize Damage to Structures	Minimize damage to structures and infrastructure from falling trees. Actions include but are not limited to the following: · Pursue and coordinate a dangerous tree and limb removal program to protect infrastructure and critical facilities from damage. This includes working with private homeowners for voluntary removal of hazardous trees and limbs on private property. · Coordinate contracting to	FEMA PA, HMGP, local operating budgets	City of Coushatta, Red River Parish Police Jury, Red River Parish Public Works	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over

City of Coushatta					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
	remove and/or trim trees that endanger structures, infrastructure, and vital roadways.				
C18: Enforce Burn Ban Ordinances	Work with State Fire Marshall, Parish, and local fire departments to enforce burn ban ordinances during times of drought to prevent wildfire.	HMGP, Local operating budgets	City of Coushatta, Red River Parish, State Fire Marshall, local fire department	Wildfire	Carried Over
C19: Retrofit Shelters	Retrofit existing structures and/or construct new structures to act as shelters during and after Hurricanes/Tropical Storms.	HMGP, PDM	City of Coushatta, Red River Parish Police Jury, Red River Parish OHSEP, GOHSEP	Hurricane/Tropical Storm	Carried Over

Town of Edgefield					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
E1: Wind Retrofit	Complete a wind retrofit for the Edgefield Town Hall	HMGP, PDM, FMA, local operating budgets	Town of Edgefield, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E2: Community Rating System	Identify and implement all necessary actions and steps to initiate participation in the NFIP Community Rating System	HMGP, PDM, FMA, local operating budgets	City of Coushatta, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E3: Back-Up Generators	Provide generators/back-up power systems for critical facilities (including but not limited to lift stations, police, EMS, Fire and other first responder facilities) throughout Edgefield.	HMGP, PDM, local operating budgets, TDEM	Town of Edgefield, Red River Parish OHSEP, Red River Parish Police Jury	Earthquake, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E4: Flood Prone Property	Acquire flood prone properties (including Repetitive Loss and Severe Repetitive Loss Properties	HMGP, FMA, PDM, RFC, SRL	Town of Edgefield, Red River Parish OSHEP, Red River Parish Police Jury	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Ongoing
E5: Storm Hardening/ Retrofitting	Storm harden/retrofit critical facilities throughout Edgefield. Actions can include but are not limited to window shutters, roof straps, flood proofing, roll-up door reinforcement	HMGP, PDM, FMA, local operating budgets	Town of Edgefield, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E6: Pipelines	Bury underground, secure or otherwise harden exposed or vulnerable pipelines.	HMGP, PDM, local operating budgets, CTPP	Town of Edgefield, Red River Parish OHSEP, private industry	Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E7: Drainage Improvements	Pursue drainage improvements throughout Edgefield. Actions can include but are not limited to installing/upgrading culverts and headwalls as well as enlarging storm water ditches and canals.	HMGP, PDM, FMA, local operating budgets	Town of Edgefield, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storms, Thunderstorms	Carried Over
E8: Upgrade Bridges	Replace and/or upgrade bridges, culverts and other crossings throughout Edgefield	HMGP, PDM, local operating budgets	Town of Edgefield, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E9: Elevate Construction	Elevate future construction and existing flood prone structures and infrastructure throughout Edgefield.	HMGP, PDM, FMA, RFC, SRL	Town of Edgefield, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
E10: Safe Rooms	Retrofit existing structures or construct new structures to act as safe rooms during tornados.	HMGP, PDM, local operating budgets	Town of Edgefield, Red River Parish OHSEP	Tornados	Carried Over

Town of Edgefield					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
E11: Maintain Function	Mitigate damage to utilities in order to maintain function during and after a hazard event. Actions can include but are not limited to: · Burying utility lines underground · Provide frangible links/break away connections on utility poles · Harden utility poles by converting from wood to concrete or metal utility poles. · Increasing the easement area/clearance of utility lines/poles from trees lines		Town of Edgefield, Red River Parish OHSEP, Red River Parish Police Jury, local utility companies	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E12: Improve Retention Ponds	Construct or improve existing detention/retention ponds where appropriate to collect storm water to reduce flooding.	HMGP, PDM, FMA, RFC, SRL, local operating budgets	Town of Edgefield, Red River Parish Police Jury, Red River Parish Public Works	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storm, Thunderstorms	Carried Over
E13: Public Educational Brochures	Provide the public with educational brochures for the hazards identified as part of the 2011 Plan Update	HMGP, PDM, local operating budgets, EMPG	Town of Edgefield, Red River Parish OHSEP, GOHSEP, FEMA	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Tornado, Wildfire, Winter Storm	Ongoing
E14: Retrofit Structures	Retrofit existing structures to act as cooling stations in times of extreme heat.	HMGP, PDM, local operating budgets	Town of Edgefield, Red River Parish Police Jury, Red River Parish OHSEP	Extreme Heat	Carried Over
E15: Areas of Defensible Space	Develop areas of defensible space to prevent damage due to wildfires	HMGP, EMPG, PDM, local operating budgets	Town of Edgefield, Red River Parish OHSEP, local fire departments	Wildfire	Carried Over
E16: Water/Drought Conservation Management Plans	Develop and enact water conservation or drought management plans, ordinances or strategies to be used during times of drought.	HMGP, PDM, local operating budgets	Town of Edgefield, Red River Parish Police Jury	Drought	Carried Over

Town of Edgefield					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
E17: Minimize Damage to Structures	Minimize damage to structures and infrastructure from falling trees. Actions include but are not limited to the following: · Pursue and coordinate a dangerous tree and limb removal program to protect infrastructure and critical facilities from damage. This includes working with private homeowners for voluntary removal of hazardous trees and limbs on private property. · Coordinate contracting to remove and/or trim trees that endanger structures, infrastructure, and vital roadways.	FEMA PA, HMGP, local operating budgets	Town of Edgefield, Red River Parish Police Jury, Red River Parish Public Works	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
E18: Enforce Burn Ban Ordinances	Work with State Fire Marshall, Parish, and local fire departments to enforce burn ban ordinances during times of drought to prevent wildfire.	HMGP, Local operating budgets	Town of Edgefield, Red River Parish, State Fire Marshall, local fire department	Wildfire	Carried Over
E19: Retrofit Shelters	Retrofit existing structures and/or construct new structures to act as shelters during and after Hurricanes/Tropical Storms.	HMGP, PDM	Town of Edgefield, Red River Parish Police Jury, Red River Parish OHSEP, GOHSEP	Hurricane/Tropical Storm	Carried Over

Town of Hall Summit					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
H1: Wind Retrofit	Complete a wind retrofit for the Hall Summit Town Hall	HMGP, PDM, FMA, local operating budgets	Town of Hall Summit, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H2: Community Rating System	Identify and implement all necessary actions and steps to initiate participation in the NFIP Community Rating System	HMGP, PDM, FMA, local operating budgets	Town of Hall Summit, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H3: Back-Up Generators	Provide generators/back-up power systems for critical facilities (including but not limited to lift stations, police, EMS, Fire and other first responder facilities) throughout Hall Summit.	HMGP, PDM, local operating budgets, TDEM	Town of Hall Summit, Red River Parish OHSEP, Red River Parish Police Jury	Earthquake, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H4: Flood Prone Property	Acquire flood prone properties (including Repetitive Loss and Severe Repetitive Loss Properties	HMGP, FMA, PDM, RFC, SRL	Town of Hall Summit, Red River Parish OSHEP, Red River Parish Police Jury	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Ongoing
H5: Storm Hardening/ Retrofitting	Storm harden/retrofit critical facilities throughout Hall Summit. Actions can include but are not limited to window shutters, roof straps, flood proofing, roll-up door reinforcement	HMGP, PDM, FMA, local operating budgets	Town of Hall Summit, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H6: Pipelines	Bury underground, secure or otherwise harden exposed or vulnerable pipelines.	HMGP, PDM, local operating budgets, CTPP	Town of Hall Summit, Red River Parish OHSEP, private industry	Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H7: Drainage Improvements	Pursue drainage improvements throughout Hall Summit. Actions can include but are not limited to installing/upgrading culverts and headwalls as well as enlarging storm water ditches and canals.	HMGP, PDM, FMA, local operating budgets	Town of Hall Summit, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storms, Thunderstorms	Carried Over
H8: Upgrade Bridges	Replace and/or upgrade bridges, culverts and other crossings throughout Hall Summit	HMGP, PDM, local operating budgets	Town of Hall Summit, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H9: Elevate Construction	Elevate future construction and existing flood prone structures and infrastructure throughout Hall Summit	HMGP, PDM, FMA, RFC, SRL	Town of Hall Summit, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
H10: Safe Rooms	Retrofit existing structures or construct new structures to act as safe rooms during tornados.	HMGP, PDM, local operating budgets	Town of Hall Summit, Red River Parish OHSEP	Tornados	Carried Over

