BOSSIER

PARISH HAZARD MITIGATION UPDATE – 2016

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BOSSIER PARISH

HAZARD MITIGATION PLAN UPDATE

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Bossier Parish

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ACKNOWLEDGMENTS

This 2016 Bossier Parish Hazard Mitigation Plan Update was coordinated by the Bossier 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:

Unincorporated Bossier Parish
Town of Benton
City of Bossier City
Town of Haughton
Town of Plain Dealing

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

Lorenzo James Walker	Mayor of Bossier City	City of Bossier
Ollie Tyler	Mayor of Shreveport	City of Shreveport
Wayne Cathcart	Mayor of Benton	Town of Benton
Carlton Anderson	Mayor of Haughton	Town of Haughton
Wiley Robinson	Mayor of Plain Dealing	Town of Plain Dealing
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The 2016 Bossier Parish Hazard Mitigation Plan Update was written by the Stephenson Disaster Management Institute, Louisiana State University. Further comments should be directed to the Bossier Parish Office of Homeland Security and Emergency Preparedness: 1511 Doctors Drive, Bossier City, LA 71111.

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

- Unincorporated Bossier Parish
- Town of Benton
- City of Bossier City
- Town of Haughton
- Town of Plain Dealing

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 Bossier 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

Bossier Parish is located in northwest Louisiana, and Bossier City is approximately 125 miles northwest of the City of Alexandria. Bossier Parish is adjacent to Red River Parish to the south, Webster and Bienville Parishes to the east, and Caddo Parish to the west. The Red River forms the border with Caddo Parish. Bossier Parish shares its northern border with the State of Arkansas. The Town of Benton is the Parish seat.

The topography of Bossier Parish consists of wooded areas, rolling hills, and open farmland. Some of the land around Bossier City is urban or suburban. The Red River forms the western border of the parish and is complemented by other bayous and lakes including Bodcau, Caney, Clarke, Cypress, and Red Chute Bayous; Cypress Bayou Reservoir; and Lake Bistineau. North Bossier boasts the mountain range referred to by geologists as the Ozark Spur.

Figure 1-1: Location of Bossier Parish within the State of Louisiana

The main transportation arteries through Bossier Parish are Interstates I-20 and I-220; U.S. Highways 71, 79, and 80; and State Highways 2 and 3. I-20 is the primary road traveling east-west in the Parish. It is paralleled by U.S. Highway 80. State Highway 2 and many secondary state and parish roads also travel east-west. I-220 splits off I-20 to the north and circles around Bossier City, merging with I-20 again west of Shreveport in Caddo Parish. Some of these roadways are significant evacuation routes for Bossier Parish, as well as surrounding parishes during states of emergency.

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

As noted above, Bossier Parish is located in the northwest region of Louisiana.

Figure 1-2: Louisiana Homeland Security Regions

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

	2010 Census	2014 Census	Current Year (If Available)	Percent Change 2010 - 2014
Total Population	116,979	125,064	____	6.90%
Population Density (Pop/Sq. Mi.)	139.3	____	____	____
Total Households	49,351	54,045	____	____

Economy

The Bossier Parish economy shares many similarities to its immediate neighbor to the west, Caddo Parish. Both were initially majors players in the steamboat commerce, and both also reaped the benefits from a boom in the oil and gas industry during the 1980's, and again later with the discovery of the Haynesville Shale. The major differentiating factor is that Bossier Parish is the home to Barksdale Air Force Base, the largest

employer in the parish. Employing more than 10,000 people, Barksdale generates an annual economic impact of $753.8 million for the economy of Bossier Parish and surrounding communities.

Another major recent contributor to the Bossier Parish economy is the gaming industry. Bossier Parish is currently home to four casinos: Harrah's Horseshoe Casino and Hotel, Diamond Jacks Casino and Hotel, Boomtown Casino Hotel, and Margaritaville Resort Casino. These casinos led to an increase in tourism, along with the development and construction of the Louisiana Boardwalk along the banks for the Red River. These investments in the social and entertainment aspects of the economy have contributed to Bossier Parish becoming a tourist destination. Industry data for business patterns in Bossier Parish can be found in the table below:

Table 1-2: Business Patterns in Bossier 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	6,921	457	169,954
Manufacturing	1,660	65	71,391
Health Care and Social Assistance	4,101	217	153,543
Mining, Quarrying, Oil and Gas Extraction	1,175	61	85,679
Transportation and Warehousing	1,296	96	56,580
Construction	2,011	226	80,126
Administration and Support and Waste Management and Remediation Services	1,645	112	44,763
Real Estate and Rental and Leasing	644	111	20,322
Wholesale Trade	1,768	129	90,877
Other Services (except Public Administration)	1,847	210	53,888
Accommodation and Food Services	7,813	254	159,427
Financial and Insurance	1,080	164	46,313
Professional, Scientific, and Technical Services	1,047	203	49,850
Information	938	23	30,818
Educational Services	285	26	6,102
Arts, Entertainment, and Recreation	1,128	40	15,978
Management of Companies and Enterprises	496	9	20,483
Agriculture, Forestry, Fishing and Hunting	133	8	3,651
Utilities	20-99	5	___

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 Bossier 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 Bossier 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 Bossier 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 Bossier Hazard Mitigation Plan were as follows:

- Section One Introduction
- Section Two Parish Profile
- Section Three Planning Process
- Section Four Risk Assessment
- Section Five Mitigation Strategy
- Section Six Plan Maintenance
- Section Seven Action Plan
- Tables
- Figures
- 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 Bossier 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 Bossier Parish Hazard Mitigation Plan. The current goals are as follows:

- Enhance and develop emergency services, including response
- Protect lives and property from the dangers of natural hazards

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: Introduction	Section 1: Introduction
Section 2: Parish Profile	Section 1: Introduction
Section 3: Planning Process	Appendix A: Planning Process
Section 4: Risk Assessment	Section 2: Hazard Identification and Risk Assessment, Section 3: Capability Assessment
Section 5: Mitigation Strategy	Section 4: Mitigation Strategy
Section 6: Plan Maintenance	Appendix B: Plan Maintenance
Section 7: Action Plan	Section 4: Mitigation Strategy
Appendices	Appendices A, B, C, D, E

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 Bossier Parish and its municipalities. The extent of this risk is dictated primarily by its geographic location. Most significantly, Bossier 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.

2. Hazard Identification and Parish-Wide Risk Assessment

This section assesses the various hazard risks that Bossier 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 Bossier 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			
Drought	X		X
Earthquakes	X		*
Expansive Soils			
Fog			
Flooding	X	X	X
Extreme Heat	*		
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, their occurrence was not merited for further study by the planning committee. The determination was made to focus attention and resources on the most prevalent hazards, which include the hazards previously profiled, along with dam and levee failure. Earthquake hazards were discounted since the hazard has no impact on the parish, and dam and levee failures claim a data deficiency.

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

a) Drought
b) Extreme Heat
c) Flooding (backwater, riverine, localized stormwater event)
d) Thunderstorms (hail, lightning, wind)
e) Tornadoes
f) Tropical Cyclones (flooding and high winds)
g) Wildfires
h) Winter Storms
i) Dam Failure
j) 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. Eleven of sixteen Presidential Declarations Bossier Parish has received resulted from either tropical cyclones (6 declarations) or flooding (5 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 Bossier Parish is included in the hurricane risk assessment.

Bossier Parish is also susceptible to tornadoes. Tornadoes can spawn from tropical cyclones or severe weather systems that pass through Bossier 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 Bossier Parish since 1965. Information includes names, dates, and types of disaster.

Table 2-2: Bossier Parish Major Disaster Declarations

Disaster Declaration Number	Date	Type of Disaster
3031	2/22/1977	Drought and Freezing
567	12/6/1978	Severe Storms and Tornadoes
835	7/17/1978	Tropical Cyclone - Tropical Storm Allison
902	4/23/1991	Severe Storms and Flooding
904	5/3/1991	Severe Storms, Tornadoes, and Flooding
1012	2/28/1994	Severe Winter Ice Storm
1269	4/9/1999	Severe Storms, Tornadoes, and Flooding
1357	1/12/2001	Severe Winter Ice Storm
3172	2/1/2003	Loss of Space Shuttle Columbia
1548	9/15/2004	Tropical Cyclone – Hurricane Ivan
1603	8/29/2005	Tropical Cyclone – Hurricane Katrina
1607	9/24/2005	Tropical Cyclone – Hurricane Rita
1786	9/2/2008	Tropical Cyclone – Hurricane Gustav
1863	12/10/2009	Severe Storms, Tornadoes, and Flooding
4080	8/29/2012	Tropical Cyclone – Hurricane Isaac
4228	7/13/2015	Severe Storms and Flooding

Probability of Future Hazard Events

The probability of a hazard event occurring in Bossier 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				
	Bossier Parish (Unincorporated)	Benton	Bossier City	Haughton	Plain Dealing
Drought	8%	8%	8%	8%	8%
Earthquake	< 1%	< 1%	< 1%	< 1%	< 1%
Extreme Heat	64%	64%	64%	64%	64%
Flooding	100%	72%	100%	56%	64%
Thunderstorms (Hail)	100%	100%	100%	100%	100%
Thunderstorms (Lightning)	72%	72%	72%	72%	72%
Thunderstorms (Wind)	100%	100%	100%	100%	100%
Tornadoes	84%	84%	84%	84%	84%
Tropical Cyclones	12%	12%	12%	12%	12%
Wildfires	< 1%	< 1%	< 1%	< 1%	< 1%
Winter Storms	28%	28%	28%	28%	28%
Dam Failure	< 1%	< 1%	< 1%	< 1%	< 1%
Levee Failure	< 1%	< 1%	< 1%	< 1%	< 1%

As shown in *Table 2-3*, flooding events for unincorporated Bossier Parish and Bossier City; and hailstorms and high winds for the entire planning area, have the highest annual chance of occurrence in the parish (100%). Flood events in the remaining incorporated areas have a slightly lower chance of occurring annually. Tornadoes have an 84% annual chance of reoccurrence, followed by lightning (72%), extreme heat (64%), and winter storms (28%). Tropical cyclones (12%), drought (8%), and wildfires (<1%) have the lowest annual chance of occurrence in Bossier Parish. Earthquakes were discounted since the annual chance of occurrence was calculated at less than 1% and they have no impact on the parish. 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 $18,495,457,000 in structures throughout the parish. The table on the following page provide the total estimated value for each type of structure by occupancy.

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

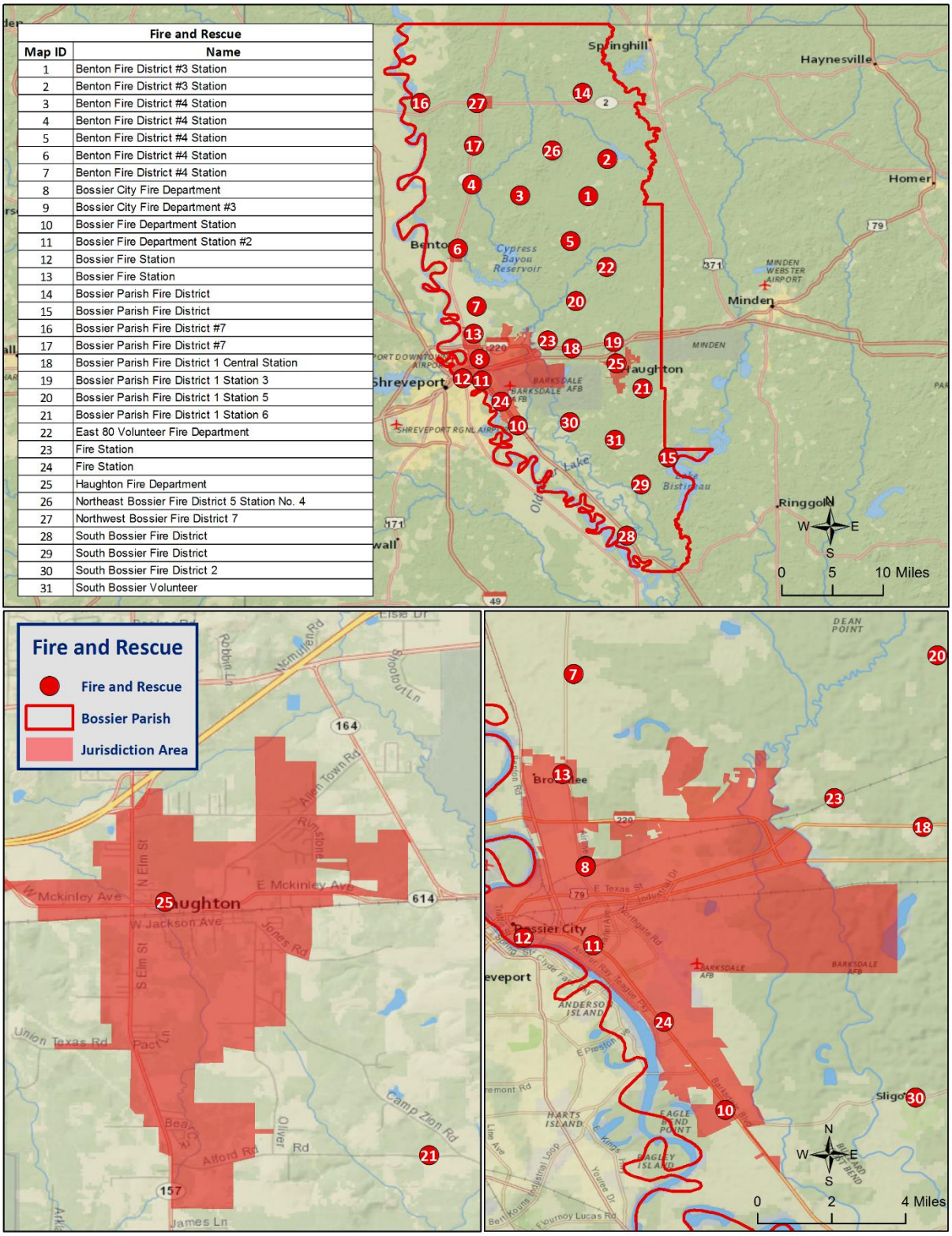
Occupancy	Bossier Parish	Unincorporated Bossier	Benton
Agricultural	$47,698,000	$26,356,000	$1,762,000
Commercial	$2,624,971,000	$545,609,000	$36,438,000
Government	$199,882,000	$12,850,000	$57,557,000
Industrial	$621,855,000	$241,619,000	$4,526,000
Religion	$354,110,000	$132,884,000	$8,710,000
Residential	$14,555,279,000	$5,841,090,000	$192,479,000
Education	$91,662,000	$29,047,000	$2,746,000
Total	$18,495,457,000	$6,829,455,000	$304,218,000

Table 2-4: Estimated Total of Potential Losses throughout Bossier Parish (Continued)

Occupancy	Bossier City	Haughton	Plain Dealing
Agricultural	$16,986,000	$918,000	$1,676,000
Commercial	$1,992,751,000	$19,244,000	$30,929,000
Government	$125,794,000	$2,013,000	$1,668,000
Industrial	$369,678,000	$3,051,000	$2,981,000
Religion	$198,478,000	$8,310,000	$5,728,000
Residential	$8,169,042,000	$262,440,000	$90,228,000
Education	$47,999,000	$5,188,000	$6,682,000
Total	$10,920,728,000	$301,164,000	$139,892,000

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	Benton Fire District #3 Station
2	Benton Fire District #3 Station
3	Benton Fire District #4 Station
4	Benton Fire District #4 Station
5	Benton Fire District #4 Station
6	Benton Fire District #4 Station
7	Benton Fire District #4 Station
8	Bossier City Fire Department
9	Bossier City Fire Department #3
10	Bossier Fire Department Station
11	Bossier Fire Department Station #2
12	Bossier Fire Station
13	Bossier Fire Station
14	Bossier Parish Fire District
15	Bossier Parish Fire District
16	Bossier Parish Fire District #7
17	Bossier Parish Fire District #7
18	Bossier Parish Fire District 1 Central Station
19	Bossier Parish Fire District 1 Station 3
20	Bossier Parish Fire District 1 Station 5
21	Bossier Parish Fire District 1 Station 6
22	East 80 Volunteer Fire Department
23	Fire Station
24	Fire Station
25	Haughton Fire Department
26	Northeast Bossier Fire District 5 Station No. 4
27	Northwest Bossier Fire District 7
28	South Bossier Fire District
29	South Bossier Fire District
30	South Bossier Fire District 2
31	South Bossier Volunteer

Figure 2-1: Fire and Rescue Buildings in Bossier Parish

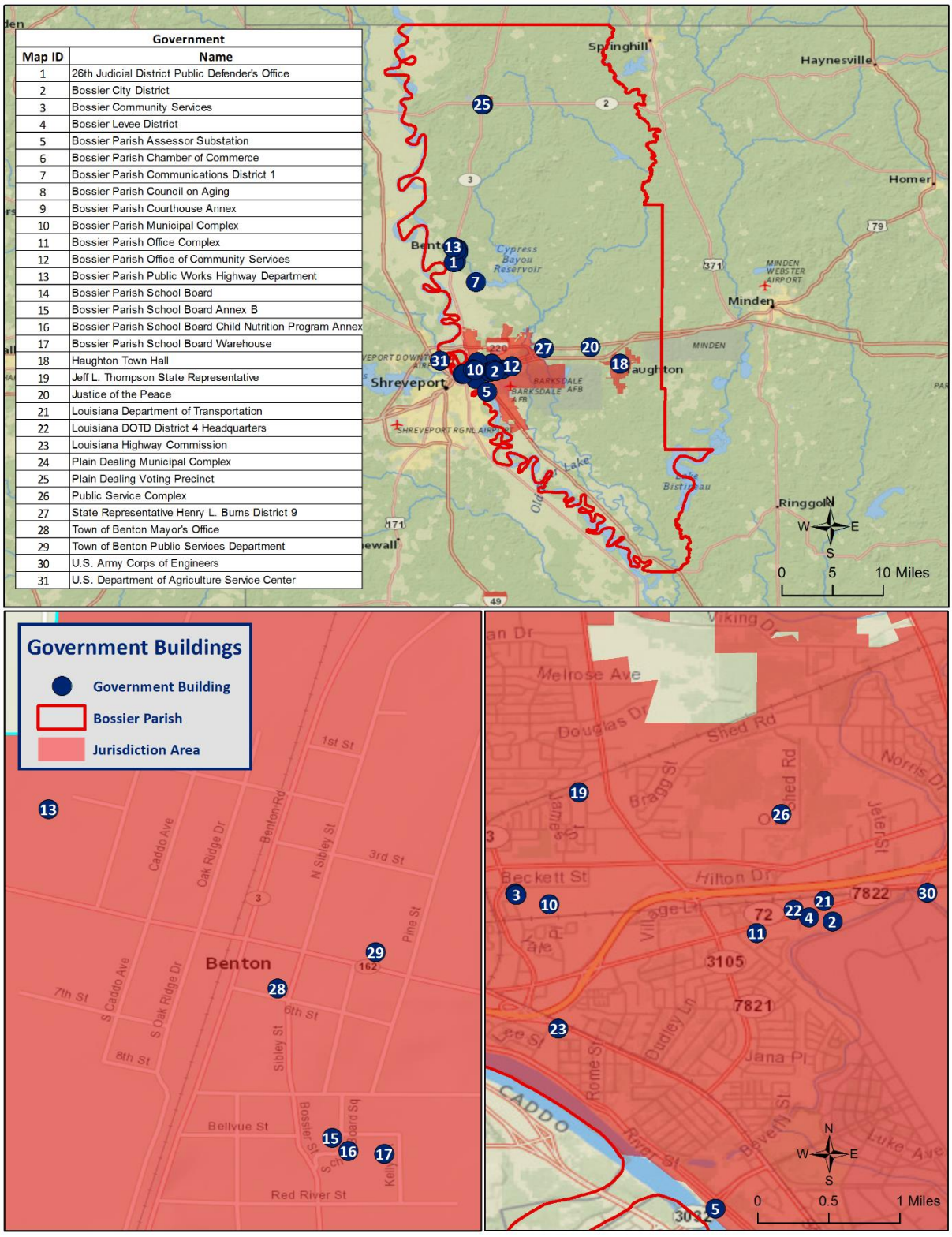


Figure 2-2: Government Buildings in Bossier Parish

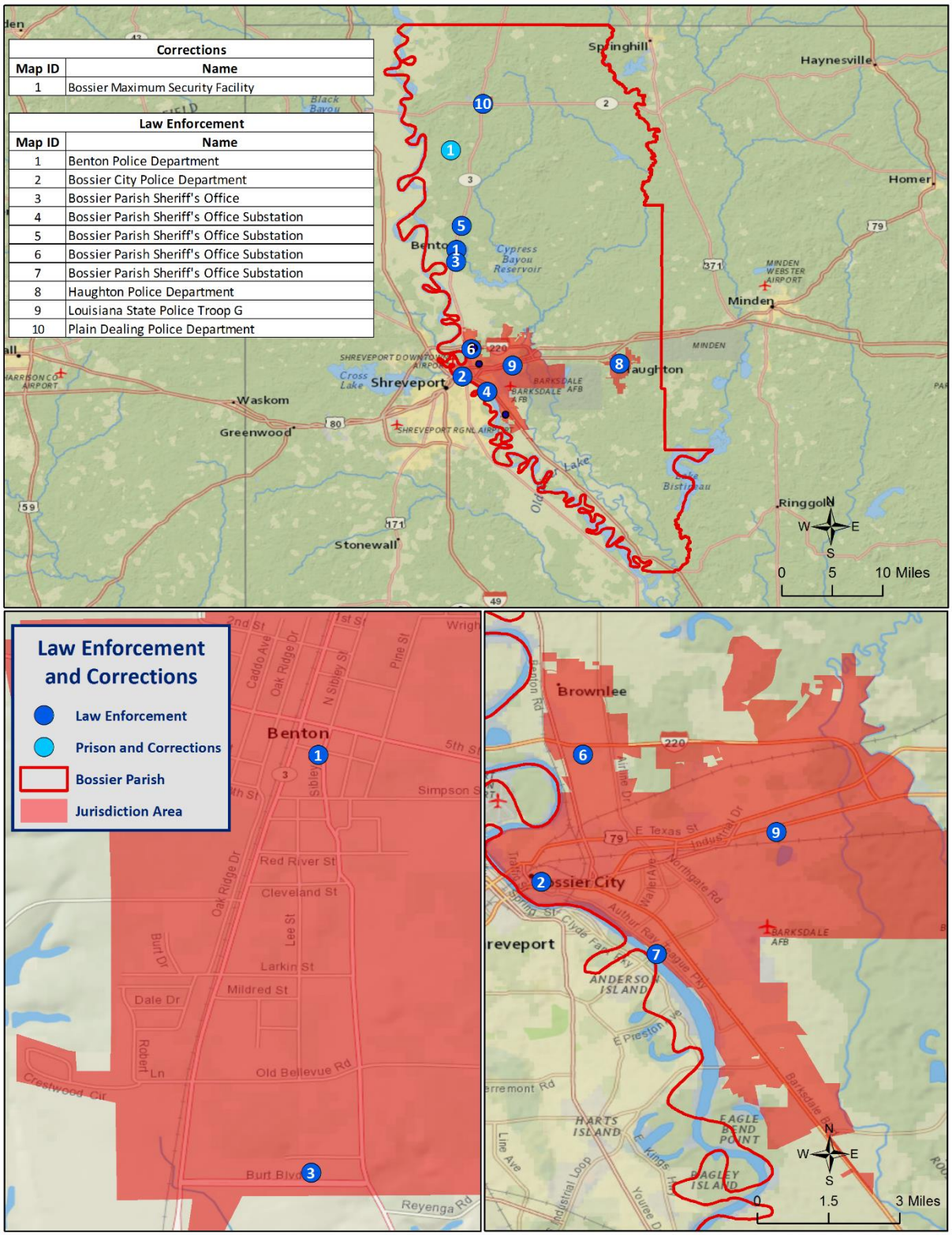


Figure 2-3: Law Enforcement and Correction Buildings in Bossier Parish

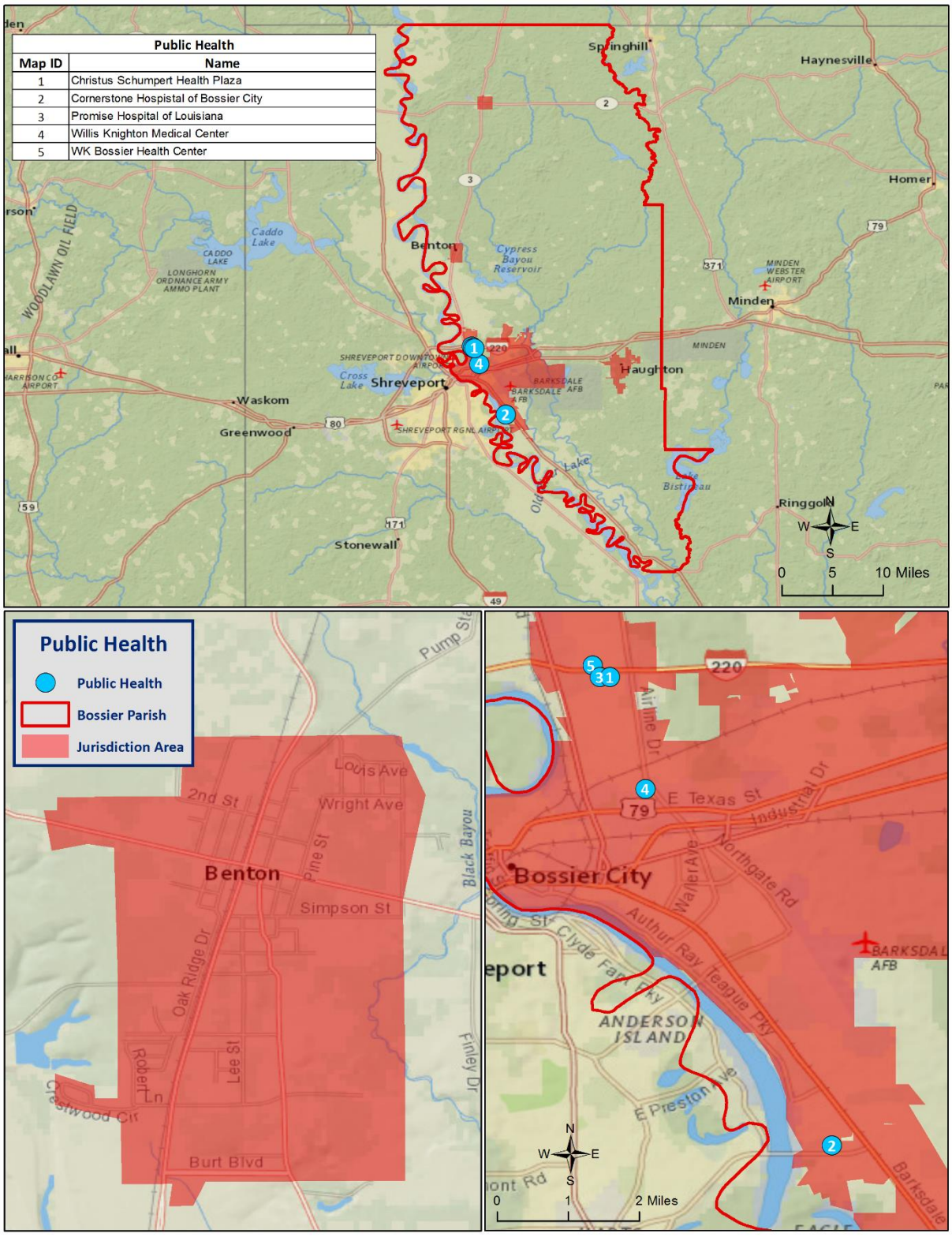


Figure 2-4: Public Health Buildings in Bossier Parish

Bossier Schools	
Map ID	Name
1	Airline High School
2	Bellaire Elementary School
3	Benton Elementary School
4	Benton High School
5	Benton Middle School
6	Bossier Elementary
7	Butler School
8	Carrie Martin Elementary
9	Central Park Elementary
10	Charlotte Mitchell Educational Center
11	Cope Middle School
12	Curtis Elementary
13	Elm Grove Elementary School
14	Elm Grove Middle School
15	Green Acres Middle
16	Haughton High School
17	Haughton Middle School
18	Legacy Elementary School
19	Meadowview Elementary
20	Parkway High School
21	Plain Dealing High School
22	Plantation Park School
23	Platt Elementary School
24	Princeton Elementary School
25	Providence Classical Academy
26	R.V. Kerr Elementary
27	Rusheon Middle School
28	Stockwell Place Elementary
29	T.D. Rodes Elementary School
30	Waller Elementary
31	WT Lewis Elementary

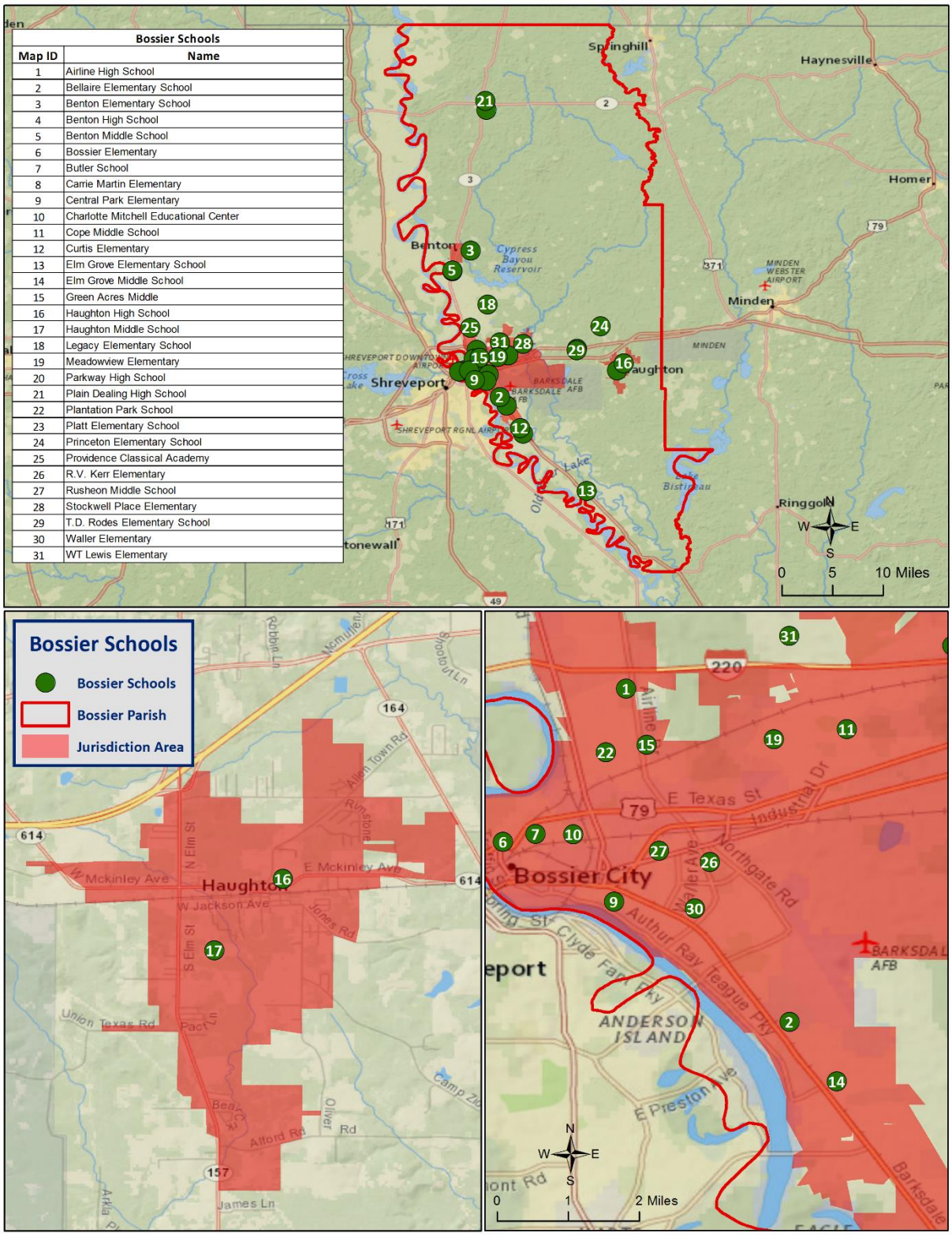


Figure 2-5: School Buildings in Bossier Parish

Future Development Trends

Bossier Parish experienced a growth in population and housing between the years of 2000 and 2014, growing from a population of 99,658 with 40,286 housing units in 2000 to a population of 121,918 with 51,705 housing units in 2014. This growth was largely in the unincorporated areas of Bossier Parish, and in the incorporated area of Haughton from the years 2000 to 2010, and in the incorporated area of Bossier City from 2010 to 2014. 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 Bossier Parish

Total Population	Bossier Parish	Bossier Parish (Unincorporated)	Benton	Bossier City	Haughton	Plain Dealing
1-Apr-00	99,658	37,432	2,042	56,128	2,973	1,083
1-Apr-10	117,522	49,479	1,957	61,597	3,470	1,019
1-Jul-14	121,918	50,780	1,878	64,895	3,458	907
Population Growth between 2000 – 2010	17.9%	32.2%	-4.2%	9.7%	16.7%	-5.9%
Average Annual Growth Rate between 2000 – 2010	1.8%	3.2%	-0.4%	1.0%	1.7%	-0.6%
Population Growth between 2010 – 2014	3.7%	2.6%	-4.0%	5.4%	-0.3%	-11.0%
Average Annual Growth Rate between 2010 – 2014	0.94%	0.66%	-1.01%	1.34%	-0.09%	-2.75%

Table 2-6: Housing Growth Rate for Bossier Parish

Total Housing Units	Bossier Parish	Bossier Parish (Unincorporated)	Benton	Bossier City	Haughton	Plain Dealing
1-Apr-00	40,286	14,762	834	23,027	1,169	494
1-Apr-10	49,351	21,004	856	25,579	1,417	495
1-Jul-14	51,705	21,485	785	27,536	1,398	501
Housing Growth between 2000 – 2010	22.5%	42.3%	2.6%	11.1%	21.2%	0.2%
Average Annual Growth Rate between 2000 – 2010	2.3%	4.2%	0.3%	1.1%	2.1%	0.0%
Housing Growth between 2010 – 2014	4.8%	2.3%	-8.3%	7.7%	-1.3%	1.2%
Average Annual Growth Rate between 2010 – 2014	1.2%	0.6%	-2.1%	1.9%	-0.3%	0.3%

As shown in the previous tables, Bossier Parish has experienced growth in both population and housing units. Housing growth rates grew at 2.3% annually from 2000 to 2010, and at 1.2% annually from 2010 to 2014. Population growth rates for the parish were slightly lower at 1.8% annually from 2000 to 2010, and 0.94% annually from 2010 to 2014. From 2000 to 2010, the unincorporated area of Bossier Parish had the largest

increase in population increasing by 32.2% overall, followed by the incorporated area of Haughton at 16.7%. The incorporated area of Plain Dealing had the largest decrease in population during this time period at -5.9%. From 2010 to 2014, Bossier City experienced the largest growth in population at 5.4%.

The unincorporated area of Bossier Parish experienced the largest increase in housing units from 2000 to 2010 at 42.3%, followed by the incorporated area of Haughton at 21.2%. From 2010 to 2014, the incorporated area of Bossier City experienced the largest increase in housing units at 7.7%, followed by the unincorporated area of Bossier Parish at 2.3%. The incorporated area of Benton experienced the only decline in housing units from 2010 to 2014 declining at a rate of -2.1% annually.

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 continue to grow slightly within Bossier 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	52,322	9,589	10,174	10,668
Value of Structures	$18,906,914,640	$3,464,950,427	$3,867,897,971	$4,223,742,142
# of People	123,058	22,552	23,626	24,523
Tropical Cyclones				
Structures	52,322	52,322	55,516	58,212
Value of Structures	$18,906,914,640	$18,906,914,640	$21,105,645,898	$23,047,351,991
# of People	123,058	123,058	128,921	133,811

Land Use

The Bossier Parish Land Use table is provided on the following page. Residential, commercial, and industrial areas account for only 9% of the parish's land use. Forest land is the largest category at 267,957 acres, accounting for 48% of parish land. At 130,991 acres, agricultural lands account for 24% of parish lands, while 80,950 acres of wetlands areas account for 15% of parish lands. The parish also consists of 21,266 acres of water areas, accounting for 4% of all parish lands.

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

Land Use	Acres	Percentage
Agricultural Land, Cropland, and Pasture	130,991	24%
Wetlands	80,950	15%
Forest Land (not including forested wetlands)	267,957	48%
Urban/Development	51,888	9%
Water	21,266	4%

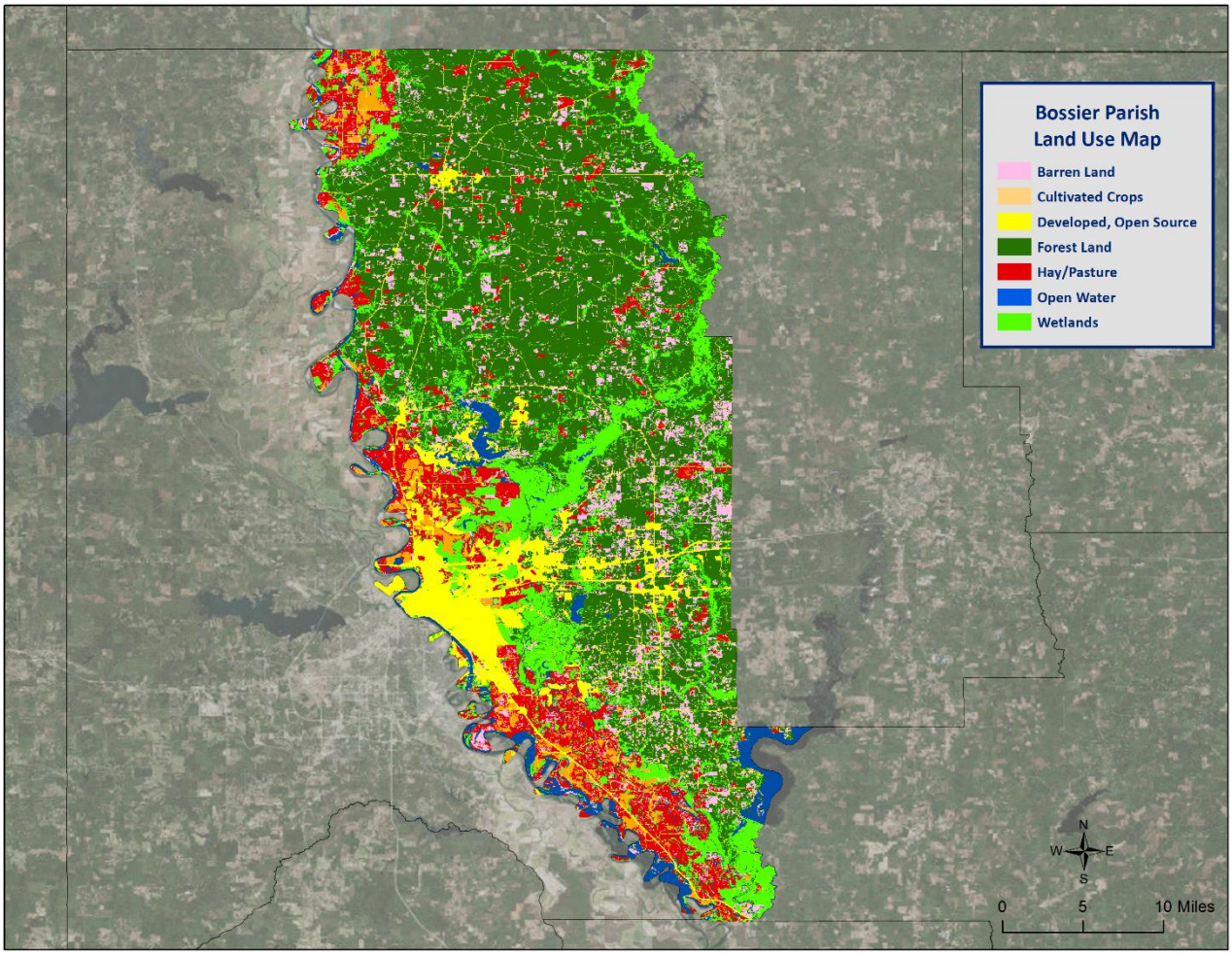


Figure 2-6: Bossier Parish Land Use Map
(Source: USGS Land Use Map)

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. *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 Bossier Parish at the time this plan went to publication (*Figure 2-7*).