Town of Hall Summit					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
H11: Maintain Function	Mitigate damage to utilities in order to maintain function during and after a hazard event. Actions can include but are not limited to: · Burying utility lines underground · Provide frangible links/break away connections on utility poles · Harden utility poles by converting from wood to concrete or metal utility poles. · Increasing the easement area/clearance of utility lines/poles from trees lines		Town of Hall Summit, Red River Parish OHSEP, Red River Parish Police Jury, local utility companies	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H12: Improve Retention Ponds	Construct or improve existing detention/retention ponds where appropriate to collect storm water to reduce flooding.	HMGP, PDM, FMA, RFC, SRL, local operating budgets	Town of Hall Summit, Red River Parish Police Jury, Red River Parish Public Works	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storm, Thunderstorms	Carried Over
H13: Public Educational Brochures	Provide the public with educational brochures for the hazards identified as part of the 2011 Plan Update	HMGP, PDM, local operating budgets, EMPG	Town of Hall Summit, Red River Parish OHSEP, GOHSEP, FEMA	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Tornado, Wildfire, Winter Storm	Ongoing
H14: Retrofit Structures	Retrofit existing structures to act as cooling stations in times of extreme heat.	HMGP, PDM, local operating budgets	Town of Hall Summit, Red River Parish Police Jury, Red River Parish OHSEP	Extreme Heat	Carried Over
H15: Areas of Defensible Space	Develop areas of defensible space to prevent damage due to wildfires	HMGP, EMPG, PDM, local operating budgets	Town of Hall Summit, Red River Parish OHSEP, local fire departments	Wildfire	Carried Over
H16: Water/Drought Conservation Management Plans	Develop and enact water conservation or drought management plans, ordinances or strategies to be used during times of drought.	HMGP, PDM, local operating budgets	Town of Hall Summit, Red River Parish Police Jury	Drought	Carried Over

Town of Hall Summit					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
H17: Minimize Damage to Structures	Minimize damage to structures and infrastructure from falling trees. Actions include but are not limited to the following: · Pursue and coordinate a dangerous tree and limb removal program to protect infrastructure and critical facilities from damage. This includes working with private homeowners for voluntary removal of hazardous trees and limbs on private property. · Coordinate contracting to remove and/or trim trees that endanger structures, infrastructure, and vital roadways.	FEMA PA, HMGP, local operating budgets	Town of Hall Summit, Red River Parish Police Jury, Red River Parish Public Works	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
H18: Enforce Burn Ban Ordinances	Work with State Fire Marshall, Parish, and local fire departments to enforce burn ban ordinances during times of drought to prevent wildfire.	HMGP, Local operating budgets	Town of Hall Summit, Red River Parish, State Fire Marshall, local fire department	Wildfire	Carried Over
H19: Retrofit Shelters	Retrofit existing structures and/or construct new structures to act as shelters during and after Hurricanes/Tropical Storms.	HMGP, PDM	Town of Hall Summit, Red River Parish Police Jury, Red River Parish OHSEP, GOHSEP	Hurricane/Tropical Storm	Carried Over

Village Of Martin					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
M1: Wind Retrofit	Complete a wind retrofit for the Martin Village Hall.	HMGP, PDM, FMA, local operating budgets	Village of Martin, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M2: Community Rating System	Identify and implement all necessary actions and steps to initiate participation in the NFIP Community Rating System	HMGP, PDM, FMA, local operating budgets	Village of Martin, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M3: Back-Up Generators	Provide generators/back-up power systems for critical facilities (including but not limited to lift stations, police, EMS, Fire and other first responder facilities) throughout Martin.	HMGP, PDM, local operating budgets, TDEM	Village of Martin, Red River Parish OHSEP, Red River Parish Police Jury	Earthquake, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M4: Flood Prone Property	Acquire flood prone properties (including Repetitive Loss and Severe Repetitive Loss Properties	HMGP, FMA, PDM, RFC, SRL	Village of Martin, Red River Parish OSHEP, Red River Parish Police Jury	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Ongoing
M5: Storm Hardening/ Retrofitting	Storm harden/retrofit critical facilities throughout Martin. Actions can include but are not limited to window shutters, roof straps, flood proofing, roll-up door reinforcement.	HMGP, PDM, FMA, local operating budgets	Village of Martin, Red River Parish Police Jury, Red River Parish OHSEP	Dam/Levee Failure, Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M6: Pipelines	Pursue drainage improvements throughout Martin. Actions can include but are not limited to installing/upgrading culverts and headwalls as well as enlarging storm water ditches and canals.	HMGP, PDM, local operating budgets, CTPP	Village of Martin, Red River Parish OHSEP, private industry	Flood, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M7: Drainage Improvements	Pursue drainage improvements throughout Martin. Actions can include but are not limited to installing/upgrading culverts and headwalls as well as enlarging storm water ditches and canals.	HMGP, PDM, FMA, local operating budgets	Village of Martin, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storms, Thunderstorms	Carried Over
M8: Upgrade Bridges	Replace and/or upgrade bridges, culverts and other crossings throughout Martin	HMGP, PDM, local operating budgets	Village of Martin, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M9: Elevate Construction	Elevate future construction and existing flood prone structures and infrastructure throughout Martin	HMGP, PDM, FMA, RFC, SRL	Village of Martin, Red River Parish OHSEP	Dam/Levee Failure, Flooding, Hurricane/Tropical Storm, Thunderstorm	Carried Over
M10: Safe Rooms	Retrofit existing structures or construct new structures to act as safe rooms during tornados.	HMGP, PDM, local operating budgets	Village of Martin, Red River Parish OHSEP	Tornados	Carried Over

Village Of Martin					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
M11: Maintain Function	Mitigate damage to utilities in order to maintain function during and after a hazard event. Actions can include but are not limited to: · Burying utility lines underground · Provide frangible links/break away connections on utility poles · Harden utility poles by converting from wood to concrete or metal utility poles. · Increasing the easement area/clearance of utility lines/poles from trees lines		Village of Martin, Red River Parish OHSEP, Red River Parish Police Jury, local utility companies	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M12: Improve Retention Ponds	Construct or improve existing detention/retention ponds where appropriate to collect storm water to reduce flooding.	HMGP, PDM, FMA, RFC, SRL, local operating budgets	Village of Martin, Red River Parish Police Jury, Red River Parish Public Works	Dam/Levee Failure, Flooding, Hurricanes/Tropical Storm, Thunderstorms	Carried Over
M13: Public Educational Brochures	Provide the public with educational brochures for the hazards identified as part of the 2011 Plan Update	HMGP, PDM, local operating budgets, EMPG	Village of Martin, Red River Parish OHSEP, GOHSEP, FEMA	Dam/Levee Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flooding, Hailstorm, Hurricane/Tropical Storm, Tornado, Wildfire, Winter Storm	Ongoing
M14: Retrofit Structures	Retrofit existing structures to act as cooling stations in times of extreme heat.	HMGP, PDM, local operating budgets	Village of Martin, Red River Parish Police Jury, Red River Parish OHSEP	Extreme Heat	Carried Over
M15: Areas of Defensible Space	Develop areas of defensible space to prevent damage due to wildfires	HMGP, EMPG, PDM, local operating budgets	Village of Martin, Red River Parish OHSEP, local fire departments	Wildfire	Carried Over
M16: Water/Drought Conservation Management Plans	Develop and enact water conservation or drought management plans, ordinances or strategies to be used during times of drought.	HMGP, PDM, local operating budgets	Village of Martin, Red River Parish Police Jury	Drought	Carried Over

Village Of Martin					
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
M17: Minimize Damage to Structures	Minimize damage to structures and infrastructure from falling trees. Actions include but are not limited to the following: · Pursue and coordinate a dangerous tree and limb removal program to protect infrastructure and critical facilities from damage. This includes working with private homeowners for voluntary removal of hazardous trees and limbs on private property. · Coordinate contracting to remove and/or trim trees that endanger structures, infrastructure, and vital roadways.	FEMA PA, HMGP, local operating budgets	Village of Martin, Red River Parish Police Jury, Red River Parish Public Works	Hurricane/Tropical Storm, Thunderstorm, Tornado	Carried Over
M18: Enforce Burn Ban Ordinances	Work with State Fire Marshall, Parish, and local fire departments to enforce burn ban ordinances during times of drought to prevent wildfire.	HMGP, Local operating budgets	Village of Martin, Red River Parish, State Fire Marshall, local fire department	Wildfire	Carried Over
M19: Retrofit Shelters	Retrofit existing structures and/or construct new structures to act as shelters during and after Hurricanes/Tropical Storms.	HMGP, PDM	Village of Martin, Red River Parish Police Jury, Red River Parish OHSEP, GOHSEP	Hurricane/Tropical Storm	Carried Over

Unincorporated Red River New Mitigation Actions

Red River Unincorporated - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R1: Building Retrofits	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.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	High Wind, Tropical Cyclone, Tornadoes	New
R2: Drainage Improvement	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.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties. .	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
R4: Safe Room Projects	Construction of a safe room for first responders located in Red River Parish. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Tornadoes, High Wind, Tropical Cyclone	New
R5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness through mail outs and training opportunities of risks and safety for Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Drought, Dam Failure, Levee Failure and Winter Storm 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.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Winter Storms, Drought, Dam Failure, Levee Failure	New

Red River Unincorporated - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
R6: Generators for Continuity of Operations and Government	Procurement and Installation of generators at public facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, thunderstorms (lightning, high wind, hail) , Extreme Heat	New
R7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Lightning	New
R8: Warning Systems	Update/upgrade public warning system components throughout Red River Parish as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Winter Storms, Wildfire, Tornadoes, Tropical Cyclone, Dam Failure, Levee Failure	New
R9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes, Drought, Extreme Heat	New
R10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Tropical Cyclones, Flooding	New
R11: Dam/Levee Failure Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam/levee failure.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Flooding, Dam Failure, Levee Failure	New
R12: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of drought.	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Drought	New
R13: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Red River Parish OHSEP	Wildfires	New

City of Coushatta - New Mitigation Actions

City of Coushatta - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
C1: Building Retrofits	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.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	High Wind, Tropical Cyclone, Tornadoes	New
C2: Drainage Improvement	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.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties. .	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
C4: Safe Room Projects	Construction of a safe room for first responders located in Red River Parish. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Tornadoes, High Wind, Tropical Cyclone	New
C5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness through mail outs and training opportunities of risks and safety for Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Drought, Dam Failure, Levee Failure and Winter Storm 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.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Winter Storms, Drought, Dam Failure, Levee Failure	New

City of Coushatta - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
C6: Generators for Continuity of Operations and Government	Procurement and Installation of generators at public facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, thunderstorms (lightning, high wind, hail) , Extreme Heat	New
C7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Lightning	New
C8: Warning Systems	Update/upgrade public warning system components throughout Red River Parish as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Winter Storms, Wildfire, Tornadoes, Tropical Cyclone, Dam Failure, Levee Failure	New
C9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes, Drought, Extreme Heat	New
C10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Tropical Cyclones, Flooding	New
C11: Dam/Levee Failure Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam/levee failure.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Flooding, Dam Failure, Levee Failure	New
C12: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of drought.	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Drought	New
C13: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	City of Coushatta/ Red River Parish OHSEP	Wildfires	New

Town of Edgefield – New Mitigation Actions

Town of Edgefield - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
E1: Building Retrofits	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.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	High Wind, Tropical Cyclone, Tornadoes	New
E2: Drainage Improvement	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.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties. .	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
E4: Safe Room Projects	Construction of a safe room for first responders located in Red River Parish. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Tornadoes, High Wind, Tropical Cyclone	New
E5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness through mail outs and training opportunities of risks and safety for Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Drought, Dam Failure, Levee Failure and Winter Storm 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.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Winter Storms, Drought, Dam Failure, Levee Failure	New

Town of Edgefield - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
E6: Generators for Continuity of Operations and Government	Procurement and Installation of generators at public facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, thunderstorms (lightning, high wind, hail) , Extreme Heat	New
E7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Lightning	New
E8: Warning Systems	Update/upgrade public warning system components throughout Red River Parish as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Winter Storms, Wildfire, Tornadoes, Tropical Cyclone, Dam Failure, Levee Failure	New
E9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes, Drought, Extreme Heat	New
E10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Tropical Cyclones, Flooding	New
E11: Dam/Levee Failure Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam/levee failure.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Flooding, Dam Failure, Levee Failure	New
E12: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of drought.	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Drought	New
E13: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Town of Edgefield/ Red River Parish OHSEP	Wildfires	New

Town of Hall Summit – New Mitigation Actions

Town of Hall Summit - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
H1: Building Retrofits	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.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	High Wind, Tropical Cyclone, Tornadoes	New
H2: Drainage Improvement	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.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties. .	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
H4: Safe Room Projects	Construction of a safe room for first responders located in Red River Parish. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Tornadoes, High Wind, Tropical Cyclone	New
H5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness through mail outs and training opportunities of risks and safety for Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Drought, Dam Failure, Levee Failure and Winter Storm 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.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Winter Storms, Drought, Dam Failure, Levee Failure	New

Town of Hall Summit - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
H6: Generators for Continuity of Operations and Government	Procurement and Installation of generators at public facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, thunderstorms (lightning, high wind, hail) , Extreme Heat	New
H7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Lightning	New
H8: Warning Systems	Update/upgrade public warning system components throughout Red River Parish as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Winter Storms, Wildfire, Tornadoes, Tropical Cyclone, Dam Failure, Levee Failure	New
H9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes, Drought, Extreme Heat	New
H10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Tropical Cyclones, Flooding	New
H11: Dam/Levee Failure Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam/levee failure.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Flooding, Dam Failure, Levee Failure	New
H12: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of drought.	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Drought	New
H13: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Town of Hall Summit/ Red River Parish OHSEP	Wildfires	New

Village of Martin – New Mitigation Actions

Village of Martin - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
M1: Building Retrofits	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.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	High Wind, Tropical Cyclones, Tornadoes	New
M2: Drainage Improvement	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.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties. .	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
M4: Safe Room Projects	Construction of a safe room for first responders located in Red River Parish. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Tornadoes, High Wind, Tropical Cyclone	New
M5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness through mail outs and training opportunities of risks and safety for Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Drought, Dam Failure, Levee Failure and Winter Storm 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.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Flooding, Tropical Cyclone, Tornadoes, Wildfire, Extreme Heat, Thunderstorms (lightning, high wind, hail), Winter Storms, Drought, Dam Failure, Levee Failure	New

Village of Martin - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
M6: Generators for Continuity of Operations and Government	Procurement and Installation of generators at public facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, thunderstorms (lightning, high wind, hail) , Extreme Heat	New
M7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Lightning	New
M8: Warning Systems	Update/upgrade public warning system components throughout Red River Parish as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Winter Storms, Wildfire, Tornadoes, Tropical Cyclone, Dam Failure, Levee Failure	New
M9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes, Drought, Extreme Heat	New
M10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Tropical Cyclones, Flooding	New
M11: Dam/Levee Failure Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam/levee failure.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Flooding, Dam Failure, Levee Failure	New
M12: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of drought.	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Drought	New
M13.: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Village of Martin/ Red River Parish OHSEP	Wildfires	New

Action Prioritization

During the prioritization process, each jurisdiction and the 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 or 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 steering committee met internally for mitigation action meetings to review and approve Red River Parish and the jurisdiction's mitigation actions. On-going actions, as well as actions which can be undertaken by existing parish or local staff without need for additional funding, were given high priority. The actions with high benefit and low cost, political support, and public support but require additional funding from parish or external sources were given medium priority. The actions that require substantial funding from external sources with relatively longer completion time were given low priority. There have been no changes in financial, legal and political priorities within the past 5 years, with the methodology and prioritization process remaining the same.