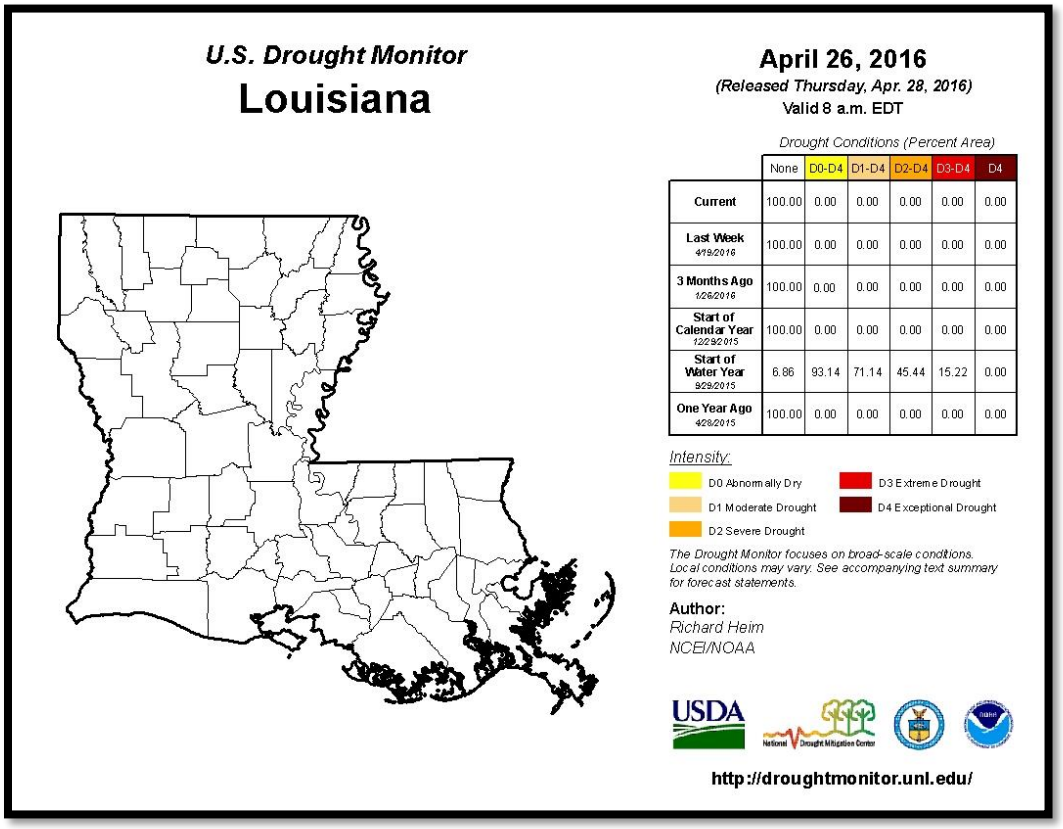


Figure 2-7: United States Drought Monitor for the State of Louisiana and its Parishes (Source: The National Drought Mitigation Center)

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 Bossier Parish is on the agricultural community.

Previous Occurrences / Extents

The SHELDUS database reports a total of two drought events occurring within the boundaries of Bossier 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 Bossier Parish. Based on previous occurrences, and in accordance with the Palmer Drought Index, the worst case scenario for drought in Bossier Parish would be a severe drought event.

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

Date	Crop Damage	Palmer Classification
May 1996	$1,508,834	Severe Drought
June 1998	$1,281,497	Severe Drought

Frequency / Probability

Based on previous occurrences of two drought events in 25 years, the probability of drought occurrence in the planning area in any given year is 8%.

Estimated Potential Losses

According to the SHELDUS database, there have been two drought events that have caused some level of crop damage. The total agricultural damage from these events is $2,790,331, with an average cost of $1,395,166 per drought event. When annualizing the total cost over the 25-year record, total annual losses based on drought is estimated to be $111,613. *Table 2-11* presents an analysis of agricultural exposure that is susceptible to drought by major crop type for Bossier Parish.

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

Agricultural Exposure by Type for Drought						
Forestry	Hay	Soybeans	Corn	Wheat	Cotton	Total
$19,761,039	$3,808,000	$3,659,305	$2,533,824	$905,281	$879,135	$31,546,584

There have been no reported injuries or deaths as a direct result to drought in Bossier 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.
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. Bossier Parish has one fault line running through the northwestern section of the parish (*Figure 2-8*). Effects of an earthquake may be felt throughout the parish.

Previous Occurrences / Extents

Both the SHELDUS and National Climatic Data Center report no earthquake events occurring within the boundaries of Bossier Parish between the years of 1990 to 2015. The National Oceanic and Atmospheric Administration's National Geophysical Data Center reports one earthquake event occurring within the boundaries of Bossier Parish between the years 1811 – 2014. *Table 2-13* summarizes the earthquake event that occurred within Bossier Parish. *Figure 2-8* displays the location and intensity of each earthquake event in Bossier Parish and surrounding parishes. Based on the previous earthquake event presented in the following table, an earthquake with an intensity level of MMI 4 could occur within the planning area. This intensity of an earthquake would be felt by many people indoors, but by a few who are outdoors.

Table 2-13: Summary of Earthquakes in Bossier Parish

Date	Location	Intensity (MMI)
May 19, 1957	Benton	4

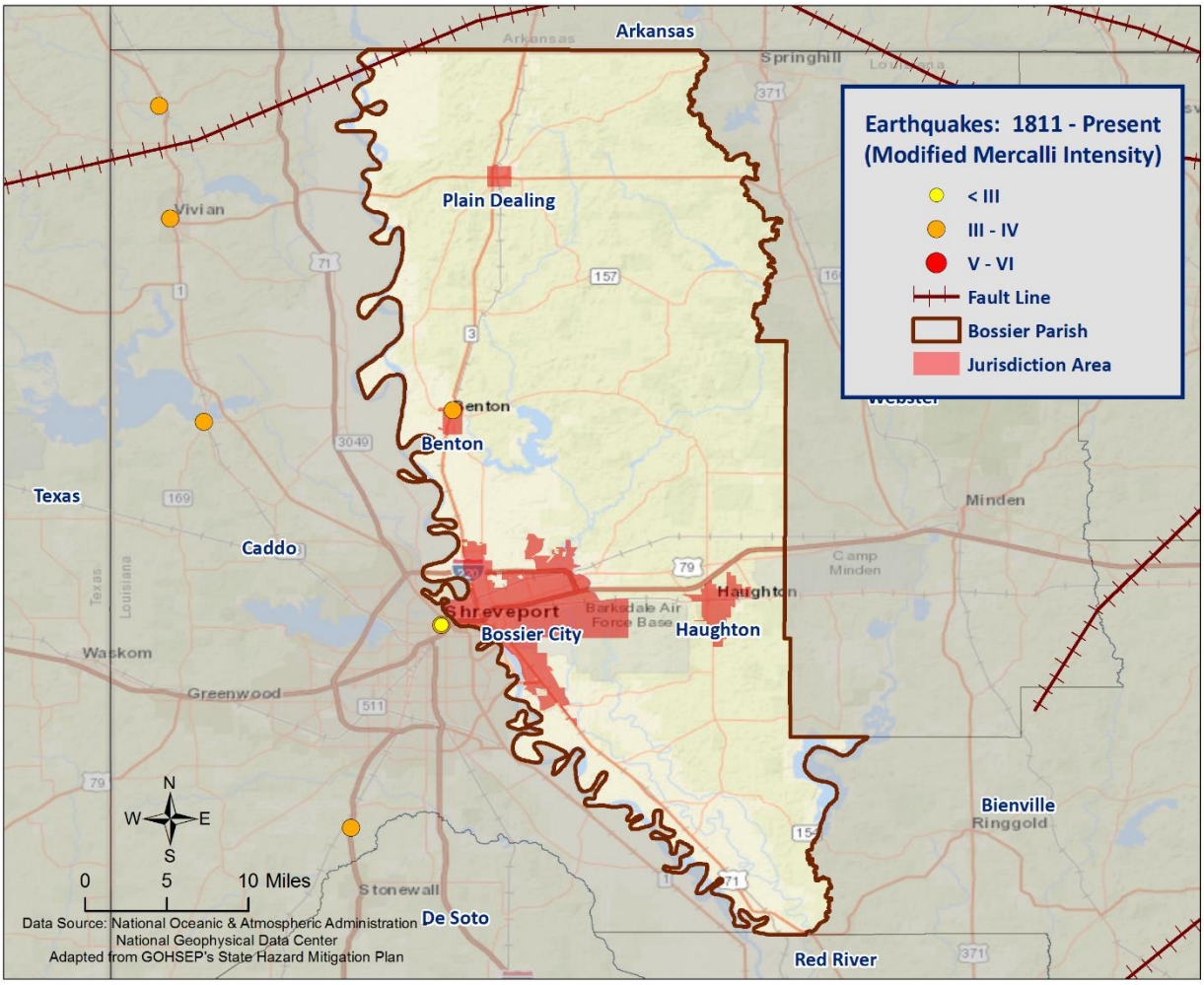


Figure 2-8: Location and Intensity (MMI) of Earthquakes in Bossier Parish

Frequency / Probability

Earthquakes are an extremely rare occurrence in the State of Louisiana and Bossier Parish, with one occurrence of an earthquake event within the boundaries of the parish from the years 1811 – 2014. Based on this historical record and Louisiana's State Hazard Mitigation Plan, it is determined that an earthquake event has less than a 1% annual chance of occurrence in the Bossier Parish planning area and they have no impact on the parish. As a result, earthquakes are discounted and not carried forward into risk assessment.

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 2-9*.

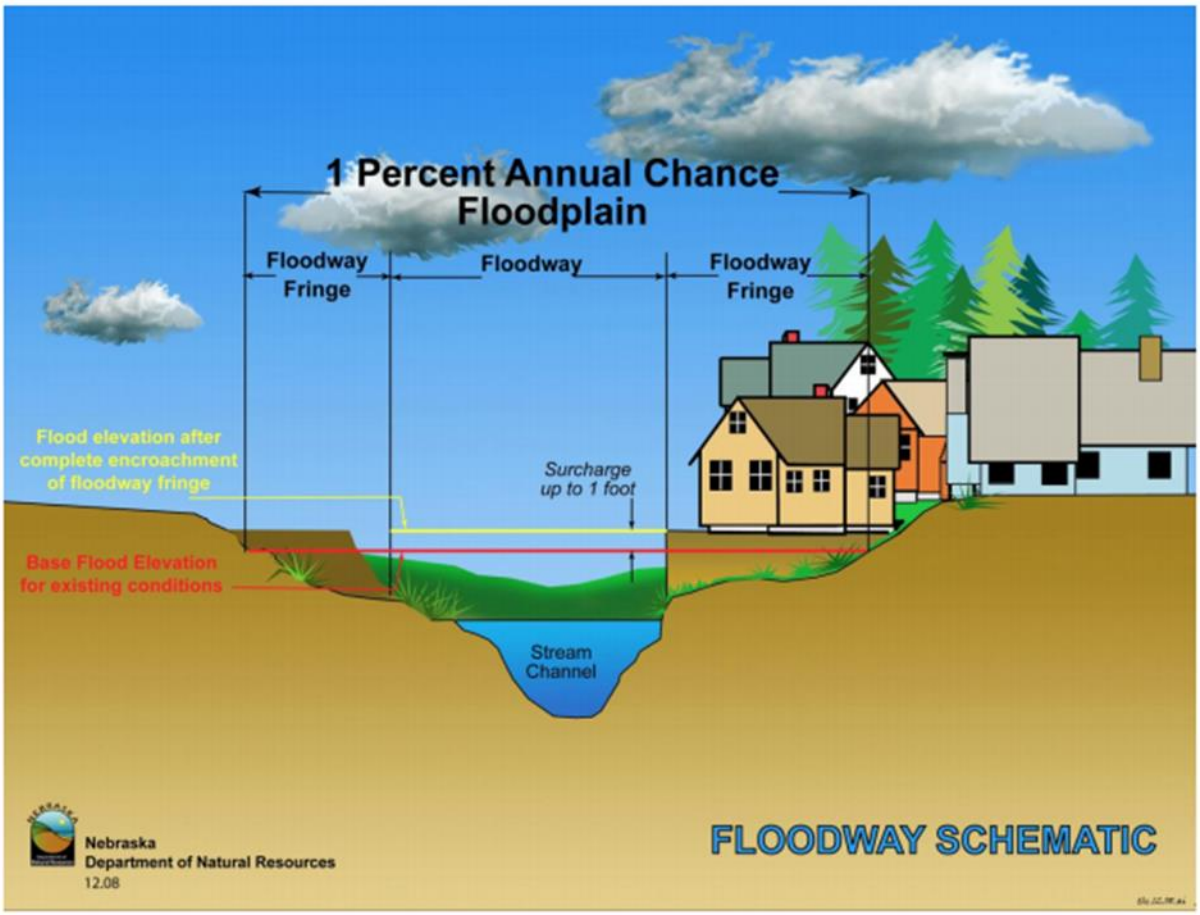


Figure 2-9: Schematic of 100-Year Floodplain. The Special Flood Hazard Area (SFHA) extends to the end of the floodway fringe.
(Source: Nebraska Department of Natural Resources)

A SFHA is the land area covered by the floodwaters of the base flood (red line in *Figure 2-9*), 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.

Figures regarding repetitive loss structures for Bossier Parish are provided in the table below:

Table 2-14: Repetitive Loss Structures for Bossier Parish

Jurisdiction	Number of Structures	Residential	Commercial	Government	Total Claims	Total Claims Paid	Average Claim Paid
Bossier Parish (Unincorporated)	207	191	16	0	636	$13,425,171	$21,109
Benton	0	0	0	0	0	$0	$0
Bossier City	22	19	3	0	64	$1,085,646	$16,963
Haughton	5	5	0	0	11	$412,125	$37,466
Plain Dealing	2	2	0	0	4	$62,361	$15,590
Total	236	217	19	0	715	$14,985,303	$20,958

Of the 236 repetitive loss structures, 73 were able to be geocoded in order to provide an overview of where the repetitive loss structures were located throughout the parish. *Figure 2-10* shows the approximate location of the 73 structures, while *Figure 2-11* shows where the highest concentration of repetitive loss structures are located. Through the repetitive loss map, it is clear that the primary concentrated area of repetitive loss structures is focused in and around the incorporated area of Bossier City.

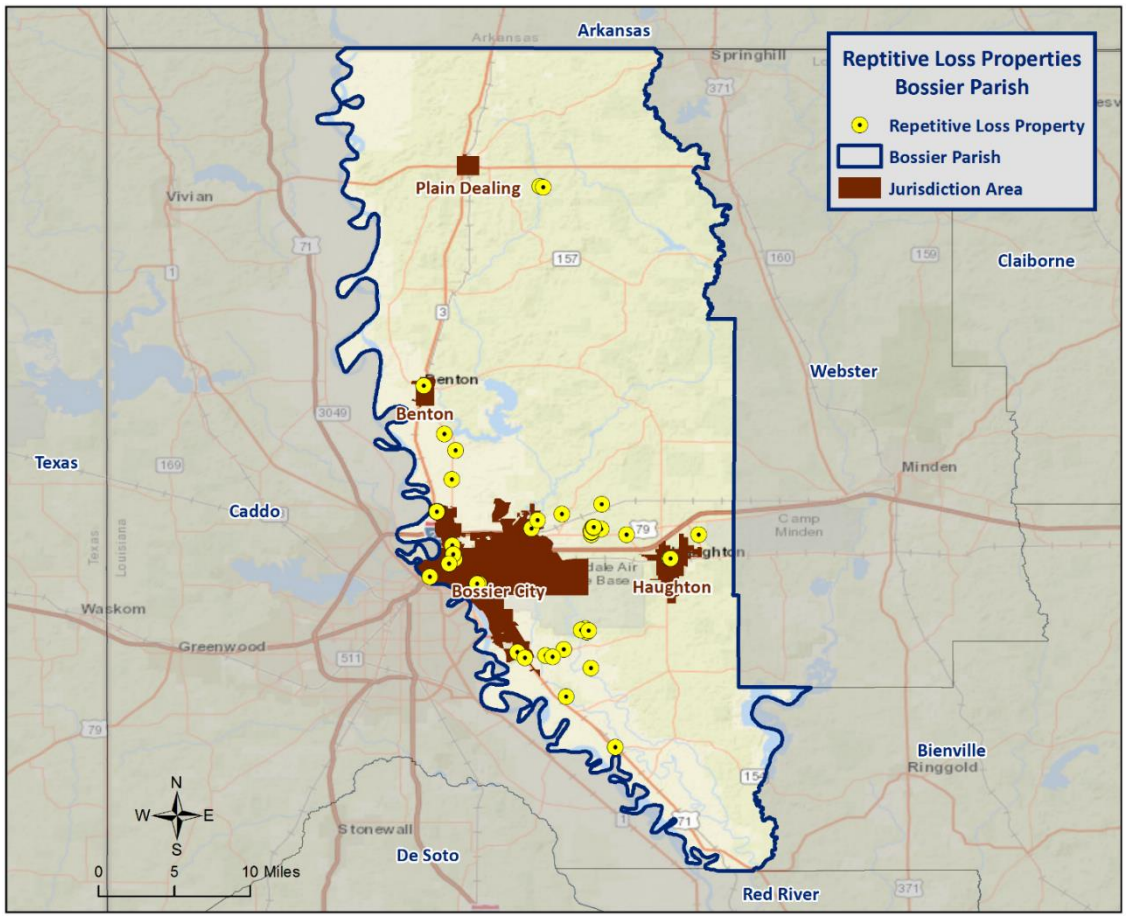


Figure 2-10: Repetitive Loss Properties in Bossier Parish

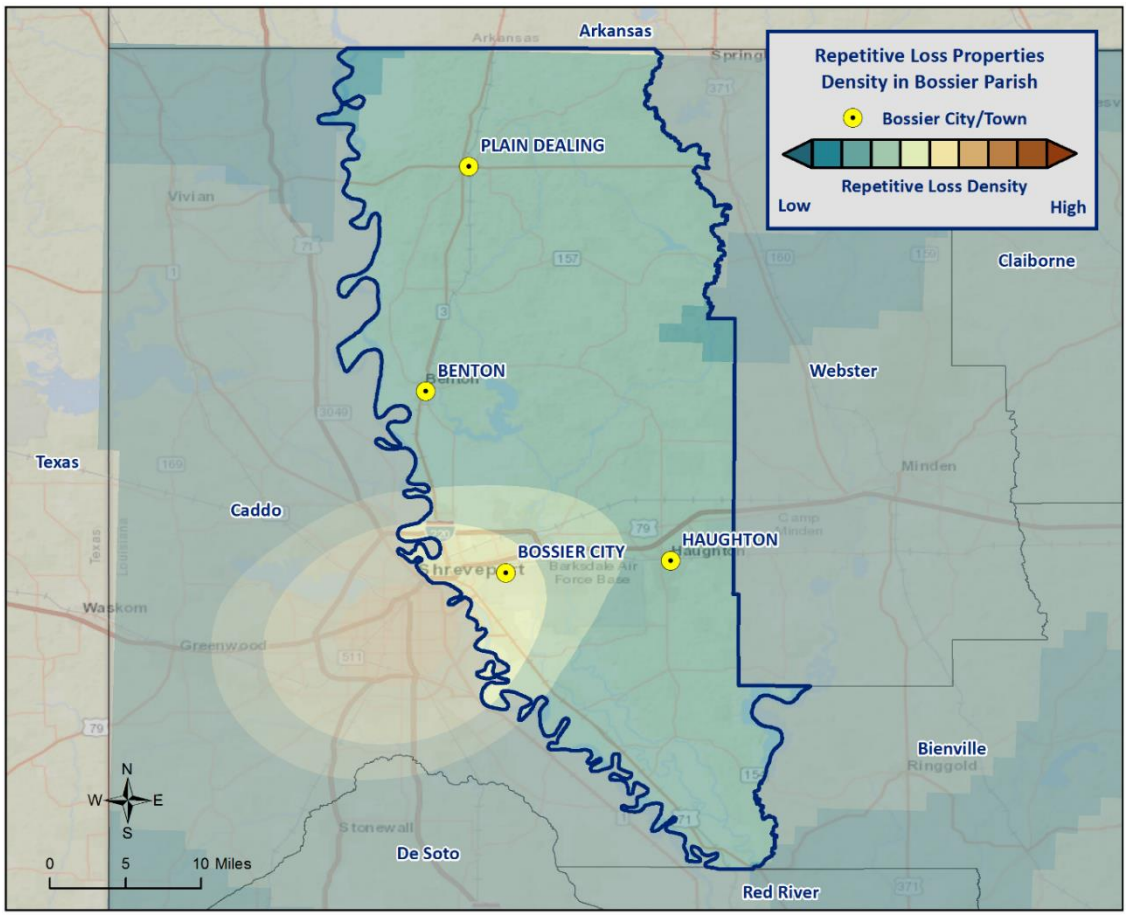


Figure 2-11: Repetitive Loss Property Densities in Bossier Parish

National Flood Insurance Program

Flood insurance statistics indicate that Bossier Parish has 4,874 flood insurance policies with the NFIP, with total annual premiums of $3,297,894. Bossier Parish and the incorporated areas of Benton, Bossier City, Haughton, and Plain Dealing are all participants in the NFIP. Bossier 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 Bossier Parish are provided in the tables to follow.

Bossier 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 community floodplain managers for the jurisdictions of Benton, Bossier City, Haughton, and Plain Dealing will continue to seek and attend floodplain management and NFIP continuing education.