Red River Parish and the participating jurisdictions will implement and administer the identified actions based off of the proposed timeframes and priorities for each reflected in the portions of this section where actions are summarized. The inclusion of any specific action item in this document does not commit the parish to implementation. Each action item will be subject to availability of staff and funding. Certain items may require regulatory changes or other decisions that must be implemented through standard processes, such as changing regulations. This plan is intended to offer priorities based on an examination of hazards.

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 builds on the research and planning efforts of previous plans while reviewing recent trends. The steering committee 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 Red River Parish Hazard Mitigation Plan Update

The Red River Parish Hazard Mitigation Plan Update process began in January 2016 with a series of meetings and collaborations between the contractor (SDMI) 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 specific time periods or meetings.

Red River Parish includes the unincorporated areas of the Parish, as well as the four incorporated municipalities that participated in the plan update process – the Town of Coushatta, the Village of Edgefield, the Village of Hall Summit, and the Village of Martin. Red River Parish Office of Homeland Security and Emergency Preparedness (OHSEP) invited communities' representatives to meetings, where they supplied critical infrastructure data and reviewed work-in-progress for the plan update.

Similar to the development of the original Hazard Mitigation Plan, the role of the steering committee members during the plan update was to attend the planning meetings and provide valuable information on the parish, develop parts of the plan update, and review the results of research conducted by SDMI. Tasks completed by the steering committee include:

- Reviewing and revising the list of potential hazards included in the plan update
- Assembling a list of critical facilities, such as hospitals, police stations, and shelters
- Updating mitigation goals and objectives
- Determining prudent mitigation measures
- Prioritization of identified mitigation measures

The table below details the meeting schedule and purpose for the planning process:

Date	Meeting or Outreach	Location	Public Invited	Purpose
1/22/2016	Initial Coordination	Telephone/ Email	No	Discuss with Parish HM coordinator and any Steering Committee members expectations and requirements of the project.
2/16/2016	Kick-Off Meeting	Coushatta, LA	No	Discuss with the plan steering committee expectations and requirements of the project. Assign plan worksheets to jurisdictions.
6/22/2016	Risk Assessment Overview	Coushatta, LA	No	Discuss and review the risk assessment with the steering committee discuss and review expectations for public meeting.
6/22/2016	Public Meeting	Coushatta, LA	Yes	The public meeting allowed the public and community stakeholders to participate and provide input into the hazard mitigation planning process. Maps of the Red River Parish communities were provide for the meeting attendees to identify specific areas where localized hazards occur.
Ongoing	Public Survey Tool	Online	Yes	This survey asked participants about public perceptions and opinions regarding natural hazards in Red River 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/r/RedRiverParish
2 Week Period	Public Plan Review (Digital)		Yes	Parish Website and Red River Parish OHSEP

Planning

The plan update process consisted of several phases:

Phase	Month 1-2	Month 3-4	Month 5-6	Month 7-8	Month 9	Month 10	Month 11	Month 12
Plan Revision								
Data Collection								
Risk Assessment								
Public Input								
Mitigation Strategy and Actions								
Plan Review by GOHSEP and FEMA								
Plan Adoption								
Plan Approval								

Coordination

The Red River Parish OHSEP oversaw the coordination of the 2016 Hazard Mitigation Plan Update Steering Committee during the update process. The Red River Parish OHSEP and participating jurisdictions were responsible for identifying members for the committee.

The Parish Director and SDMI were jointly responsible for inviting the Steering Committee and key stakeholders to all planned meetings and activities by email invitations and calendar invites. SDMI assisted the Parish Director with meeting notices, website and social media statements for notification to the media and general public for public meetings and public outreach activities.

SDMI was 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 2016 Hazard Mitigation Plan Update Steering Committee consisted of representatives from the following parish, municipal, or community stakeholders:

- Red River Parish Police Jury
- Red River Office of Homeland Security and Emergency Preparedness
- City of Coushatta
- Town of Edgefield
- Town of Hall Summit
- Village of Martin

The OHSEP Administrator for DeSoto Parish was invited by the Red River Parish OHSEP via email invitation to participate in all meetings and activities as well in an effort to collaborate with neighboring communities. In addition, the participation of the GOHSEP Region 7 Coordinator during the process also contributed to neighboring community representation.

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 2016 update. The completed worksheets can be found in Appendix E – State Required Plan Update Worksheets.

Below is a detailed list of the 2016 Hazard Mitigation Plan Update Steering Committee:

Name	Title	Agency	Address	Phone
Johnny Cox	Mayor of Coushatta	Town of Coushatta	1211 East Carrol Street Coushatta, LA	(318) 932-4312
Tom Mangham	Mayor of Martin	Village of Martin	201 Hwy 501, Coushatta, LA	(318) 932-5448
Lary Wimberly	Mayor of Hall Summit	Village of Hall Summit	3006 Carter Ave Hall Summit, LA	(318) 932-5355
Vince Almond	Mayor of Edgefield	Village of Edgefield	225 Spruce St. Coushatta, LA	(318) 932-0430
Karen Freeman	Administrative Assistant	Red River OHSEP	Coushatta, LA	(318) 228-0021
Shane Hubbard	Director	Red River OHSEP	Coushatta, LA	(318) 228-0021
Jennifer Reynolds	Director	Webster OHSEP	Minden, LA	(318) 371-1128
Todd Edwards	OHSEP Administrator	DeSoto OHSEP	Mansfield, LA	(318) 872-1877

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 Red River Parish programs and planning.

A measure of integration and coordination is achieved through the Hazard Mitigation Plan participation of steering committee members and community stakeholders, who administer programs such as floodplain management under the National Flood Insurance Program (NFIP) and parish planning and zoning and building code enforcement.

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 five-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 (e.g. risk assessment, plan amendments, ordinance revisions, capital improvement projects, etc.).

The members of the Red River 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 damages that occurred. The parish's 2005 Hazard Mitigation Plan was also used in the planning process. Other existing parish and jurisdiction data and plans reviewed and/or incorporated into the planning process include those listed below:

- Emergency Operations Plan
- State of Louisiana's Hazard Mitigation Plan
- Flood Insurance Rate Maps

Further information on other plans and capabilities reviewed can be found in the Capabilities Assessment, Section 3.

Meeting Documentation and Public Outreach Activities

The following pages contain information from the meetings and public outreach activities conducted during this Hazard Mitigation Plan Update for Red River Parish.

Meeting #1: Coordination Discussion

Date: January 22, 2016
Location: Email
Purpose: Discuss with the Hazard Mitigation Lead for the parish (OHSEP Director) the expectations and requirements of the Hazard Mitigation Plan Update process and to establish and initial project timeline.
Public Initiation: No
Invitees Included: Red River Parish OHSEP, SDMI Staff

Meeting #2: Hazard Mitigation Plan Update Kick-Off

Date: February 2016, 2016

Location: Coushatta, LA

Purpose: Discuss the expectations and requirements of the Hazard Mitigation Plan Update process and to establish and initial project timeline with the parish's Hazard Mitigation Plan Steering Committee. Assign each individual jurisdiction and the parish data collection for the plan update.

Public Initiation: No

Invitees Included:

Name	Title	Agency
Johnny Cox	Mayor of Coushatta	Town of Coushatta
Tom Mangham	Mayor of Martin	Village of Martin
Lary Wimberly	Mayor of Hall Summit	Village of Hall Summit
Vince Almond	Mayor of Edgefield	Village of Edgefield
Karen Freeman	Administrative Assistant	Red River OHSEP
Shane Hubbard	Director	Red River OHSEP
Jennifer Reynolds	Director	Webster OHSEP
Todd Edwards	OHSEP Administrator	DeSoto OHSEP

Meeting #3: Risk Assessment Overview

Date: June 22, 2016

Location: Coushatta, LA

Purpose: Members of the Hazard Mitigation Plan Update Steering Committee were invited and were presented the results of the most recent risk assessment and an overview of the public meeting presentation during this overview. The assessment was conducted based on hazards identified during previous plans.

Public Initiation: No

Invitees Included:

Name	Title	Agency
Johnny Cox	Mayor of Coushatta	Town of Coushatta
Tom Mangham	Mayor of Martin	Village of Martin
Lary Wimberly	Mayor of Hall Summit	Village of Hall Summit
Vince Almond	Mayor of Edgefield	Village of Edgefield
Karen Freeman	Administrative Assistant	Red River OHSEP
Shane Hubbard	Director	Red River OHSEP
Jennifer Reynolds	Director	Webster OHSEP
Todd Edwards	OHSEP Administrator	DeSoto OHSEP

Meeting #4: Public Meeting

Date: June 22, 2016

Location: Coushatta, LA

Purpose: The public meeting allowed the public and community stakeholders to participate and provide input into the hazard mitigation planning process. Maps of the Red River Parish communities were provided for the meeting attendees to identify specific areas where localized hazards occur.

Public Initiation: Yes

Invitees Included:

Name	Title	Agency
Johnny Cox	Mayor of Coushatta	Town of Coushatta
Tom Mangham	Mayor of Martin	Village of Martin
Lary Wimberly	Mayor of Hall Summit	Village of Hall Summit
Vince Almond	Mayor of Edgefield	Village of Edgefield
Karen Freeman	Administrative Assistant	Red River OHSEP
Shane Hubbard	Director	Red River OHSEP
Jennifer Reynolds	Director	Webster OHSEP
Todd Edwards	OHSEP Administrator	DeSoto OHSEP

****Subject Matter Experts from parish government were present to answer specific questions about proposed projects from any citizens****

Meeting Public Notice

RED RIVER PARISH
OFFICE OF HOMELAND SECURITY & EMERGENCY PREPAREDNESS

MEETING NOTICE – June 22, 2016

Red River Parish to hold Public Meetings for Hazard Mitigation Plan Update

Coushatta, LA – Red River Parish Office of Homeland Security & Emergency Preparedness is in the process of updating the Red River Parish Hazard Mitigation Plan and are required to hold public meetings on the plan update. The Public meeting will be held on June 22, 2016 in the Red River Police Jury Meeting Room located at 615 E. Carroll St., Coushatta, LA from 5:00PM to 6:00PM.

Natural hazards have the potential to cause property loss, loss of life, economic hardship, and threats to public health and safety. While an important aspect of emergency management deals with disaster recovery (the actions that a community takes to repair damages), an equally important aspect of emergency management involves hazard mitigation - sustained actions taken to reduce long-term risk to life and property. They are things we do today to be more protected in the future. For example, elevating buildings in flood hazard areas, installing hurricane clips and storm shutters, relocating critical facilities out of hazard areas, using fire-resistant construction materials in wildfire hazard areas, etc. Hazard mitigation actions are essential to breaking the typical disaster cycle of damage, reconstruction, and repeated damage. With careful selection, they can be long-term, cost-effective means of reducing risk and helping to create a more sustainable and disaster-resilient community.

A hazard mitigation plan describes an area's vulnerability to the various natural hazards that are typically present, along with an array of actions and projects for reducing key risks. While natural disasters cannot be prevented from occurring, the continued implementation of mitigation strategies identified in the plan will gradually, but steadily, make our communities more sustainable and disaster-resilient.

The Disaster Mitigation Act of 2000 (DMA 2000) requires all states and local governments to have a hazard mitigation plan in order to be eligible to apply for certain types of federal hazard mitigation project grants. Hazard mitigation plans must be: (a) implemented on an ongoing basis, and (b) updated every five years to ensure that they remain applicable representations of local risk and locally-preferred risk reduction strategies.

Red River Parish is in the beginning stages of updating its hazard mitigation plan. Public meeting will be held on June 22, 2016 for all citizens interested in learning about and participating in discussions concerning the Red River Parish Hazard Mitigation Plan.

Residents of Red River Parish are asked to participate in a survey about public perceptions and opinions regarding natural hazards in the parish. The survey results will be used in the development of the plan. This short web-based survey can be found at https://www.surveymonkey.com/r/RedRiverParish

For more information, please contact: Red River Parish OHSEP Office

Stephenson Disaster Management Institute
Louisiana State University • 3000 Business Education Complex • Baton Rouge, Louisiana 70803

Outreach Activity #1: Public Opinion Survey

Date: Ongoing throughout planning process
Location: Web Survey
Public Initiation: Yes
No comments were collected through this activity.

Outreach Activity #2: Incident Questionnaire

Date: Public Meeting Activity
Location: Public Meeting
Public Initiation: Yes

Outreach Activity #3: Mapping Activities

Public meeting attendees were asked to identify areas on jurisdictional maps provided that were "problem areas". They were also asked to indicate any areas of new development. This activity gave the public an opportunity to interact with SDMI's GIS Mapping section, as well as provide valuable input on areas that may flood repeatedly during rain events that may not get reported to local emergency managers as significant events. However, because no members of the public attended, no comments were collected.

Public Plan Review Documentation

The Red River Parish Hazard Mitigation Draft Plan was placed on the Red River Parish website to collect comments and feedback from the public. This outreach provided the public an opportunity to comment on the plan during the drafting stage and prior to plan approval. No feedback or public comment was received during this time.

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Appendix B: Plan Maintenance

Purpose

The section of the Code of Federal Regulations (CFR) pertaining to Local Mitigation Plans lists five 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 Update must include (1) "a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-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

The Red River Parish Planning Committee will be responsible for monitoring, evaluating, and documenting the plan's progress throughout the year. Part of the plan maintenance process should include a system by which local governing bodies incorporate the HMP into the parish's comprehensive or capital improvement plans. This process provides for continued public participation through the diverse resources of the parish to help in achieving the goals and objectives of the plan. Public participation will be achieved through availability of copies of HMP in parish public library and parish website. This section describes the whole update process which includes the following:

- Responsible parties
- Methods to be used
- Evaluation criteria to be applied
- Scheduling for monitoring and evaluating the plan

Responsible Parties

Red River Parish has developed a method to ensure that a regular review and update of the Hazard Mitigation Plan occurs. This will be the responsibility of the steering committee, which consists of representatives from governmental organizations, local businesses, and private citizens, who will be involved in the process of monitoring, evaluating and updating the plan. All committee members in this plan will remain active in the steering committee.

Although the people filling the positions may change from year to year, the parish and its stakeholders will have representatives on the Steering Committee. The future Steering Committee will continue to be comprised of the same job functions as currently evident in the Steering Committee. However, the decision of specific job duties will be left to the Parish OHSEP Director to be assigned as deemed appropriate.

Methods for Monitoring and Evaluating the Plan and Plan Evaluation Criteria

Red River Parish has developed a method to ensure monitoring, evaluating, and updating of the HMP occurs during the five-year cycle of the plan. The planning committee will become a permanent body and will be responsible for monitoring, evaluating, and updating of the plan. The planning committee meeting will be held annually in order to monitor, evaluate, and update the plan. The Red River Parish OHSEP Director will be responsible for conducting the annual planning committee meetings.

The lead person of the agency responsible for the implementation of a specific mitigation action will submit a progress report to the Director at least thirty days prior to the planning committee meeting. The progress report will provide project status monitoring to include the following: whether the project has started; if not started, reason for not starting; if started, status of the project; if the project is completed, whether it has eliminated the problem; and any changes recommended to improve the implementation of the project etc. In addition, the progress report will provide status monitoring on the plan evaluation, changes to the hazard profile, changes to the risk assessment, and public input on the Hazard Mitigation Plan updates and reviews.

Progress on the mitigation action items and projects will be reviewed during the annual planning committee meeting. The criteria that would be utilized in the project review will include the following:

1) Whether the action was implemented and reasons, if the action was not implemented

2) What were the results of the implemented action

3) Were the outcomes as expected, and reasons if the outcomes were not as expected

4) Did the results achieve the stated goals and objectives

5) Was the action cost-effective

6) What were the losses avoided after completion of the project

7) In case of a structural project, did it change the hazard profile

In addition to monitoring and evaluating the progress of the mitigation plan actions and projects, the mitigation plan is required to be maintained and monitored annually, and updated every five years. The annual maintenance, monitoring and evaluation of the plan will be conducted in the annual planning committee meeting. The planning committee will review each goal and objective to determine their relevance to changing situations in the parish, as well as changes to state or federal policy, and to ensure that they are addressing current and expected conditions. The planning committee will evaluate if any change in hazard profile and risk in the parish occurred during the past year. In addition, the evaluation will include the following criteria in respect of plan implementation:

1) Any local staffing changes that would warrant inviting different members to the planning committee

2) Any new organizations that would be valuable in the planning process or project implementation need to be included in the planning committee

3) Are there any procedures that can be done more efficiently

4) Are there more ways to gain more diverse and widespread cooperation

5) Are there any different or additional funding sources available for mitigation planning and implementation

The HMP will be updated every five years to remain eligible for continued HMGP funding. The planning committee will be responsible for updating the HMP. The OHSEP Director will be the lead person for the HMP update. The HMP update process will commence at least one year prior to the expiration of the plan. The HMP will be updated after a major disaster if an annual evaluation of the plan indicate a substantial change in hazard profile and risk assessment in the parish.