Table 2-15: Summary of NFIP Policies for Bossier Parish

Location	No. of Insured Structures	Total Insurance Coverage Value	Annual Premiums Paid	No. of Insurance Claims Filed Since 1978	Total Loss Payments
Bossier Parish (Unincorporated)	1,844	$473,102,400	$1,191,388	350	$8,550,882
Benton	4	$927,000	$2,166	1	$714
Bossier City	2,960	$674,523,300	$2,057,551	305	$3,065,453
Haughton	46	$10,000,600	$17,488	34	$792,537
Plain Dealing	20	$3,865,800	$29,301	8	$96,894
Total	4,874	$1,162,419,100	$3,297,894	698	$12,506,480

Table 2-16: Summary of Community Flood Maps for Bossier Parish

CID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Date Joined the NFIP	Tribal
220032#	Benton	6/14/1974	7/26/1977	3/19/2013 (M)	7/26/1977	No
220033#	Bossier City	6/27/1974	4/4/1983	3/19/2013	4/4/1983	No
220031#	Bossier Parish*	9/6/1977	4/18/1983	3/19/2013	4/18/1983	No
220034#	Haughton	6/28/1974	9/30/1981	9/26/2008	9/30/1981	No
220035#	Plain Dealing	6/15/1974	4/15/1981	9/26/2008	4/15/1981	No

*Denotes the unincorporated areas of the parish

According to the Community Rating System (CRS) list of eligible communities dated June 1, 2014, Bossier City participates in the CRS, while the unincorporated area of Bossier Parish and the incorporated areas of Benton, Haughton, and Plain Dealing do not participate.

Table 2-17: List of Areas within Bossier Parish that Participate in the Community Rating System

Community Number	Name	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA	Status
220033	Bossier City	10/1/1992	5/1/2008	8	10	5	C

Threat to People

Just as with property damage, depth and velocity are major factors in determining the threat posed to people by flooding. It takes very little depth or velocity for flood waters to become dangerous. A car will float in less than 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 Bossier 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 Bossier 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.

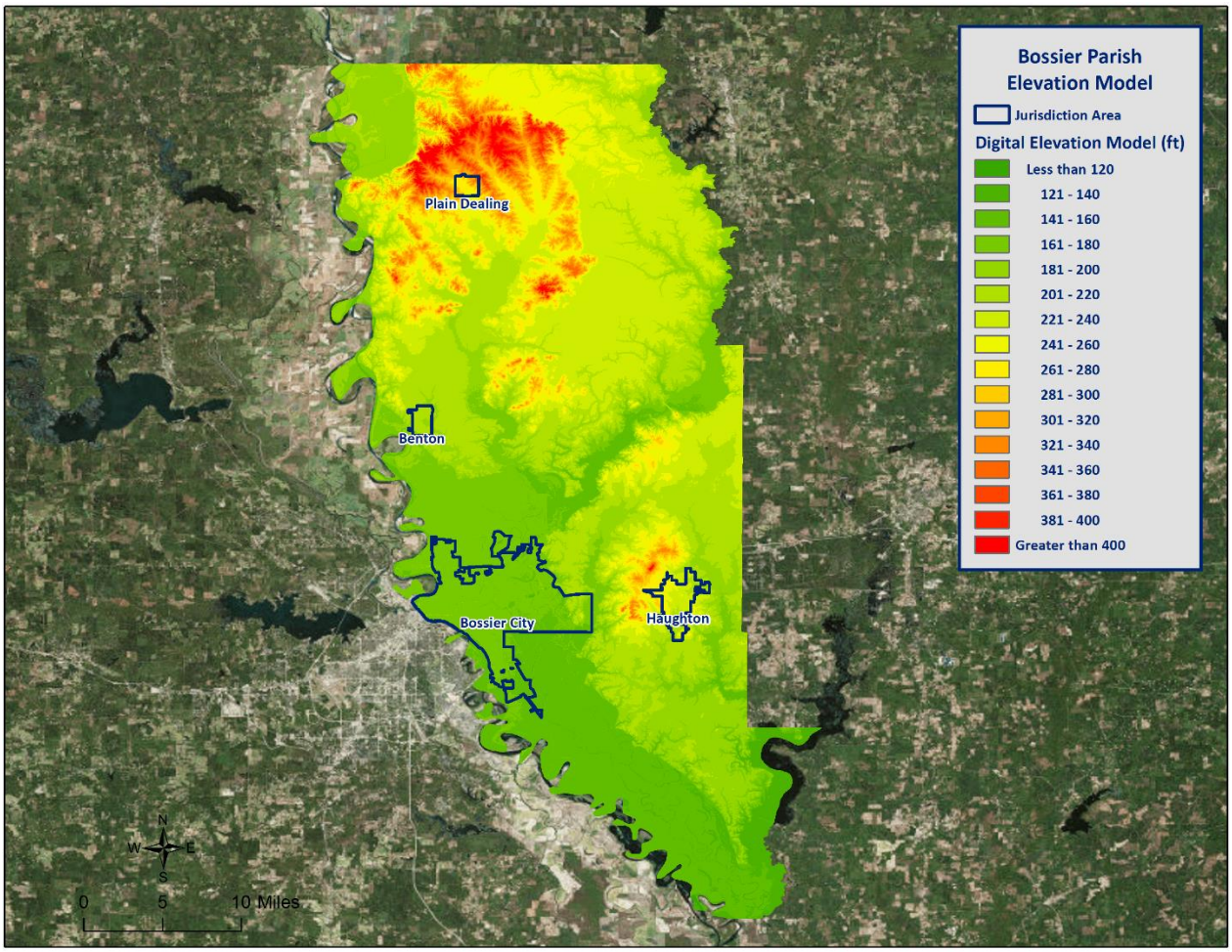


Figure 2-12: Elevation throughout Bossier Parish

Looking at the digital elevation model (DEM) in the figure above for Bossier Parish is instructive in visualizing where the low lying and high risk areas are for the parish. Elevations in the parish range from less than 120 feet to over 400 feet. The highest elevations in the parish are approximately 400 feet, located in northern section of the parish. The incorporated areas range in elevation from 174 to 266 feet, with Bossier City averaging 174 feet, Benton averaging 207 feet, Haughton averaging 239 feet, and Plain Dealing averaging 266 feet.

Location

Bossier Parish has experienced significant flooding in its history and can expect more in the future. Bossier Parish is located in the northwest corner of Louisiana, across the Red River from Shreveport, Louisiana. The historic channel of the Red River forms most of the western and southern limits of the Parish. The eastern boundary is formed in part by Bayou Bodcau, Lake Bistineau, and Loggy Bayou. Heavy rains and rising water levels, made worse in some areas by poor drainage due to urbanization, have caused flooding in many areas of the City of Bossier City, and in the communities of Benton, Haughton, and Plain Dealing, as well as the unincorporated areas of the parish, particularly in southern Bossier Parish, and around the shores of Lake Bistineau and other lakes in the parish. Flooding has occurred along major transportation routes including U.S. and State Highways, and numerous local streets and roads in and around Bossier City and other incorporated communities.

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

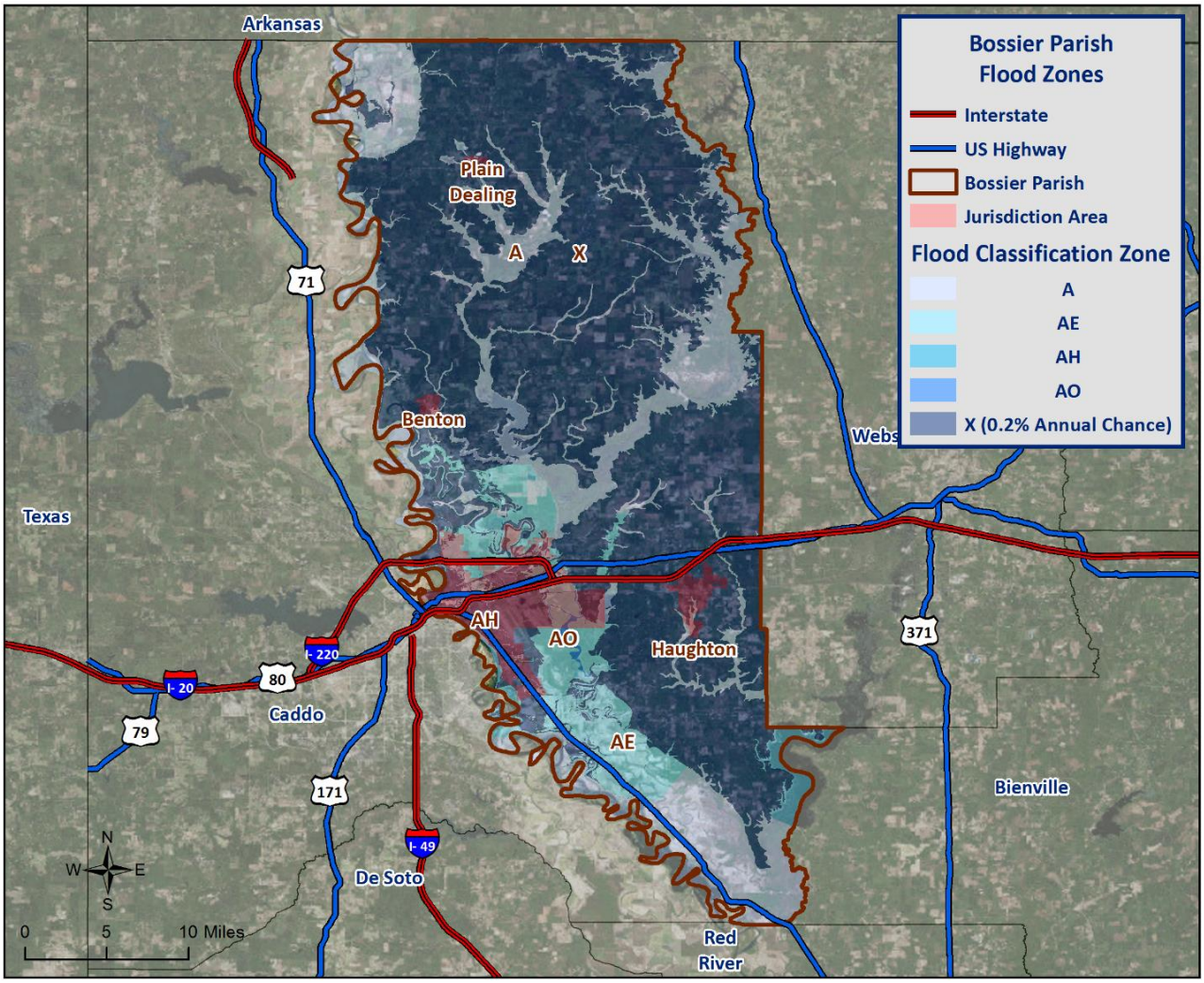


Figure 2-13: Bossier Parish Areas within the Flood Zones

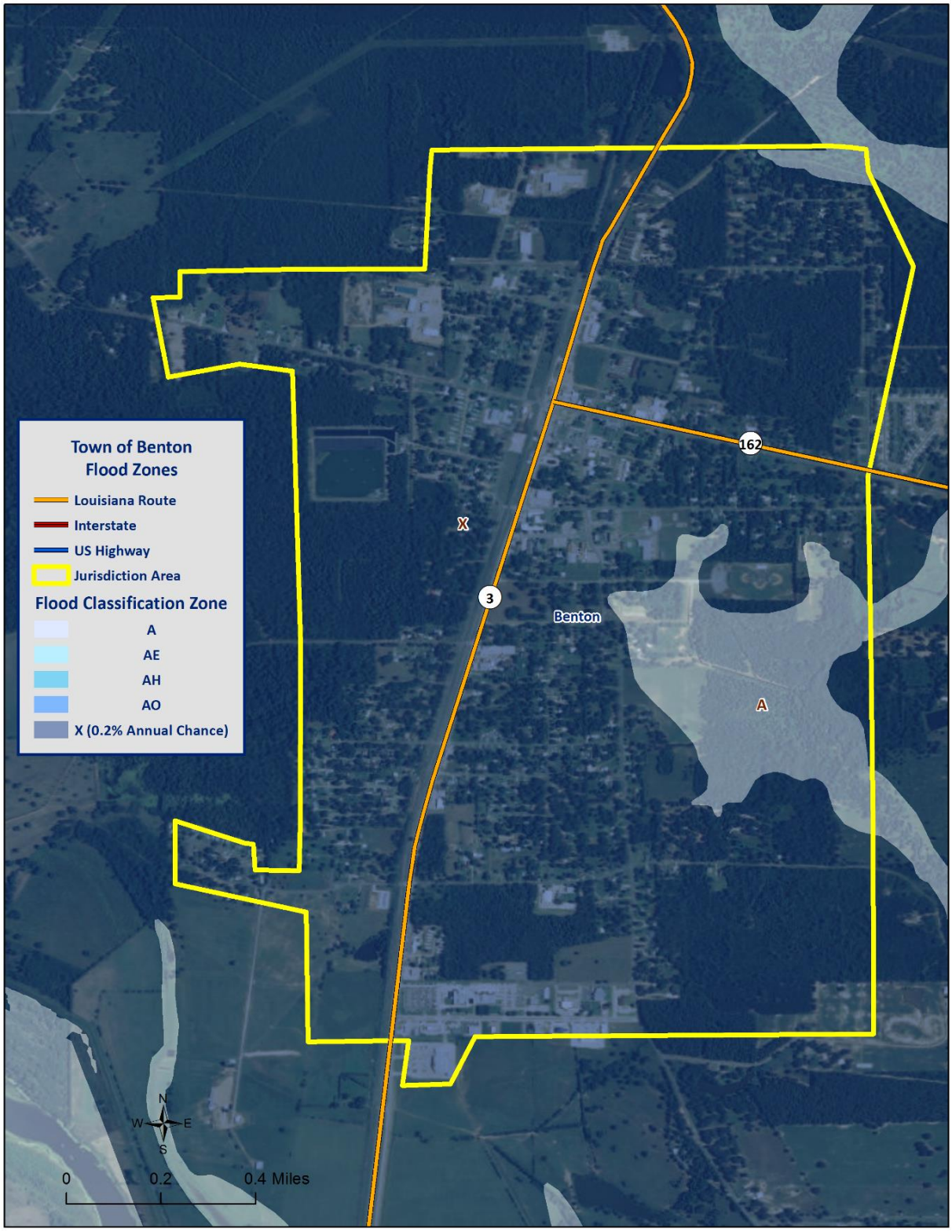


Figure 2-14: Town of Benton Areas within the Flood Zones

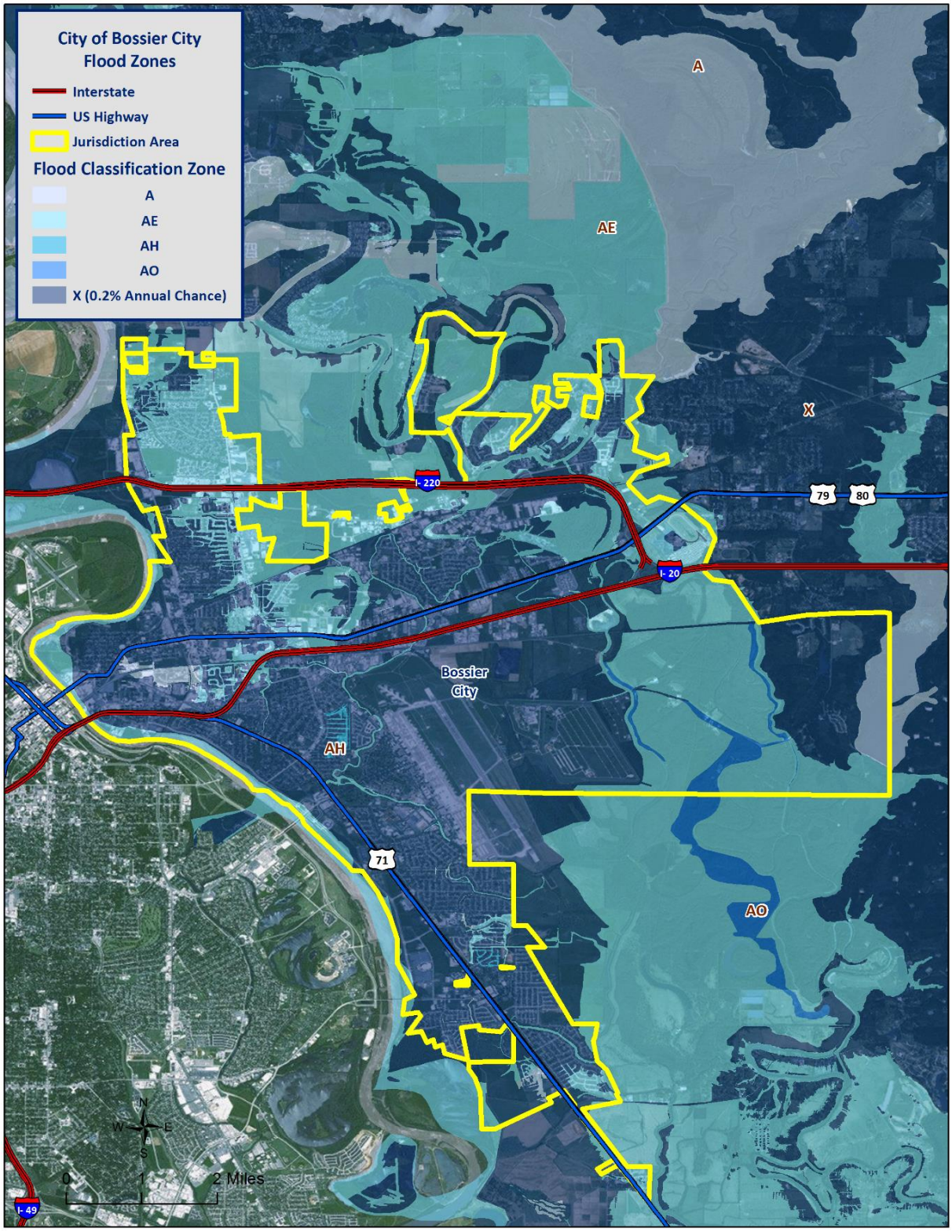


Figure 2-15: City of Bossier City Areas within the Flood Zones

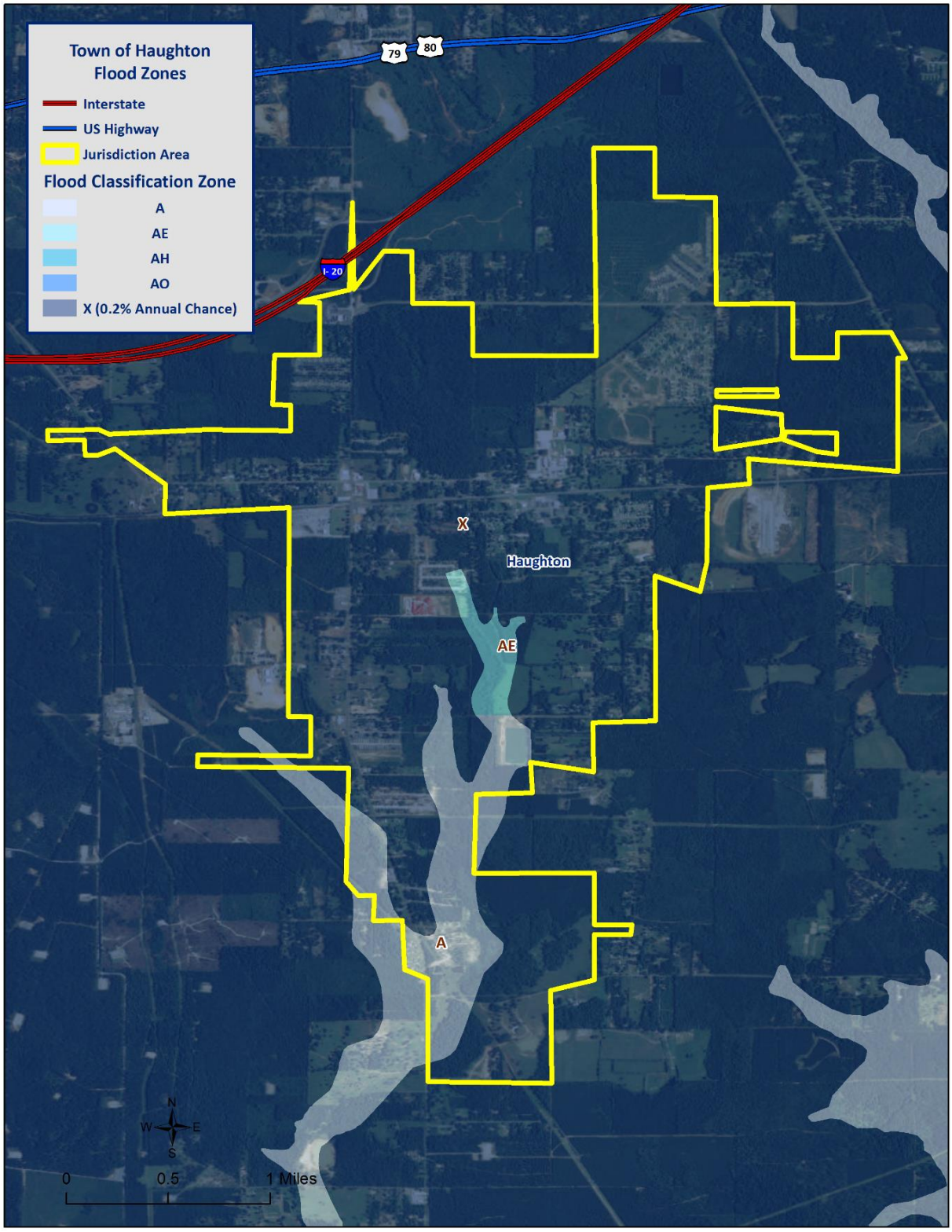


Figure 2-16: Town of Haughton Areas within the Flood Zones

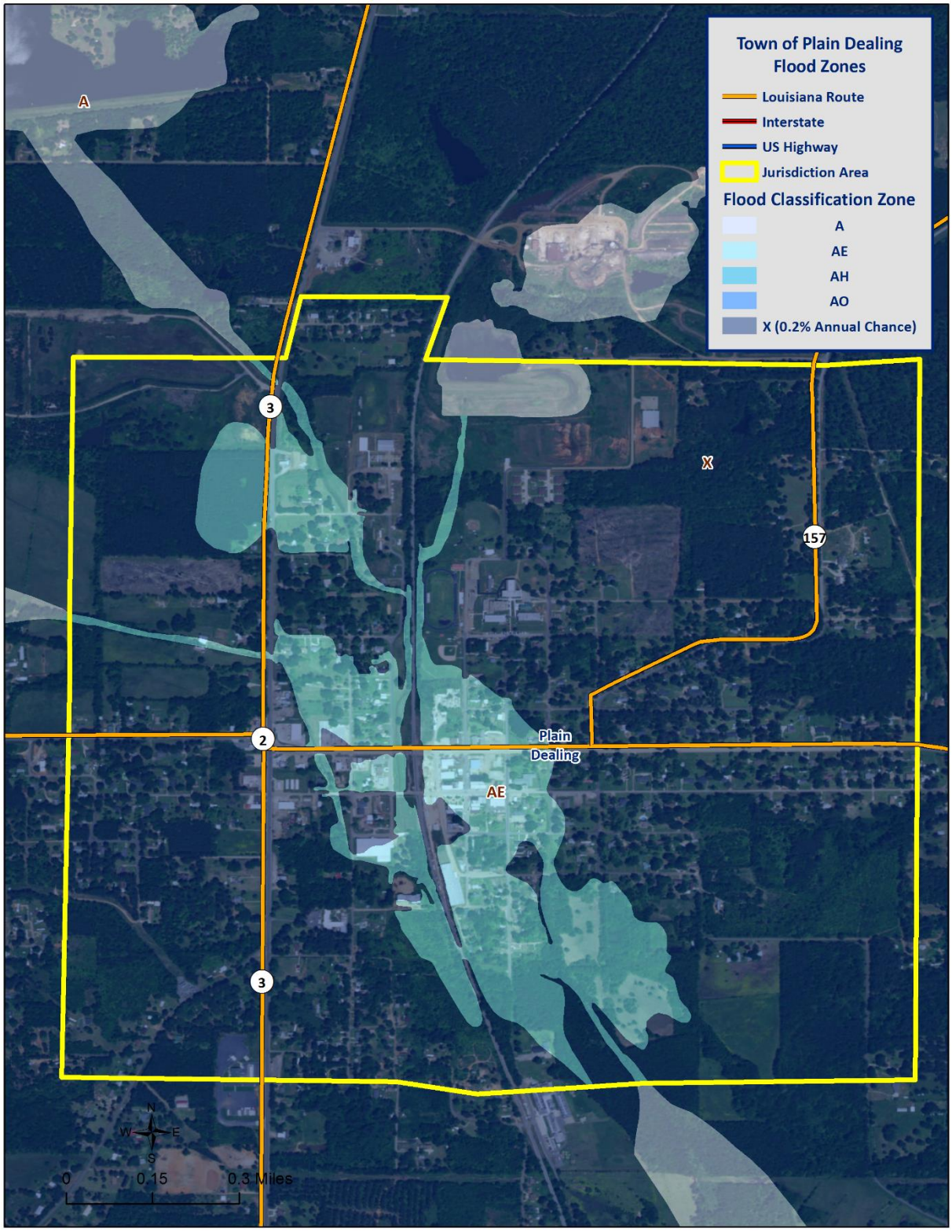


Figure 2-17: Town of Plain Dealing Areas within the Flood Zones

Previous Occurrences / Extents

Historically, there have been 86 flooding events that have created significant flooding in Bossier Parish between 1990 and 2015. Below is a brief synopsis of the 27 flooding events that have occurred since 2010, including flooding events that have occurred since the parish's last planning update.

Table 2-18: Historical Floods in Bossier Parish with Locations from 2010 - 2015

Date	Extents	Type of Flooding	Estimated Damages	Location
July 17, 2010	Excessive heavy rainfall resulted in high water and a few road closures. A woman had to be rescued from her vehicle at the corner of Benton Road and Beckett Street.	Flash Flood	$5,435	BOSSIER CITY
March 20, 2012	Bellvue Road and Wafer Road were flooded and closed east of Bossier City.	Flash Flood	$0	ADNER
March 21, 2012	A swift water rescue of a person was made whose pickup truck was washed off Johnson Koran Road. The driver was rescued 40 yards in the woods from the road using a rope and life jacket.	Flash Flood	$10,323	OAKLAND
July 10, 2012	Old Minden Road north of Interstate 20 was closed due to high water. Several cars were stalled out.	Flash Flood	$51,617	BOSSIER CITY
July 11, 2012	Police at Barksdale Air Force Base had to close a few roads briefly.	Flash Flood	$0	FOSTERS
August 17, 2012	Numerous streets were flooded and closed due to high water. Numerous cars were stalled.	Flash Flood	$103,233	BOSSIER CITY
September 20, 2013	Street flooding was reported on Barksdale Boulevard and on Old Minden Road. Streets were briefly closed and barricaded.	Flash Flood	$0	BOSSIER CITY
March 12, 2015	Widespread heavy rainfall resulted in the closure of several city streets in Bossier City. Some cars were stalled in high water.	Flash Flood	$75,000	BOSSIER CITY
March 12, 2015	A portion of Highway 154 caved in over a large culvert between Bossier Point Road and Robinson Road.	Flash Flood	$25,000	MCDADE

Date	Extents	Type of Flooding	Estimated Damages	Location
May 30, 2015	Excessive heavy rainfall during the month of May resulted in very high river levels on the Red River.	Flood	$0	FERRY
June 1, 2015	Excessive heavy rainfall during the month of May resulted in very high river levels on the Red River.	Flood	$0	FERRY
June 18, 2015	Excessive heavy rainfall flooded Traffic Street under the railroad underpass.	Flash Flood	$0	BOSSIER CITY
June 18, 2015	Excessive heavy rainfall resulted in the closure of Hamilton Road/Cox Street intersection.	Flash Flood	$0	BOSSIER CITY
June 18, 2015	Barksdale Blvd. near the Barksdale Air Force Base was flooded.	Flash Flood	$0	(BAD) BARKSDALE AFB
June 18, 2015	The 1600 block of Benton Road in Bossier City was closed due to flash flooding.	Flash Flood	$0	BOSSIER CITY
June 18, 2015	The 1600 block of Barksdale Blvd. was closed due to severe flooding.	Flash Flood	$0	(BAD) BARKSDALE AFB
June 18, 2015	The intersection of Melrose and Bellgrove in Bossier City was flooded and closed.	Flash Flood	$0	HONORE
June 18, 2015	Severe street flooding was reported at the intersection of Benton Road and Shed Road.	Flash Flood	$0	BOSSIER CITY
June 18, 2015	Patricia Drive and Michael Street in Bossier City was flooded and closed.	Flash Flood	$0	BOSSIER CITY

Date	Extents	Type of Flooding	Estimated Damages	Location
June 18, 2015	The intersection of Shed Road and James Street was flooded and closed.	Flash Flood	$0	BOSSIER CITY
June 18, 2015	The I-220 eastbound exit ramp at Airline Drive was flooded and closed.	Flash Flood	$0	HONORE
June 18, 2015	The intersection of James Street and East Texas Street was flooded and closed.	Flash Flood	$0	BOSSIER CITY
June 18, 2015	The intersection of Texas Street and Benton Road was flooded and closed.	Flash Flood	$0	BOSSIER CITY
June 18, 2015	The Fox Creek Subdivision was flooded. Some water made it into homes in the subdivision.	Flash Flood	$50,000	BODCAU
June 30, 2015	Flooding was reported at the Bellevue and Winnfield street intersection.	Flash Flood	$0	ADNER
June 30, 2015	High water was reported across portions of Highway 80.	Flash Flood	$0	BOSSIER CITY
December 27, 2015	Widespread flooding was reported across Bossier Parish. Flooding was severe on Winnfield Road, Seven Pines Road, and Highway 162.	Flash Flood	$0	ADNER

Since 2010, there have been no significant flooding events in the incorporated areas of Benton, Haughton, and Plain Dealing. 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 eight feet can be expected in the unincorporated areas of the parish. The incorporated area of Bossier City can expect flood depths from six to eight feet, while the incorporated areas of Benton and Plain Dealing can expect flooding levels of approximately two to four feet. The incorporated area of Haughton can expect flood levels of approximately one to two 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 Bossier Parish having multiple jurisdictions, it was necessary to assess the historical data found in the National Climatic Data Center for Bossier 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 2-19: Annual Flood Probabilities for Bossier Parish

Jurisdiction	Annual Probability	Return Frequency
Bossier Parish (Unincorporated)	100%	Less than once a year
Benton	72%	1 – 2 years
Bossier City	100%	Less than once a year
Haughton	56%	1 – 2 years
Plain Dealing	64%	1 – 2 years

Based on historical record, the overall flooding probability for the entire Bossier Parish planning area is 100%, with 86 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. *Table 2-22* shows the total economic losses that would result from this occurrence.

Table 2-20: Estimated Losses in Bossier Parish from a 100-Year Flood Event (Source: Hazus 2.2)

Jurisdiction	Estimated Total Losses from 100-Year Flood Event
Bossier Parish (Unincorporated)	$125,073,000
Benton	$314,000
Bossier City	$378,594,000
Haughton	$240,000
Plain Dealing	$9,254,000
Total	$513,475,000

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 following tables. These sectors are comprised of privately owned structures/facilities, as well as locally, state, and federally owned structures/facilities.

Table 2-21: Estimated 100-Year Flood Losses for Unincorporated Bossier Parish by Sector (Source: Hazus 2.2)

Bossier Parish (Unincorporated)	Estimated Total Losses from 100-Year Flood Event
Agricultural	$663,000
Commercial	$8,335,000
Government	$21,000
Industrial	$3,419,000
Religious / Non-Profit	$2,817,000
Residential	$108,346,000
Schools	$1,472,000
Total	$125,073,000

Table 2-22: Estimated 100-Year Flood Losses for Benton by Sector (Source: Hazus 2.2)

Benton	Estimated Total Losses from 100-Year Flood Event
Agricultural	$0
Commercial	$0
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$314,000
Schools	$0
Total	$314,000

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

Bossier City	Estimated Total Losses from 100-Year Flood Event
Agricultural	$465,000
Commercial	$77,521,000
Government	$1,143,000
Industrial	$8,416,000
Religious / Non-Profit	$2,820,000
Residential	$285,416,000
Schools	$2,813,000
Total	$378,594,000

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

Haughton	Estimated Total Losses from 100-Year Flood Event
Agricultural	$0
Commercial	0
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$240,000
Schools	$0
Total	$0

Table 2-25: Estimated 100-Year Flood Losses for Plain Dealing by Sector
(Source: Hazus 2.2)

Plain Dealing	Estimated Total Losses from 100-Year Flood Event
Agricultural	$49,000
Commercial	$2,463,000
Government	$469,000
Industrial	$98,000
Religious / Non-Profit	$1,702,000
Residential	$3,434,000
Schools	$1,039,000
Total	$9,254,000

Threat to People

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

Table 2-26: 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**
Bossier Parish (Unincorporated)	**49,247**	**6,789**	**13.8%**
Benton	**1,948**	**99**	**5.1%**
Bossier City	**61,315**	**14,090**	**23%**
Haughton	**3,454**	**151**	**4.4%**
Plain Dealing	**1,015**	**314**	**30.9%**
Total	**116,979**	**21,438**	**18.3%**

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

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

Bossier Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	6,935	14.1%
Persons Under 5 Years	514	7.4%
Persons Under 18 Years	1,266	18.3%
Persons 65 Years and Over	832	12.0%
White	5,006	72.2%
Minority	1,929	27.8%

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

Benton		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	99	5.1%
Persons Under 5 Years	6	6.1%
Persons Under 18 Years	20	20.1%
Persons 65 Years and Over	14	14.1%
White	55	55.3%
Minority	44	44.7%

Table 2-29: Vulnerable Populations Susceptible to a 100-Year Flood Event in Bossier City (Source: Hazus 2.2)

Bossier City		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	14,090	23.0%
Persons Under 5 Years	1,143	8.1%
Persons Under 18 Years	2,533	18.0%
Persons 65 Years and Over	1,718	12.2%
White	9,212	65.4%
Minority	4,878	34.6%

Table 2-30: Vulnerable Populations Susceptible to a 100-Year Flood Event in Haughton (Source: Hazus 2.2)

Plain Dealing		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	151	4.4%
Persons Under 5 Years	13	8.5%
Persons Under 18 Years	29	19.1%
Persons 65 Years and Over	14	9.3%
White	118	78.2%
Minority	33	21.8%

Table 2-31: Vulnerable Populations Susceptible to a 100-Year Flood Event in Plain Dealing (Source: Hazus 2.2)

Plain Dealing		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	314	30.9%
Persons Under 5 Years	16	5.2%
Persons Under 18 Years	53	16.8%
Persons 65 Years and Over	70	22.3%
White	164	52.2%
Minority	150	47.8%

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 2-32: 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 2-33: Spectrum of Hailstone Diameters and their Everyday Descriptions (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 2-34: 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 2-35: 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 2-36: 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 Bossier Parish is equally at risk for hailstorms.

Previous Occurrences / Extents

The SHELDUS database reports 54 significant hailstorm events occurring within the boundaries of Bossier Parish between the years of 1990 - 2015. According to the National Climatic Data Center, hailstorm diameters experienced in Bossier Parish have ranged from 0. 5 inches to 4.5 inches since 1990. The most frequently recorded hail size has been 1 inch diameters. *Figure 2-18* displays the density of hailstorms in Bossier Parish and adjacent parishes. Based on the National Climatic Data Center dataset, *Table 2-37* on the next page provides an overview of hailstorms that have impacted the Bossier Parish planning area since 2010. Bossier Parish can expect to experience hail up to 4.5 inches in diameter for future events.

Table 2-37: Previous Occurrences of Hailstorms in Bossier Parish from 2010 – 2015 (Source: NCDC)

Date	Recorded Hail Size (inches)	Location
January 20, 2010	0.88	BENTON
March 10, 2010	2.75	COLLINSBURG
March 10, 2010	1	PLAIN DEALING
March 10, 2010	0.88	HAUGHTON
March 10, 2010	0.88	FOSTERS
April 24, 2010	0.88	CURTIS
May 14, 2010	1.75	FILMORE
May 14, 2010	0.75	PRINCETON
August 6, 2010	0.75	BENTON
October 24, 2010	0.75	FERGUSTON
October 24, 2010	0.75	HAUGHTON
October 24, 2010	1	(BAD) BARKSDALE AFB/BOSSIER CITY
November 1, 2010	0.75	BLENHEIM
November 1, 2010	1	BLENHEIM
November 1, 2010	1	BODCAU
November 1, 2010	1.75	PLAIN DEALING
November 1, 2010	1	PLAIN DEALING
March 5, 2011	0.75	BODCAU
March 29, 2011	1.25	(BAD) BARKSDALE AFB/BOSSIER CITY
March 29, 2011	1.5	FOSTERS
April 15, 2011	0.75	HAUGHTON
April 26, 2011	1.75	TAYLORTOWN
February 15, 2012	0.75	COLLINSBURG
April 2, 2012	0.88	FOSTERS
April 3, 2012	0.88	FOSTERS
April 3, 2012	1.25	FOSTERS
June 15, 2012	1.75	FOSTERS
February 21, 2013	0.75	FOSTERS
February 25, 2013	1	PLAIN DEALING
April 27, 2013	0.75	ADNER
March 28, 2014	0.75	(BAD) BARKSDALE AFB/BOSSIER CITY
April 24, 2014	0.75	FOSTERS
June 8, 2014	1	PRINCETON
June 8, 2014	0.75	BOLINGER
April 19, 2015	1.75	ALDEN BRIDGE
April 19, 2015	1	BENTON
April 19, 2015	2.25	BENTON
May 26, 2015	1	FOSTERS
June 30, 2015	1	BLENHEIM

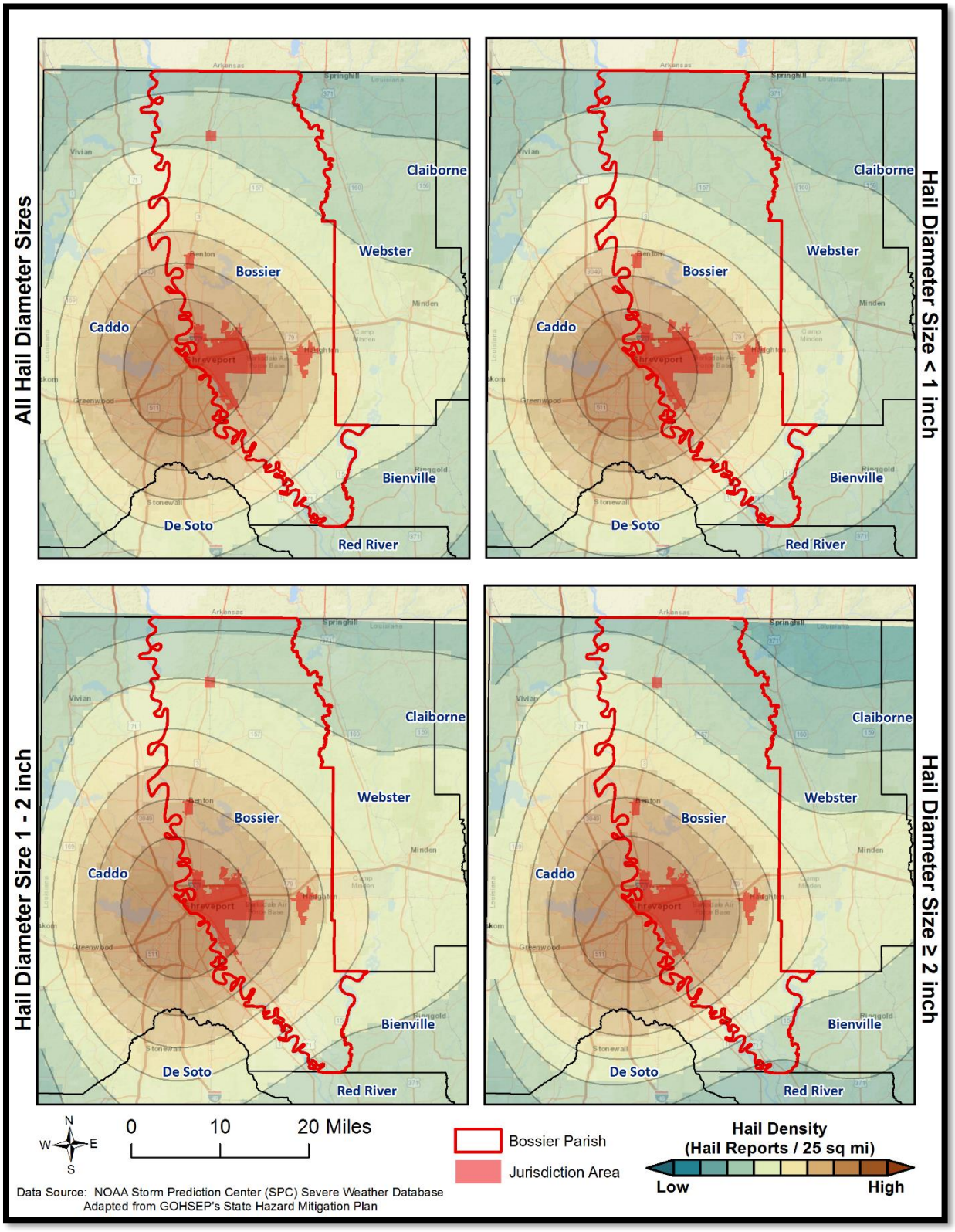


Figure 2-18: Density of Hailstorms by Diameter from 1950-2012
(Source: State of Louisiana Hazard Mitigation Plan 2014)

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 100%. The probability was determined based on a review of significant hail data that has caused damages in the last 25 years, in which Bossier Parish has had 20 recorded events.