Additionally, the public will be canvassed to solicit public input to continue Red River Parish's dedication to involving the public directly in review and updates of the Hazard Mitigation Plan. Meetings will be scheduled as needed by the plan administrator to provide a forum for which the public can express their concerns, opinions, and/or ideas about the plan. The plan administrator will be responsible for using parish resources to publicize the annual public meetings and maintain public involvement through the newspapers, radio, and public access television channels. Copies of the plan will be catalogued and kept at all appropriate agencies in the city government, as well as at the Public Library.

The review by the steering committee and input from the public will determine whether a plan update is needed prior to the required five-year update.

Annual Reports on the progress of actions, plan maintenance, monitoring, evaluation, incorporation into existing planning programs, and continued public involvement will be documented at each annual meeting of the committee and kept by the Parish OHSEP Director. The Steering Committee will work together as a team, with each member sharing responsibility for completing the monitoring, evaluation and updates. It is the responsibility of the Parish OHSEP Director for contacting committee members, organizing the meeting and providing public noticing for the meeting to solicit public input.

2016 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 2016 update. Based on this analysis, the method and schedule were deemed to be acceptable, and nothing was changed for this update.

Incorporation into Existing Planning Programs

It is and has been the responsibility of the Red River Parish Hazard Mitigation Plan Steering Committee and participating jurisdictions to determine additional implementation procedures when appropriate. This may include integrating the requirements of the Red River Parish Hazard Mitigation Plan into each jurisdiction's planning documents, processes, or mechanisms as follows:

- Ordinances, Resolutions, Regulations
- Floodplain Ordinances
- Capital Improvements Plan
- Economic Development Plan
- Local Emergency Operation Plan
- Stormwater Management Plan

Opportunities to integrate the requirements of this plan into other local planning mechanisms will continue to be identified through future meetings of the Red River Parish Hazard Mitigation Steering Committee and through the five-year review process described herein. 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 plans that require specific planning and administrative tasks (e.g. risk assessment, plan amendments, ordinance revisions, capital improvement projects, etc.). The members of the steering committee will meet with Department Heads to discuss what should be included in the changes that are necessary before the changes are introduced to the city council or police jury meetings. Steering committee members 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

Red River Parish Hazard Mitigation Plan, and will not contribute to increased hazard vulnerability within the parish.

During the planning process for new and updated local planning documents at the parish and jurisdiction level, such as a risk assessment, comprehensive plan, capital improvements plan, or emergency operations plan, the jurisdictions will provide a copy of the Parish Hazard Mitigation Plan to the appropriate parties and recommend that all goals and strategies of new and updated local planning documents are consistent with and support the goals of the Parish Hazard Mitigation Plan and will not contribute to increased hazards.

Although it is recognized that there are many possible benefits to integrating components of this plan into other parish and jurisdiction planning mechanisms, the development and maintenance of this stand-alone Hazard Mitigation Plan is deemed by the steering committee to be the most effective and appropriate method to ensure implementation of parish and local hazard mitigation actions.

On behalf of the jurisdictions of the Town of Coushatta, the Village of Edgefield, the Village of Hall Summit, and the Village of Martin, Red River Parish has the authority to incorporate the contents of the Hazard Mitigation Plan into the parish's existing regulatory mechanisms. Agreements are currently in place with jurisdictions to allow for the parish incorporation mechanisms to take place.

The following parish and local plans incorporate requirements of this HMP Update as follows through steering committee member and jurisdiction representation throughout the planning process as described above:

Red River Unincorporated
Economic Development Plan/Updated as needed/Red River Parish Police Jury
Local Emergency Operations Plan/Updated as needed/Red River Parish OHSEP

Town of Coushatta
Capital Improvements Plan/Updated as needed/Red River Parish Police Jury and Mayor of Coushatta
Economic Development Plan/Updated as needed/Red River Parish Police Jury and Mayor of Coushatta
Local Emergency Operations Plan/Updated as needed/Red River Parish OHSEP and Mayor of Coushatta

Village of Edgefield
There are no additional plans within this jurisdiction for the Hazard Mitigation Plan to be integrated.

Village of Hall Summit
Local Emergency Operations Plan/Updated as needed/Red River Parish OHSEP and Mayor of Hall Summit

Village of Martin
There are no additional plans within this jurisdiction 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 as necessary. These efforts will include at least one of the following:

- Advertising meetings of the Mitigation Committee in the local newspaper, public bulletin boards, and/or city and county office buildings
- Designating willing and voluntary citizens and private sector representatives as official members of the Mitigation Committee
- Utilizing local media to update the public of any maintenance and/or periodic review activities taking place
- Utilizing city and parish web sites to advertise any maintenance and/or periodic review activities taking place
- Keeping copies of the plan in appropriate public locations

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Appendix C: Essential Facilities

Red River Parish Essential Facilities – All Jurisdictions

Red River Parish Unincorporated Essential Facilities											
Type	**Name**	**Drought***	**Extreme Heat***	**Flooding**	**Hail**	**Lightning**	**Wind**	**Tornadoes**	**Tropical Cyclone**	**Wildfire**	**Winter Storms***
Fire and Rescue	Red River Parish Fire District 6				X	X	X	X	X		
	Two Bay Fire Station			X	X	X	X	X	X		
	West Dale Fire District 7			X	X	X	X	X	X		
Law Enforcement	Red River Parish Sheriff's Office- CIU				X	X	X	X	X		
	Red River Parish Sheriff's Office- Maintenance			X	X	X	X	X	X		
Government	Maintenance Barn			X	X	X	X	X	X	X	
	East Point Post Office			X	X	X	X	X	X	X	
	Hanna Post Office			X	X	X	X	X	X	X	

Coushatta Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclone	Wildfire	Winter Storms*
Fire and Rescue	Red River Parish Fire Department				X	X	X	X	X	X	
Government	Coushatta City Hall				X	X	X	X	X	X	
	Red River Council on Aging				X	X	X	X	X	X	
Law Enforcement	Coushatta Police Station				X	X	X	X	X	X	
Public Health	Red River Behavioral Health Clinic				X	X	X	X	X	X	
Schools	Red River Elementary School				X	X	X	X	X	X	
	Red River High School				X	X	X	X	X	X	
	Red River Junior High				X	X	X	X	X	X	

Edgefield Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclone	Wildfire	Winter Storms*
Government	Edgefield Village Hall				X	X	X	X	X	X	

Hall Summit Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclone	Wildfire	Winter Storms*
Fire and Rescue	Hall Summit Fire Department				X	X	X	X	X	X	
	Red River Parish Fire District 2			X	X	X	X	X	X	X	
Government	Hall Summit City Hall				X	X	X	X	X	X	
Law Enforcement	Hall Summit Police Station				X	X	X	X	X	X	

Martin Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclone	Wildfire	Winter Storms*
Fire and Rescue	Martin Fire Department				X	X	X	X	X	X	
Government	Martin Village Hall				X	X	X	X	X	X	

* There are no critical facilities vulnerable to the hazard.

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Appendix D: Plan Adoption

RED RIVER PARISH

LOUISIANA

RESOLUTION NO. 817

RESOLUTION

Red River Parish Hazard Mitigation Update-2016

WHEREAS the RED RIVER PARISH recognizes the threat that natural hazards pose to people and property within RED RIVER PARISH; and

WHEREAS the RED RIVER PARISH has prepared a multi-hazard mitigation plan, hereby known as Red River Parish Hazard Mitigation Update-2016 in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS Red River Parish Hazard Mitigation Update-2016 identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in RED RIVER PARISH from the impacts of future hazards and disasters; and

WHEREAS adoption by the RED RIVER PARISH POLICE JURY demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the Red River Parish Hazard Mitigation Update-2016.