Estimated Potential Losses

According to the SHELDUS database, property damage due to hailstorms in Bossier Parish have totaled approximately $13,445,992 since 1990. To estimate the potential losses of a hail event on an annual basis, the total damages recorded for hail 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 $537,840. *Table 2-38* provides an estimate of potential property losses for Bossier Parish.

Table 2-38: Estimated Annual Property Losses in Bossier Parish from Hailstorms

Estimated Annual Potential Losses from Hailstorms for Bossier Parish				
Unincorporated Bossier Parish (42.1% of Population)	Benton (1.7% of Population)	Bossier City (52.4% of Population)	Haughton (3.0% of Population)	Plain Dealing (0.9% of Population)
$226,425	$8,956	$281,911	$15,881	$4,667

There have been no deaths or injuries due to hailstorms from 1990 – 2015 in Bossier 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 Bossier Parish is equally at risk for high winds.

Previous Occurrences / Extents

The SHELDUS database reports a total of 81 thunderstorm wind events occurring within the boundaries of Bossier Parish between the years of 1990 to 2015. The significant thunderstorm wind events experienced in Bossier Parish have ranged in wind speed from 57 mph to 166 mph. Bossier Parish can expect to receive thunderstorm winds up to 166 mph for future high wind events. The following table provides an overview of significant high wind events over the last five years:

Table 2-39: Previous Occurrences for Thunderstorm High Wind Events from 2010 – 2015

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
HAUGHTON	March 25, 2010	62	10k	$0
SLIGO	May 14, 2010	70	$0	$0
BODCAU	May 14, 2010	61	$0	$0

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
(BAD) BARKSDALE AFB	May 26, 2010	62	$0	$0
FOSTERS	May 26, 2010	62	$16,304	$0
PLAIN DEALING	May 27, 2010	57	$21,739	$0
BENTON	June 9, 2010	60	$0	$0
ALDEN BRIDGE	June 9, 2010	61	$0	$0
BOLINGER	August 22, 2010	61	$0	$0
ROCKY MT	August 22, 2010	61	$0	$0
BENTON	August 22, 2010	60	$2,174	$0
CURTIS	August 22, 2010	60	$0	$0
BENTON	February 1, 2011	61	$0	$0
PLAIN DEALING	February 24, 2011	62	$0	$0
ROCKY MT	February 24, 2011	60	$0	$0
HAUGHTON	February 24, 2011	60	$0	$0
FOSTERS	April 4, 2011	57	$0	$0
TAYLORTOWN	April 26, 2011	60	$0	$0
PLAIN DEALING	June 30, 2011	64	$0	$0
PLAIN DEALING	August 20, 2011	63	$0	$0
PLAIN DEALING	August 24, 2011	64	$0	$0
HAUGHTON	September 18, 2011	60	$0	$0
PLAIN DEALING	September 18, 2011	60	$0	$0
HAUGHTON	September 18, 2011	61	$0	$0
KORAN	September 18, 2011	60	$0	$0
FOSTERS	April 2, 2012	59	$0	$0
HAUGHTON	April 2, 2012	60	$61,940	$0
HAUGHTON	April 2, 2012	60	$0	$0
WARDVIEW	June 12, 2012	61	$0	$0
MOT	June 12, 2012	64	$0	$0
WILLOW CHUTE	June 12, 2012	64	$0	$0
FOSTERS	June 12, 2012	62	$0	$0
ALDEN BRIDGE	November 11, 2012	60	$0	$0
HUGHES	November 11, 2012	60	$0	$0
BENTON	December 20, 2012	66	$0	$0
PLAIN DEALING	December 20, 2012	66	$0	$0
LINTON	January 12, 2013	61	$0	$0
PLAIN DEALING	January 29, 2013	62	$0	$0
HAUGHTON	January 29, 2013	61	$0	$0
ADNER	March 31, 2013	66	$101,743	$0

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
FOSTERS	March 31, 2013	64	$30,523	$0
PLAIN DEALING	May 21, 2013	62	$0	$0
CAPLIS	May 21, 2013	62	$0	$0
PLAIN DEALING	July 11, 2013	63	$0	$0
HAUGHTON	July 11, 2013	64	$0	$0
HAUGHTON	August 13, 2013	60	$0	$0
BOSSIER CITY	February 20, 2014	60	$15,018	$0
ADNER	July 23, 2014	62	$5,006	$0
FOSTERS	July 23, 2014	60	$0	$0
ADNER	July 23, 2014	60	$25,030	$0
HAUGHTON	October 2, 2014	62	$20,024	$0
HAUGHTON	October 2, 2014	62	$0	$0
BENTON	October 2, 2014	63	$0	$0
(BAD) BARKSDALE AFB	October 2, 2014	60	$0	$0
MIDWAY	October 12, 2014	61	$0	$0
FOSTERS	January 3, 2015	63	$3,000	$0
FOSTERS	January 3, 2015	63	$0	$0
WARDVIEW	April 24, 2015	62	$0	$0
PLAIN DEALING	April 24, 2015	62	$0	$0
(BAD) BARKSDALE AFB	April 24, 2015	62	$0	$0
ELM GROVE	May 25, 2015	60	$0	$0
TAYLORTOWN	May 25, 2015	67	$0	$0
PLAIN DEALING	May 29, 2015	60	$0	$0
FOSTERS	June 9, 2015	60	$0	$0
MOT	June 17, 2015	62	$0	$0
REDLAND	June 17, 2015	62	$0	$0
REDLAND	November 17, 2015	61	$0	$0
HAUGHTON	November 17, 2015	61	$15,000	$0
FOSTERS	December 27, 2015	62	$0	$0

Frequency

High winds are a fairly common occurrence within Bossier Parish, with an annual chance of occurrence calculated at 100%.

Estimated Potential Losses

Since 1990, there have been 81 significant wind events that have resulted in property damages according to the SHELDUS database. The total property damages associated with those storms have totaled $5,043,936. 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 $201,757. The following table provides an estimate of potential property losses for Bossier Parish:

Table 2-40: Estimated Annual Property Losses in Bossier Parish Resulting from High Winds

Estimated Annual Potential Losses from Thunderstorm Winds for Bossier Parish				
Unincorporated Bossier Parish (42.1% of Population)	Benton (1.7% of Population)	Bossier City (52.4% of Population)	Haughton (3.0% of Population)	Plain Dealing (0.9% of Population)
$84,938	$3,360	$105,752	$5,957	$1,751

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 Bossier Parish.

Previous Occurrences / Extents

The SHELDUS database reports a total of 18 lightning events occurring within the boundaries of Bossier 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 Bossier 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 on the next page provides an overview of significant lightning strikes over the last five years.

Table 2-41: Previous Occurrences of Significant Lightning Strikes in Bossier Parish from 2010 – 2015 (Source: NCDC and SHELDUS)

Location	Date	Summary	Property Damage
FOSTERS	April 7, 2010	A home on Devereaux Street in the Colony Subdivision was struck by lightning and burned to the ground.	$271,739
BOSSIER CITY	June 28, 2010	Lightning struck a home in the Olde Oaks subdivision resulting in structural damage to the house.	$10,870
BENTON	August 6, 2010	The local Dairy Queen and Sonic restaurants in Benton struck by lightning. Damage was determined to be fairly minimal.	$3,261
PLAIN DEALING	August 22, 2010	Lightning started a small fire when it hit a house on Highway 3 near Plain Dealing.	$10,870
PLAIN DEALING	August 22, 2011	Lightning struck a home, resulting in a fire. The fire resulted in the fatality of a 74 year old woman.	$52,685
BENTON	October 2, 2014	A storage shed was struck by lightning and set on fire on Highway 3 north of I-220.	$5,006

Since 2010, there have been no lightning events that have caused property damage or loss of life in the incorporated area of Haughton.

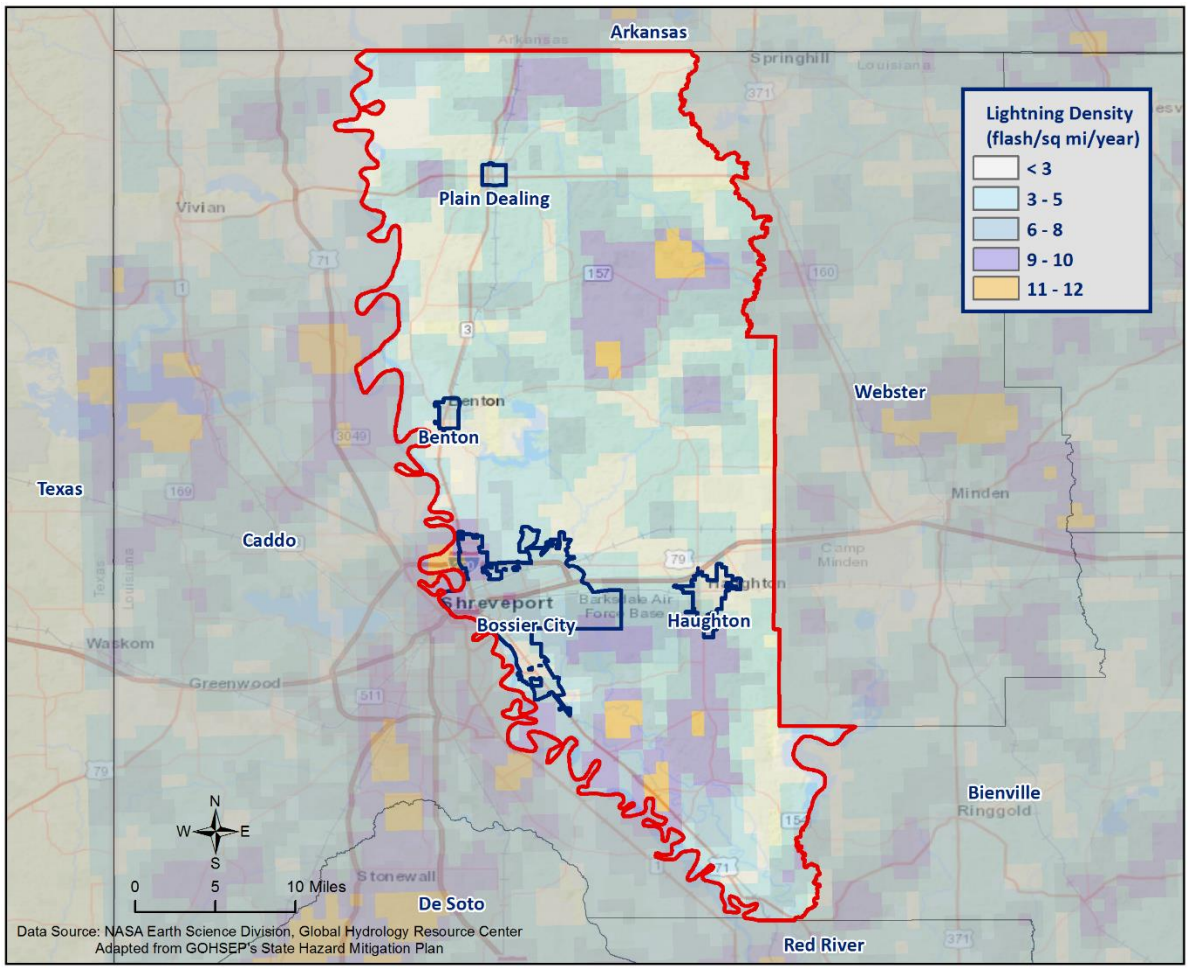


Figure 2-19: Lightning Density Reports for Bossier Parish

Frequency

Lightning can strike anywhere and is produced by every thunderstorm, so the chance of lightning occurring in Bossier 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 have been 18 lightning events that have caused property damages or injuries over the last 25 years, establishing an annual probability of 72%.

Estimated Potential Losses

Since 1990, there have been 18 significant lightning events that have resulted in property damages according to the SHELDUS database. The total property damages associated with lightning events totaled $14,430,453. 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 $577,218. The table on the net page provides an estimate of potential property losses for Bossier Parish.

Table 2-42: Estimated Annual Property Losses in Bossier Parish from Lightning

Estimated Annual Potential Losses from Thunderstorm Lightning for Bossier Parish				
Unincorporated Bossier Parish (42.1% of Population)	Benton (1.7% of Population)	Bossier City (52.4% of Population)	Haughton (3.0% of Population)	Plain Dealing (0.9% of Population)
$243,003	$9,612	$302,551	$17,043	$5,008

There have been no reported injuries but one fatality in Bossier 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 2-43* 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 2-43: 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 2-44: 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 Bossier Parish with actual locations, tornadoes in general are a climatological based hazard and have the same approximate probability of occurring in Bossier Parish as all of its jurisdictions. Because a tornado has a similar probability of striking anywhere within the planning area for Bossier Parish, all jurisdictions are equally at risk for tornadoes.

Previous Occurrences / Extents

SHELDUS reports a total of 21 tornadoes or waterspouts occurring within the boundaries of Bossier Parish between the years of 1990 - 2015. The tornadoes experienced in Bossier Parish have from ranged EF0 to EF2 on the EF scale, and ranged from F1 to F4 on the F scale. The worst case scenario Bossier Parish can expect in the future is an EF3 tornado.

The tornado that caused the most damage to property occurred on April 3, 1999. The F4 tornado effected 389 structures in Bossier Parish, 227 of which suffered either major damage or total destruction. Roofs were missing. Brick homes were leveled with one brick home totally missing, leaving only the slab. Numerous large oak and pine trees were uprooted or snapped near the bases. Seven people died from the tornado with another 90 injured.

Table 2-45: Historical Tornadoes in Bossier Parish with Locations from 1990 - 2015

Date	Impacts	Property Damage	Location	Magnitude
April 27, 1990	0.1 mile path with a width of 20 yards. Ten house roofs were damaged, a number of trees were blown down, and the roof of a church was heavily damaged.	$45,336	BOSSIER CITY	F1
December 21, 1990	0.5 mile path with a width of 75 yards. Most of the path was through forested areas, and a majority of the damage was confined to downed trees.	$4,534	BOSSIER CITY	F1
December 21, 1990	2.5 mile path with a width of 165 yards. A barn was destroyed, and car windows were blown out.	$4,534	BENTON	F1
December 21, 1990	1.5 mile path with a width of 50 yards. The tornado touched down in open country, and damage was confined to downed trees and power lines.	$453	NINOCK	F1
April 12, 1991	15 mile path with a width of 100 yards. Ripped apart trees 40 to 60 feet in height. The most damage was associated with flash flooding after the tornado.	$435,053	HAUGHTON	F2
November 3, 1992	0.5 mile path with a width of 45 yards. Took off the roofs of four buildings and blew down numerous trees. Two B52H bombers and a KC135 tanker received light damage.	$422,340	BARKSDALE AFB	F1
January 1, 1999	1.1 mile path with a width of 31 yards. Moderate damage occurred to a storage building as the tornado plowed right through the middle of the shed, leaving both ends intact. Several aluminum buildings were also blown apart.	$21,340	SLIGO	F1
January 1, 1999	1.5 mile path with a width of 40 yards. Damage consisted of moderate damage to two	$85,360	KORAN	F2

Date	Impacts	Property Damage	Location	Magnitude
	homes, one completely destroyed mobile home, and numerous snapped and fallen trees.			
April 3, 1999	12.6 mile path with a width of 200 yards. 389 structures were effected, 227 of which suffered either major damage or complete destruction. One brick home was totally missing, leaving only the slab. Seven people died with another 90 treated for injuries.	$9,503,443	BOSSIER CITY	F4
May 4, 1999	10 mile path with a width of 250 yards. Two mobile homes were destroyed and several frame homes suffered roof damage. Numerous trees were snapped and uprooted.	$426,801	PLAIN DEALING	F2
April 23, 2000	21 mile path with a width of 700 yards. Tree damage was noted up to 3 miles on either side of the track. Approximately 25 to 30 residences were damaged.	$2,753,811	PLAIN DEALING	F2
April 23, 2000	7.5 mile path with a width of 500 yards. One brick structure was almost totally demolished. 6 inch iron poles supporting the corners of this structure were bent and twisted. A two story house had its roof completely removed and most of the siding stripped off. A man's arm was lacerated to the bone by flying debris.	$3,165,732	ELM GROVE	F3
April 23, 2000	1.6 mile path with a width of 125 yards. About 30 homes suffered roof damage. Several trees were blown down and many tree limbs were snapped.	$1,376,405	BOSSIER CITY	F1
February 24, 2007	1 mile path with a width of 200 yards. One injury was reported. Between 40 and 50 structures	$0	BOSSIER CITY	EF1

Date	Impacts	Property Damage	Location	Magnitude
	sustained varying degrees of damage from lost shingles to roof decking.			
December 9, 2008	0.33 mile path with a width of 75 yards. A small tin outbuilding and some trees along the levee were damaged.	$330	NINOCK	EF0
April 9, 2009	0.75 mile path with a width of 75 yards. Several trees were snapped or uprooted along Leila Road.	$5,524	BOLINGER	EF0
April 9, 2009	11.9 mile path with a width of 300 yards. Damaged the west gate, golf course, fitness center, and Chapel Two at Barksdale Air Force Base.	$3,314,351	BOSSIER CITY	EF2
October 29, 2009	2.53 mile path with a width of 200 yards. Nearly 30 homes had significant roof damage. Numerous trees were snapped and uprooted on Eastwood Golf Course. Eight people were injured.	$1,104,784	BODCAU	EF1
October 29, 2009	9.54 mile path with a width of 600 yards. About 100 homes were damaged. Significant damage occurred at the Bossier Emergency Service Center. Numerous trees were snapped and uprooted in the Rose Neath Cemetery. Two people were injured by the storm.	$5,523,919	HONORE	EF2
April 26, 2011	9.03 mile path with a width of 850 yards. A mobile trailer was flipped at a gas well, injuring the two occupants.	$26,342	ELM GROVE	EF2
April 28, 2014	1.58 mile path with a width of 500 yards. Nearly 20 homes suffered damage, four to six of which suffered substantial damage.	$1,001,187	WARDVIEW	EF2

The incorporated areas of Benton, Bossier City, Haughton, and Plain Dealing have not experienced a tornado event from 2010 to the present. Since 2011, the year in which the last update to this hazard mitigation plan was written, Bossier Parish has had two tornadoes touchdown in the unincorporated areas of the parish. The following is a brief synopsis of these events:

April 26, 2011 – EF2 Tornado in Elm Grove

The tornado moved across Atkins Clark Road where a mobile trailer was flipped at a gas well injuring the occupants. The tornado continued northeast crossing Highways 154 and 157 damaging trees and power lines before weakening and lifting near Lake Bistineau. Maximum winds are estimated at 110 - 115 mph.

April 28, 2014 – EF2 Tornado in Wardview

A NWS Storm Survey crew determined that this EF2 tornado uprooted and snapped numerous trees from the time it crossed the Red River until if lifted just west of the town of Plain Dealing. Bossier Parish Sheriff's Office reported that nearly 20 homes suffered damage in the Buckshot Road and Highway 537 areas. Four to six homes suffered substantial damage while another homes suffered slight to moderate damage. The Red Cross set up a shelter near the site. NWS Doppler Radar in Shreveport exhibited a debris ball on storm reflectivity that coincided with the damage witnessed on the survey. While some of these homes were vacant at the time of the tornado touch down, there were no injuries reported.

Frequency / Probability

Tornadoes are a sporadic occurrence within Bossier Parish, with an annual chance of occurrence calculated at 84% based on the records for the past 25 years (1990 - 2015). The following figure displays the density of tornado touch downs in Bossier Parish and neighboring parishes.