NOW THEREFORE, BE IT RESOLVED BY THE RED RIVER PARISH POLICE JURY, LOUISIANA, THAT: This resolution was considered section by section and as a whole and upon motion of Mr. Moore, seconded by Mr. Taylor, was adopted by the following vote on the 7th day of August, 2017.

YEAS: 7 NAYS 0 ABSENT: 0

CERTIFICATE

I, Carolyn A. Hayes, Secretary of the Police Jury of Red River Parish, Louisiana, do hereby certify that the forgoing is a true and correct copy of a resolution adopted by the Red River Parish Police Jury in a Regular and legal session held August 7, 2017, at which a quorum were present.

GIVEN UNDER MY OFFICIAL SEAL AND signature this 7th day of August, 2017

Carolyn A. Hayes, SECRETARY

Carolyn A Hayes

JOHNNY COX
Mayor

Stephanie Babers
Town Clerk

Town of Coushatta

Post Office Box 531
COUSHATTA, LOUISIANA 71019
Tel: (318) 932-4312 · Fax: (318) 932-3653
Email: toc4312@bellsouth.net

Town Council
PETER DRAKE
JANICE W. LEWIS
BRIAN NASH
REGINALD PREALOW, JR.
EDNA WEBB

Resolution 6 of 2017

City of Coushatta City Council, AT THEIR REGULAR MEETING HELD AUGUST 15TH, 2017 DID PASS THE FOLLOWING RESOLUTIONS:

WHEREAS, it is the duty of the Coushatta City Council to protect all persons and property within the City of Coushatta.

WHEREAS, the Coushatta City Council supports public safety and damage prevention within its jurisdictional boundaries,

THEREFORE, the Coushatta City Council does adopt the updated Hazard Mitigation Plan for 2017 as approved by Region VI of the Federal Emergency Management Agency and the Louisiana Governor's Office of Homeland Security and Emergency Preparedness.

Motion for adoption of this resolution made by Janice Lewis, seconded by Reginald Prealow, Jr.

Yeas: Peter Drake, Brian Nash, Reginald Prealow Jr., and Janice Lewis.

Nays: None

Absent: Edna Webb

THEREFORE, the above resolution is hereby adopted by the City Council of the City of Coushatta this 15th day of August, 2017 and shall become a part of the official public record.

Dr. Johnny Cox, Mayor

ATTEST:
Stephanie Babers, Town Clerk

"Town of Coushatta is an Equal Opportunity Provider and Employer"

RESOLUTION

A RESOLUTION ADOPTING THE VILLAGE OF EDGEFIELD HAZARD MITIGATION PLAN

WHEREAS, the Edgefield Mayor and Council recognize that natural; hazards pose to people and property within Edgefield; and

WHEREAS, Red River Parish Government has prepared a multi- hazard mitigation plan, hereby known as RED RIVER PARISH HAZARD MITIGATION PLAN 2016 in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Red River Parish Hazard Mitigation Plan 2016 identifies mitigation goals and actions to reduce or eliminate long term-risk to people and property in Edgefield from the impacts of future hazards and disasters; and

WHEREAS, adoption by the Village of Edgefield City Council demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the Red River Parish Hazard Mitigation Plan 2016.

NOW THEREFORE, BE IT RESOLVED that the Village of Edgefield city Council hereby adopts the Red River Parish Hazard Mitigation Plan 2016.

The above resolution having been submitted to the City Council and discussed at a public meeting on 16th day of October 2017;after a motion by JACK TERRELL and Second by EUGENE FREEMAN, and having been submitted for a vote the vote was as follows:

YEAS: 3
NAYS: 0
ABSTAIN: –
ABSENT: –

Mayor

CERTIFICATE

I, CAREY PROSPERIE city clerk of Village of Edgefield, do certify that the foregoing resolution is a true and exact copy adopted by the Village of Edgefield city council at a meeting thereof legally held on the 16th day of OCTOBER 2017.

Carey Prosperie

City Clerk

RESOLUTION

A RESOLUTION ADOPTING THE VILLAGE OF HALL SUMMIT HAZARD MITIGATION PLAN

WHEREAS, the Hall Summit Mayor and Council recognize that natural; hazards pose to people and property within Hall Summit; and

WHEREAS, Red River Parish Government has prepared a multi- hazard mitigation plan, hereby known as RED RIVER PARISH HAZARD MITIGATION PLAN 2016 in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Red River Parish Hazard Mitigation Plan 2016 identifies mitigation goals and actions to reduce or eliminate long term-risk to people and property in Hall Summit from the impacts of future hazards and disasters; and

WHEREAS, adoption by the Village of Hall Summit City Council demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the Red River Parish Hazard Mitigation Plan 2016.

NOW THEREFORE, BE IT RESOLVED that the Village of Hall Summit city Council hereby adopts the Red River Parish Hazard Mitigation Plan 2016.

The above resolution having been submitted to the City Council and discussed at a public meeting on 2nd day of October 2017;after a motion by Antony Thomas and Second by Kathleen Quick, and having been submitted for a vote the vote was as follows:

YEAS: 2
NAYS:
ABSTAIN:
ABSENT: 1

W. L. Wimberly

Mayor W. L. Wimberly

CERTIFICATE

I, Julie A Murphree city clerk of Village of Hall Summit, do certify that the foregoing resolution is a true and exact copy adopted by the Village of Hall Summit city council at a meeting thereof legally held on the 2nd day of October 2017.

Julie A Murphree

City Clerk

RESOLUTION

A RESOLUTION ADOPTING THE VILLAGE OF MARTIN HAZARD MITIGATION PLAN

WHEREAS, the Martin Mayor and Council recognize that natural; hazards pose to people and property within Martin; and

WHEREAS, Red River Parish Government has prepared a multi- hazard mitigation plan, hereby known as RED RIVER PARISH HAZARD MITIGATION PLAN 2016 in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Red River Parish Hazard Mitigation Plan 2016 identifies mitigation goals and actions to reduce or eliminate long term-risk to people and property in Martin from the impacts of future hazards and disasters; and

WHEREAS, adoption by the Village of Martin City Council demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the Red River Parish Hazard Mitigation Plan 2016.

NOW THEREFORE, BE IT RESOLVED that the Village of Martin city Council hereby adopts the Red River Parish Hazard Mitigation Plan 2016.

The above resolution having been submitted to the City Council and discussed at a public meeting on 18 day of August 2017;after a motion by Jasmine Williamson and Second by Leelwayne Petersen, and having been submitted for a vote the vote was as follows:

YEAS: 3
NAYS: 0
ABSTAIN: 0
ABSENT: 0

Tom Maxglan
Mayor

CERTIFICATE

I, Christina Brown city clerk of Village of Martin, do certify that the foregoing resolution is a true and exact copy adopted by the Village of Martin city council at a meeting thereof legally held on the 18 day of August 2017.

Christina Brown
City Clerk

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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 and NFIP information. The following pages contain documentation of the worksheets.