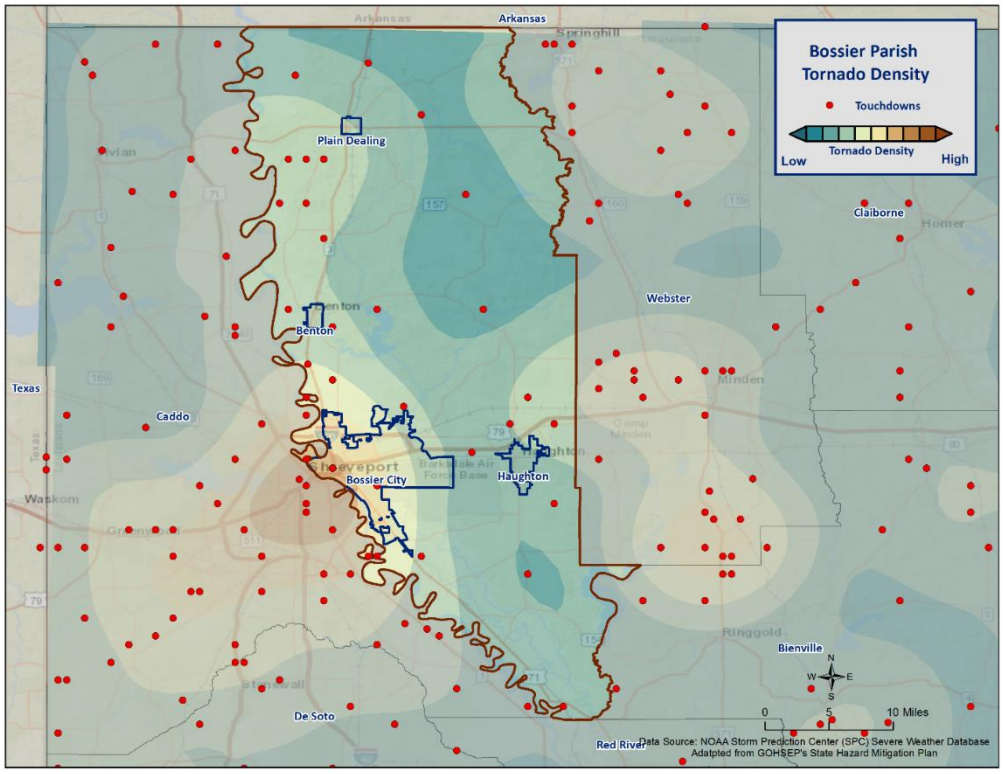


Figure 2-20: Location and Density of Tornadoes to Touch Down in Bossier Parish (Source: NOAA/SPC Severe Weather Database)

Estimated Potential Losses

According to the SHELDUS database, there have been 21 tornadoes that have caused some level of property damage. The total damage from the actual claims for property is $28,485,422, with an average cost of $1,356,449 per tornado strike. When annualizing the total cost over the 25-year record, total annual loses based on tornadoes are estimated to be $1,139,417. 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 Bossier Parish.

Table 2-46: Estimated Annual Losses from Tornadoes in Bossier Parish

Estimated Annual Potential Losses from Tornadoes for Bossier Parish				
Unincorporated Bossier Parish (42.1% of Population)	Benton (1.7% of Population)	Bossier City (52.4% of Population)	Haughton (3.0% of Population)	Plain Dealing (0.9% of Population)
$185,222	$6,939	$6,426	$154,419	$43,778

Table 2-47 presents an analysis of building exposure that is susceptible to tornadoes by general occupancy type for Bossier Parish, along with the percentage of building stock that are mobile homes.

Table 2-47: Building Exposure by General Occupancy Type for Tornadoes in Bossier 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 (%)
14,555,279	2,624,971	621,855	47,698	354,110	199,882	91,662	21.2%

The parish has suffered through a total of five days in which tornadoes or waterspouts have accounted for 104 injuries and seven fatalities during this 25-year period (*Table 2-48*). The average number of injuries per event for Bossier Parish is 4.95 per tornado, with an average of 4.16 per year for the 25-year period.

Table 2-48: Tornadoes in Bossier Parish by Magnitude that Caused Injuries or Deaths

Date	Magnitude	Deaths	Injuries
April 3, 1999	F4	7	90
April 23, 2000	F3	0	1
February 24, 2007	EF1	0	1
October 29, 2009	EF1	0	8
October 29, 2009	EF2	0	2
April 26, 2011	EF2	0	2

In assessing the overall risk to population, the most vulnerable population throughout the parish are those residing in manufacturing housing. Approximately 21.2% of all housing in Bossier Parish consists of manufactured housing. Based on location data collected in a previous hazard mitigation project, there are

35 known locations where manufactured housing is concentrated. Each of those 35 locations have an overall number of manufactured houses ranging from one to 136. The location and density of manufactured houses can be seen in *Figure 2-21*.

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 unincorporated area of Bossier Parish (*Table 2-49*). 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 2-49: Manufactured Home Distribution throughout Bossier Parish

Location	Number of Manufactured Home Parks	% of Manufactured Home Parks
Unincorporated Area	18	51.4%
Benton	4	11.4%
Bossier City	6	17.1%
Haughton	7	20.0%
Plain Dealing	0	0.0%

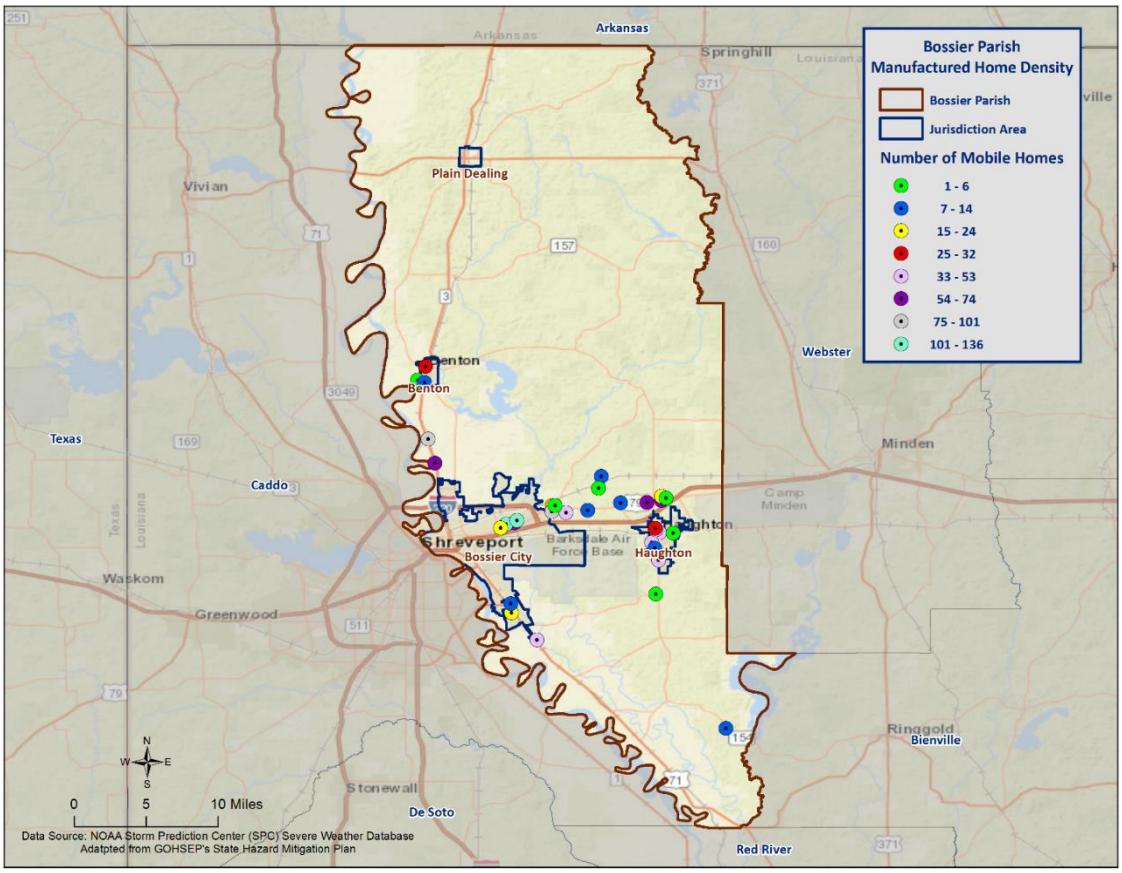


Figure 2-21: Location and Approximate Number of Manufactured Housing Units throughout Bossier Parish.

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, the table presents the Saffir-Simpson Hurricane Wind Scale, which categorizes tropical cyclones based on sustained winds.

Table 2-50: 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 all 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 Bossier 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 Bossier Parish between the years 2002 and 2014 (*Table 2-51*). The tropical cyclone events experienced in Bossier Parish include depressions, storms, and hurricanes. As a worst case scenario, Bossier Parish can expect to experience hurricanes at the Category 1 level in the future.

Table 2-51: Historical Tropical Cyclone Events in Bossier Parish from 2002 – 2015 (Source: SHELDUS)

Date	Name	Storm Type At Time of Impact
September 24, 2005	Rita	Hurricane – Category 1
September 1, 2008	Gustav	Tropical Storm
September 12, 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.

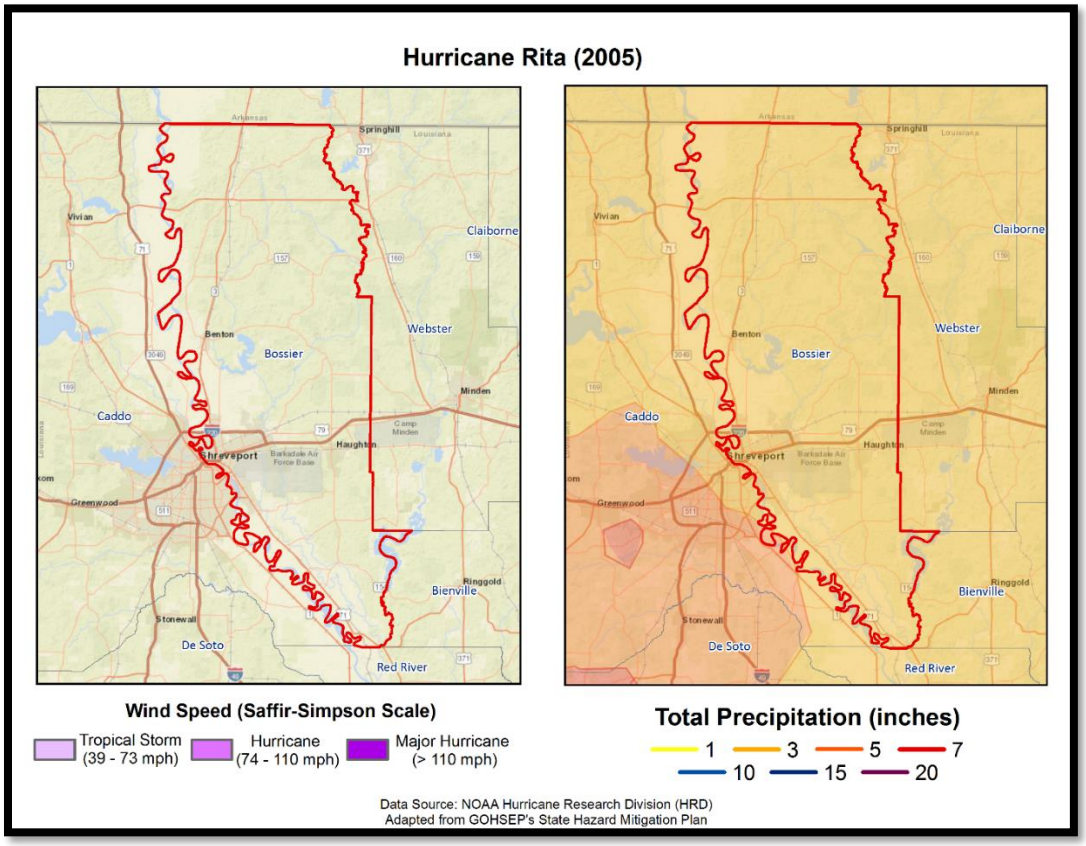


Figure 2-22: Wind Speed and Precipitation Totals in Bossier Parish for Hurricane Rita

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.

Peak wind gusts of 40 to 60 mph across all of northwest Louisiana, including Bossier Parish. At the height of the storm over 175,000 people had lost power in the region. Shreveport recorded its second lowest pressure ever recorded as Rita passed.

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.

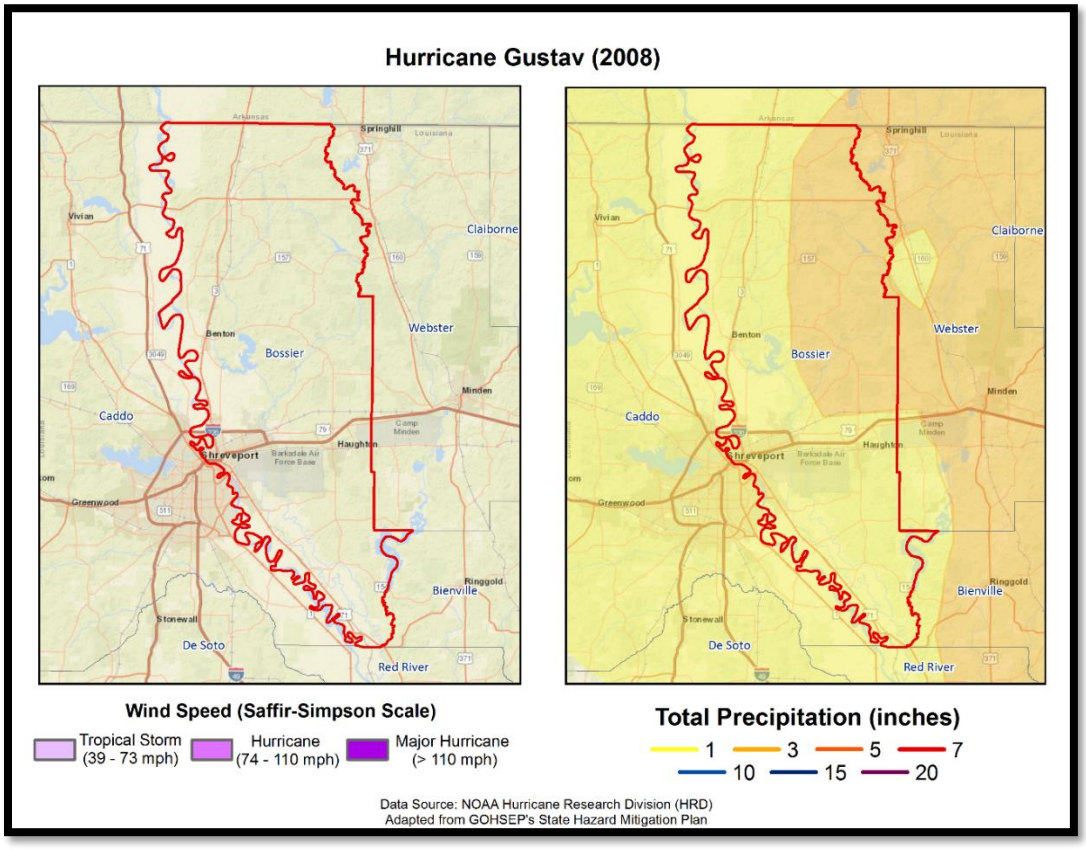


Figure 2-23: Wind Speed and Precipitation Totals in Bossier Parish for Hurricane Gustav

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 Bossier Parish, tropical storm force winds resulted in several trees down across the parish. The southern portion of the parish was hit very hard with numerous reports of power outages.

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 moved northward into the area, producing tropical storm force winds across all of Bossier Parish. Numerous trees and power lines were downed throughout the parish with widespread power outages reported. Local emergency management reported several large trees downed blocking Highway 3 near the town of Benton. A large tree was downed on a home at Highway 3 and Crestwood Circle in Benton as well. Another tree was downed on a home at Highway 157 near Princeton Road in Haughton.

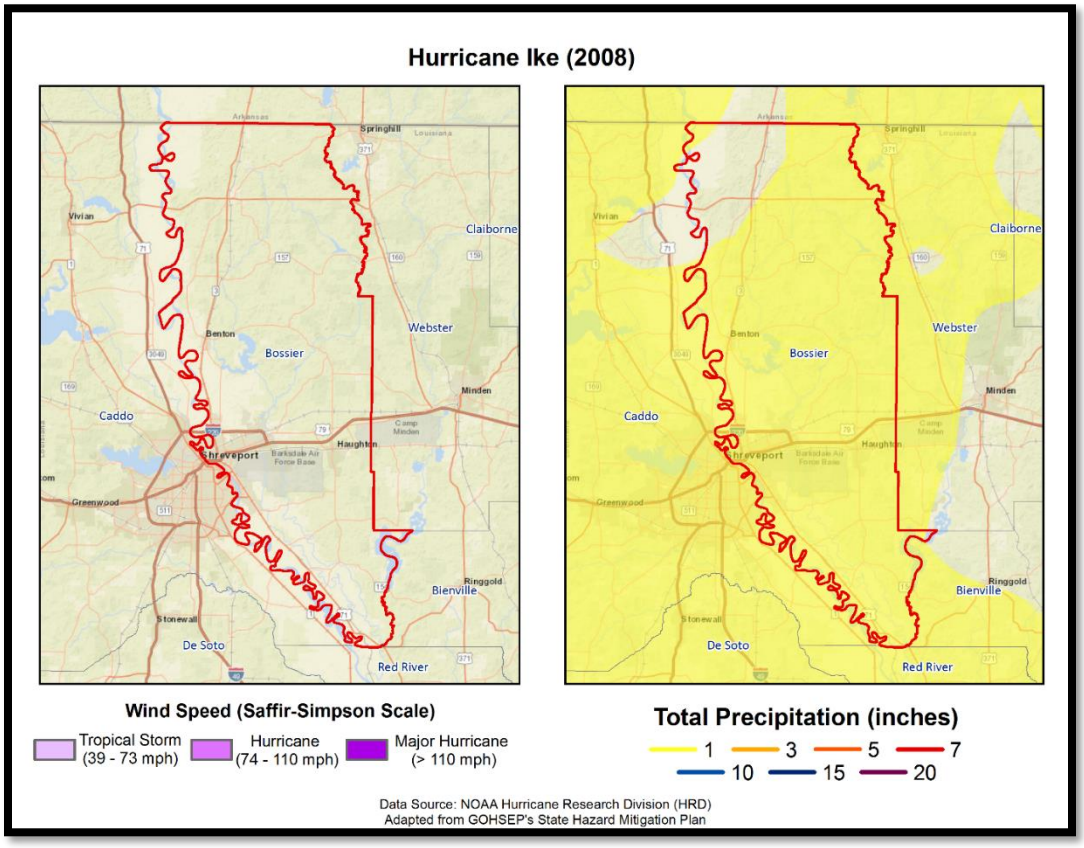


Figure 2-24: Wind Speed and Precipitation Totals in Bossier Parish for Hurricane Ike

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

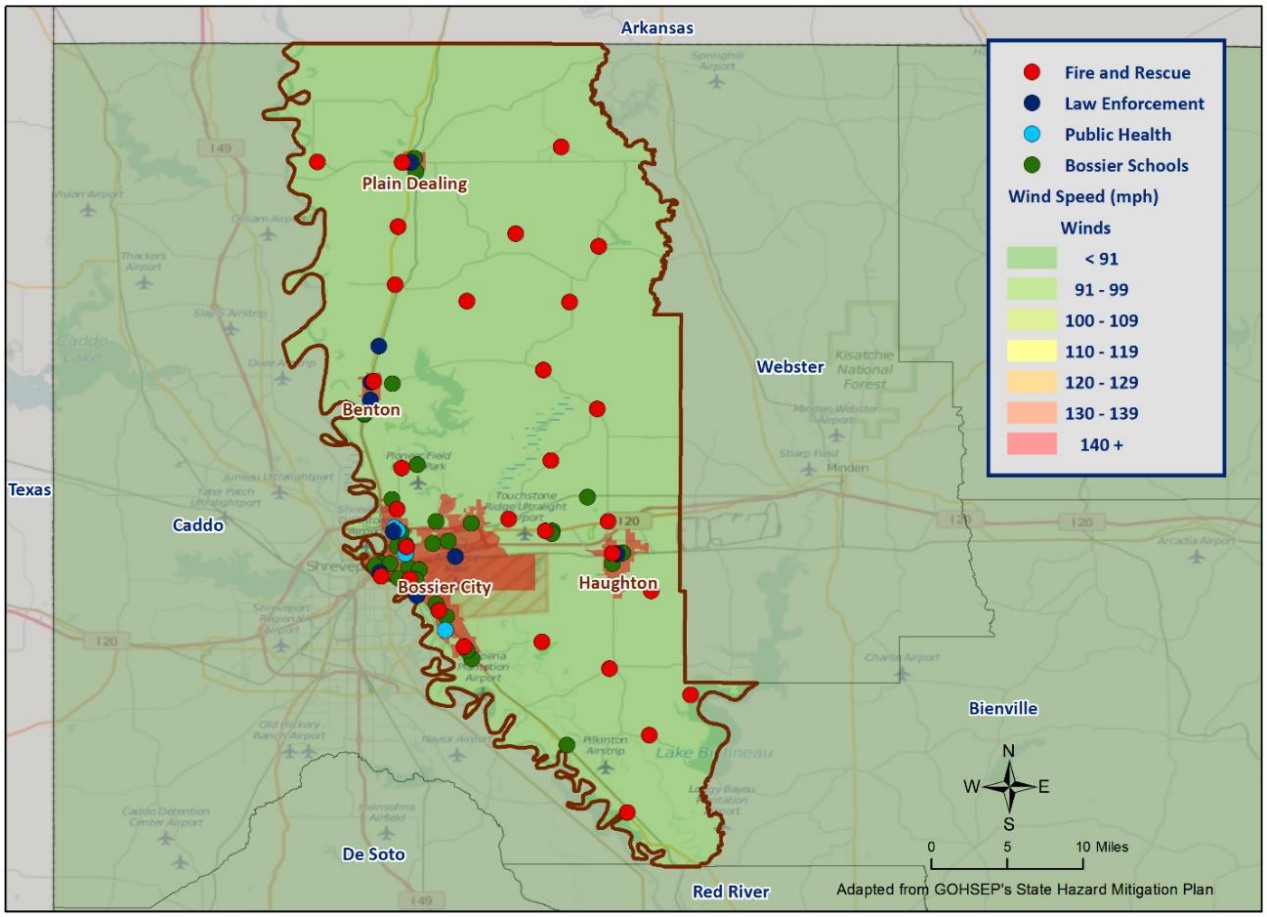


Figure 2-25: Winds Zones for Bossier Parish in Relation to Critical Facilities

Frequency / Probability

Tropical cyclones are large natural hazard events that regularly impact Bossier Parish. The annual chance of occurrence for a tropical cyclone is estimated at 12% for Bossier 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 2-52: Total Estimated Losses for a 100-Year Hurricane Event
(Source: Hazus 2.2)

Jurisdiction	Estimated Total Losses from 100-Year Hurricane Event
Bossier Parish (Unincorporated)	$1,671,012
Benton	$66,098
Bossier City	$2,080,495
Haughton	$117,199
Plain Dealing	$34,440
Total	$3,969,244

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 2-53: Ratio of Total Losses to Total Estimated Value of Assets for each Jurisdiction in Bossier 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	$1,671,012	$6,829,455,000	0.0%
Benton	$66,098	$304,218,000	0.0%
Bossier City	$2,080,495	$10,920,728,000	0.0%
Haughton	$117,199	$301,164,000	0.0%
Plain Dealing	$34,440	$139,892,000	0.0%

Based on the Hazus 2.2 Hurricane Model, estimated total losses were less than 0.1% of the total estimated value of all assets for the entirety of Bossier Parish and its incorporated areas.