Mitigation Planning Team

Name	Title	Agency	Address	Phone
Johnny Cox	Mayor of Coushatta	Town of Coushatta	1211 East Carrol Street, Coushatta, LA	(318) 932-4312
Tom Mangham	Mayor of Martin	Village of Martin	201 Hwy 501, Coushatta, LA	(318) 932-5448
Lary Wimberly	Mayor of Hall Summit	Village of Hall Summit	3006 Carter Ave, Hall Summit, LA	(318) 932-5355
Vince Almond	Mayor of Edgefield	Village of Edgefield	225 Spruce St. Coushatta, LA	(318) 932-0430
Karen Freeman	Administrative Assistant	Red River OHSEP	Coushatta, LA	(318) 228-0021
Shane Hubbard	Director	Red River OHSEP	Coushatta, LA	(318) 228-0021
Jennifer Reynolds	Director	Webster OHSEP	Minden, LA	(318) 371-1128
Todd Edwards	OHSEP Administrator	DeSoto OHSEP	Mansfield, LA	(318) 872-1877

Capability Assessment

See Section 3, Capability Assessment

Building Inventory

Critical Facility (If Yes, Mark X)	Name of Building	Purpose of Building	Address	City	Lat	Long	Assessed Value	Date Built	Const Type
Red River									
X	Red River EMS	Emergency Medical Services	Nearby: Rush Street	Coushatta	32.02351428	-93.34518928	$119,875.00	1990	Concrete
X	West Dale Fire District 7	Fire Search and Rescue	Nearby: Louisiana 1		32.16391309	-93.48006887	$9,825.00	1980	Metal
X	Red River Airport	Airports and Airfields	Nearby: The Red River Airport		31.9838468	-93.30879358	$70,350.00	1980	Metal
X	Ware Youth Center	Juvenile Detention Center	Hwy 71 North	Coushatta			$1,047,600.00	2000	Concrete
Coushatta									
	Red River Parish Special Education and Pupil Appraisal	Education	Nearby: 1906 Front Street	Coushatta	32.01665284	-93.34354355	$2,296,863	1970	Concrete
	Red River Junior High	Education	931 East Carrol Street	Coushatta	32.01460637	-93.33489645	$15,610,240	2002	Concrete
	Red River High School	Education	915 East Carrol Street	Coushatta	32.01519883	-93.33522698	$15,610,240	1929	Concrete
	Red River Elementary School	Education	1001 Ashland Road	Coushatta	32.03289229	-93.33305008	$14,215,625	2001	Concrete
	Two Bay Fire Station	Fire Search and Rescue	Nearby: Louisiana 1	Coushatta	32.06911059	-93.43658416	$58,354	1987	Metal
	Martin Fire Department	Fire Search and Rescue	1900 Lisso Street	Coushatta	32.0945336	-93.22162705	$58,354	1987	Metal
	Red River Parish Fire Department	Fire Search and Rescue	Nearby: 1801-1931 Lisso Street	Coushatta	32.01553481	-93.3419333	$242,349	1987	Metal
	Red River Parish Fire District 6	Fire Search and Rescue	Nearby: U.S. 71	Coushatta	32.1818368	-93.39055096	$58,354	1987	Metal
	Red River Parish Sheriff's Office - Maintenance Facility Farm	Law Enforcement	Nearby: U.S. 371	Coushatta	32.06955671	-93.32605824	$500,00	1986	Concrete
	Red River Parish Sheriff's Office - Criminal Investigation Unit	Law Enforcement	Nearby: Lock & Dam Road	Coushatta	31.94316881	-93.26539159	$200,000	1992	Concrete
	Coushatta Police Station	Law Enforcement	1211 East Carroll Street	Coushatta	32.01631625	-93.32940296	$100,000	1965	Concrete
	Red River Council on Aging Administrative Office	Civil Government	Nearby: 1822 Front Street	Coushatta	32.01709871	-93.34341378	$91,000	1978	Concrete
	Coushatta City Hall	Civil Government	1211 East Carroll Street	Coushatta	32.01629992	-93.32947918	$100,000	1965	Concrete

	Red River Parish Library	Library	410 East Carroll Street	Coushatta			$136,890.00	1980	Concrete
	Budget Inn	Motel	1314 Ringgold Avenue	Coushatta			$241,785.00	1990	Concrete
	Christus Coushatta Hospital	Hospital	1635 Marvel Street	Coushatta			$795,200.00	1985	Concrete
	Green Meadow Haven	Nursing Home	1110 Ringgold Avenue	Coushatta			$666,225.00	1990	Concrete
Edgefield									
	Village Hall	Board & Community Meetings	225 Spruce Street	Coushatta	32.051042	-93.335089	60,000	1975	Wood
	Sewer Pump Station	Sewer Pump Station	926 Pine Street	Coushatta	32.052381	-93.33437	8,000	1978	Metal
	Water Plant	Water Plant	7910 Highway 371	Coushatta	32.051304	-93.338211	8,000	1968	Wood
Hall Summit									
	Red River Parish Fire District 2	Fire Search and Rescue	Nearby: 1st Street	Hall Summit	32.16679398	-93.29642746	$8,700.00	1985	Metal
	Hall Summit Fire Department	Fire Search and Rescue	7100 Carter Avenue	Hall Summit	32.17569168	-93.30253183	$33,615.00	1980	Concrete
	Hall Summit Police Station	Law Enforcement	7100 Carter Avenue	Hall Summit	32.17568311	-93.30242618	$33,615.00	1980	Concrete
	Hall Summit City Hall	Civil Government	7100 Carter Avenue	Hall Summit	32.17568311	-93.30239335	$33,615.00	1980	Concrete
Martin									
	Martin Village Hall	Civil Government	LA 507	Martin	32.09460183	-93.2218393	$44,280.00	1975	Concrete

Vulnerable Populations

Vulnerable Populations Worksheet					
Red River Parish					
Name	**Street**	**City**	**Zip Code**	**Latitude**	**Longitude**
All Hospitals (Private or Public)					
Christus Coushatta Health Hospital	1635 Marvel Street	Coushatta	71019		
Fresenius Kidney Care Clinic	501 Wilkinson Street	Coushatta	71019		
Specialty Rehab Hospital	1107 Ringgold Avenue	Coushatta	71019		
Christus Coushatta Health	1626 Ringgold Avenue	Coushatta	71019		
Nursing Homes (Private or Public)					
Green Meadows Haven Nursing Home	Nearby: 1110 Shreveport Rd.	Coushatta	71019	32.02877538	-93.34050426
Mobile Home Parks					
Los Dorado Inc. RV Park	Nearby: 2117-2169 LA 480	Coushatta	71019	32.01170763	-93.33859617
In Town RV Park	1414 Ringgold Avenue	Coushatta	71019	32.0258077	-93.34101077
Evelyn's Trailer Park	Nearby: Louisiana 514	Ringgold	71068	32.18015932	-93.39775481
Village RV Park	Nearby: Par Road 437	Hall Summit	71034	32.16686734	-93.29804171
unknown	Nearby: Louisiana 174	Coushatta	71019	31.90704947	-93.33004402
Rolling Hills Mobile Home Park					
Grand Bayou Resort RV Park					
HID	Duke Avenue				
W&H	Duke Avenue				
Dunn?	Duke Avenue				

National Flood Insurance Program (NFIP)

Red River Parish

ELEMENT F: STATE REQUIREMENT National Flood Insurance Program (NFIP)					
	Red River Parish	**Coushatta**	**Edgefield**	**Hall Summit**	**Martin**
Insurance Summary					
How many NFIP polices are in the community? What is the total premium and coverage?	37, $32,963 Premium, $5,284,800 Coverage	9, $21,078 Premium, $3,694,700 Coverage	None	None	None
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	7, $59,106, Unknown	1, $104,130, Unknown	None	None	None
How many structures are exposed to flood risk with in the community?	37	9	0	0	0
Describe any areas of flood risk with limited NFIP policy coverage.	None Known	None Known	None Known	None Known	None Known
Staff Resources					
Is the Community FPA or NFIP Coordinator certified?	Yes	No	No	Do not have	N/A
Is flood plain management an auxiliary function?	Yes	Yes	Yes	Do not have	N/A
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Permits, outreach	Permits and outreach	Permits and outreach	Do not have	N/A
What are the barriers to running an effective NFIP program in the community, if any?	Funding and staff	Funding and staff	Funding and staff	N/A	N/A
Compliance History					
Is the community in good standing with the NFIP?	Yes	Yes	Not in NFIP	Not in NFIP	Yes
Are there any outstanding compliance issues (i.e., current violations)?	None Known	None Known	No	No	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	Unknown	Unknown	Unknown	Unknown	Unknown
Is a CAV or CAC scheduled or needed? If so when?	No	No	No	No	No
Regulation					
When did the community enter the NFIP?	5/15/1985	7/2/1981	Not in NFIP	Not in NFIP	7/2/1981
Are the FIRMs digital or paper?	Paper	Paper	None	None	Paper
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Meets Minimum	Meets Minimum	N/A	N/A	Meets Minimum
Community Rating System (CRS)					
Does the community participate in CRS?	No	No	No	No	No
What is the community's CRS Class Ranking?	N/A	N/A	N/A	N/A	N/A
Does the plan include CRS planning requirements?	N/A	N/A	N/A	N/A	N/A