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 below and on the following pages. These sectors are comprised of privately owned structures/facilities, as well as locally, state, and federally owned structures/facilities.

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

Bossier Parish (Unincorporated)	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$0
Commercial	$78
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$1,670,934
Schools	$0
Total	$1,671,012

Table 2-55: Estimated Losses in Benton for a 100-Year Hurricane Event (Source: Hazus 2.2)

Benton	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$0
Commercial	$3
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$66,095
Schools	$0
Total	$66,098

Table 2-56: *Estimated Losses in Bossier City for a 100-Year Hurricane Event (Source: Hazus 2.2)*

Bossier City	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$0
Commercial	$98
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$2,080,397
Schools	$0
Total	$2,080,495

Table 2-57: Estimated Losses in Haughton for a 100-Year Hurricane Event (Source: Hazus 2.2)

Haughton	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$0
Commercial	$5
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$117,193
Schools	$0
Total	$117,199

Table 2-58: Estimated Losses in Plain Dealing for a 100-Year Hurricane Event (Source: Hazus 2.2)

Plain Dealing	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$0
Commercial	$2
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$34,439
Schools	$0
Total	$34,440

Threat to People

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

Table 2-59: Number of People Susceptible to a 100-Year Hurricane Event in Bossier Parish (Source: Hazus 2.2)

Number of People Exposed to Hurricane Hazards			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Parish (Unincorporated)	**49,247**	**49,247**	**100.0%**
Benton	**1,948**	**1,948**	**100.0%**
Bossier City	**61,315**	**61,315**	**100.0%**
Haughton	**3,454**	**3,454**	**100.0%**
Plain Dealing	**1,015**	**1,015**	**100.0%**
Total	**116,979**	**116,979**	**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 2-60: Vulnerable Populations in Unincorporated Bossier Parish for a 100-Year Hurricane Event (Source: Hazus 2.2)

Bossier Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	49,247	100.0%
Persons Under 5 Years	3,649	7.4%
Persons Under 18 Years	8,993	18.3%
Persons 65 Years and Over	5,905	12.0%
White	35,546	72.2%
Minority	13,701	27.8%

Table 2-61: Vulnerable Populations in Benton for a 100-Year Hurricane Event (Source: Hazus 2.2)

Benton		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	1,948	100.0%
Persons Under 5 Years	119	6.1%
Persons Under 18 Years	391	20.1%
Persons 65 Years and Over	275	14.1%
White	1,077	55.3%
Minority	871	44.7%

Table 2-62: Vulnerable Populations in Bossier City for a 100-Year Hurricane Event (Source: Hazus 2.2)

Bossier City		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	61,315	100.0%
Persons Under 5 Years	4,973	8.1%
Persons Under 18 Years	11,024	18.0%
Persons 65 Years and Over	7,474	12.2%
White	40,088	65.4%
Minority	21,227	34.6%

Table 2-63: Vulnerable Populations in Haughton for a 100-Year Hurricane Event (Source: Hazus 2.2)

Haughton		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	3,454	100.0%
Persons Under 5 Years	293	8.5%
Persons Under 18 Years	661	19.1%
Persons 65 Years and Over	321	9.3%
White	2,700	78.2%
Minority	754	21.8%

Table 2-64: Vulnerable Populations in Plain Dealing for a 100-Year Hurricane Event (Source: Hazus 2.2)

Plain Dealing		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	1,015	100.0%
Persons Under 5 Years	53	5.2%
Persons Under 18 Years	170	16.8%
Persons 65 Years and Over	226	22.3%
White	530	52.2%
Minority	485	47.8%

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 2-26* displays the areas of wildland-urban interaction in Bossier 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 2-65: 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 Bossier Parish and its jurisdictions.

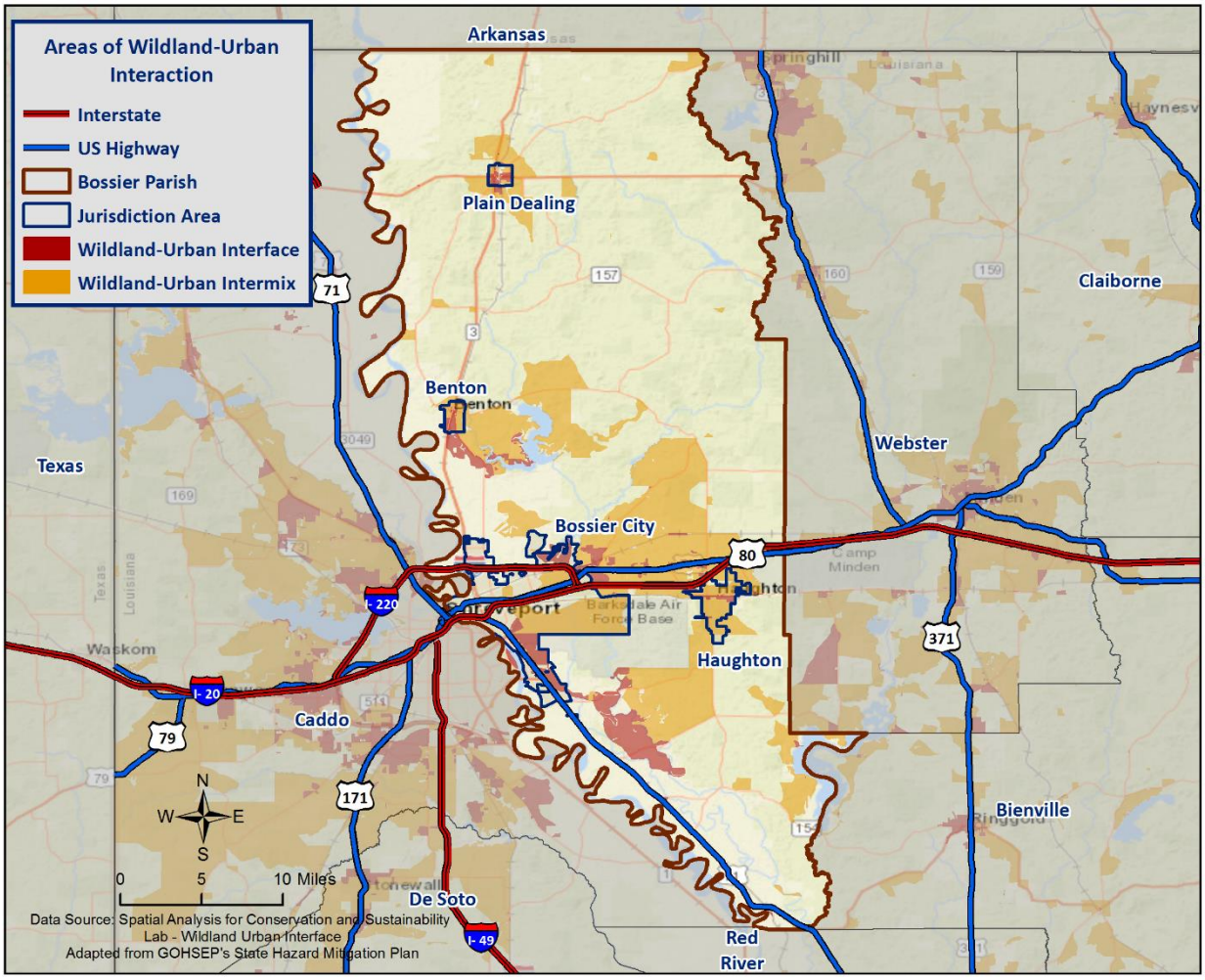


Figure 2-26: Wildland-Urban Interaction in Bossier Parish

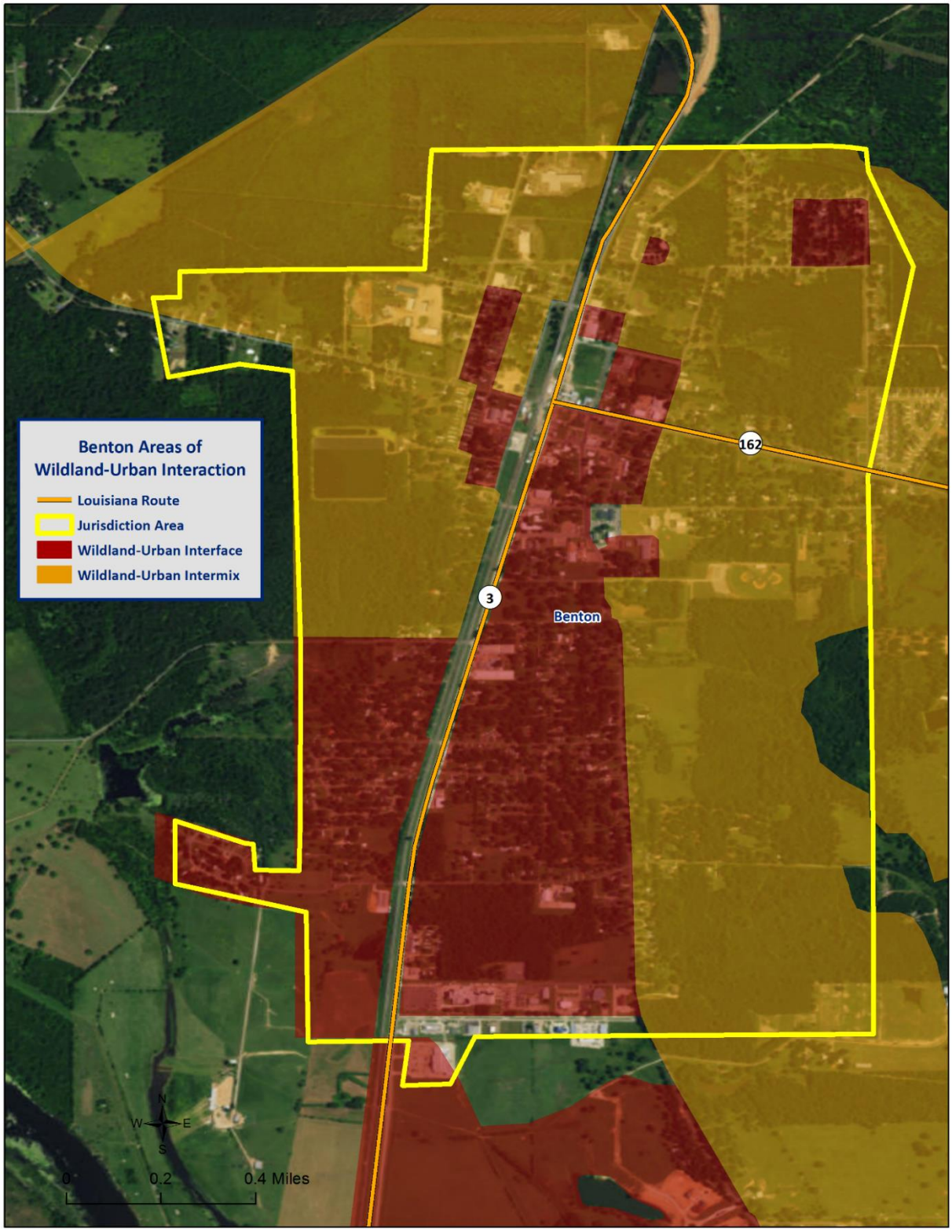


Figure 2-27: Wildland-Urban Interaction in Benton

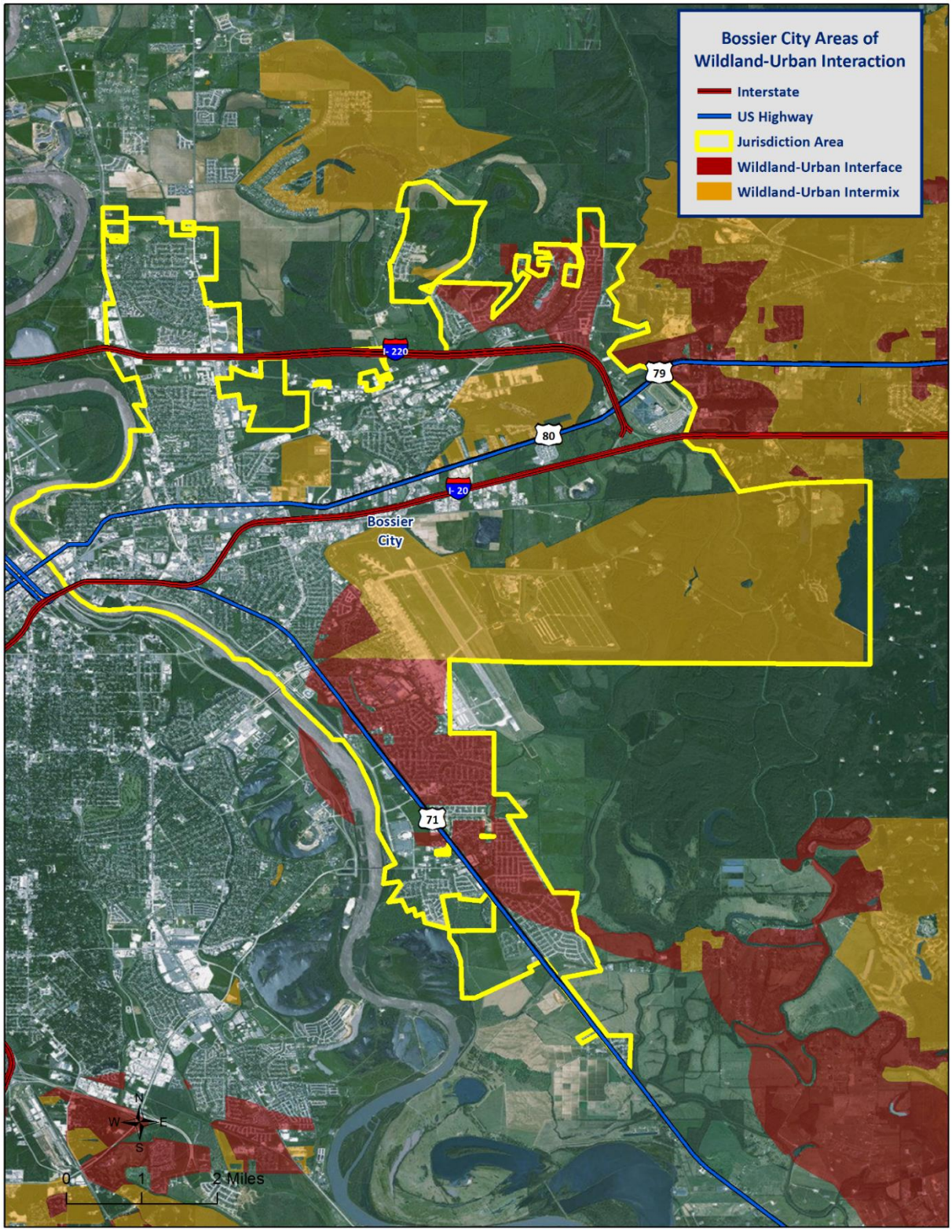


Figure 2-28: Wildland-Urban Interaction in Bossier City

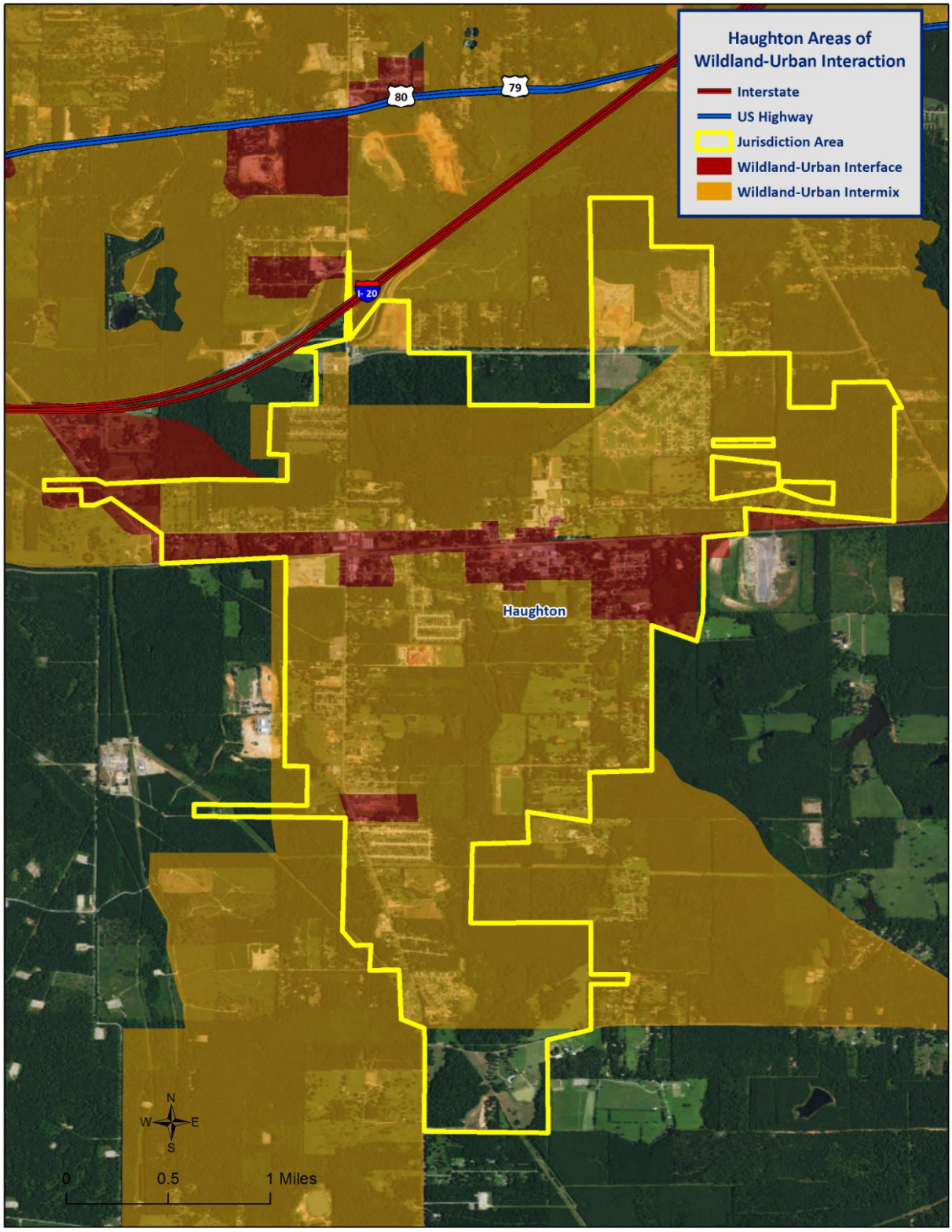


Figure 2-29: Wildland-Urban Interaction in Haughton

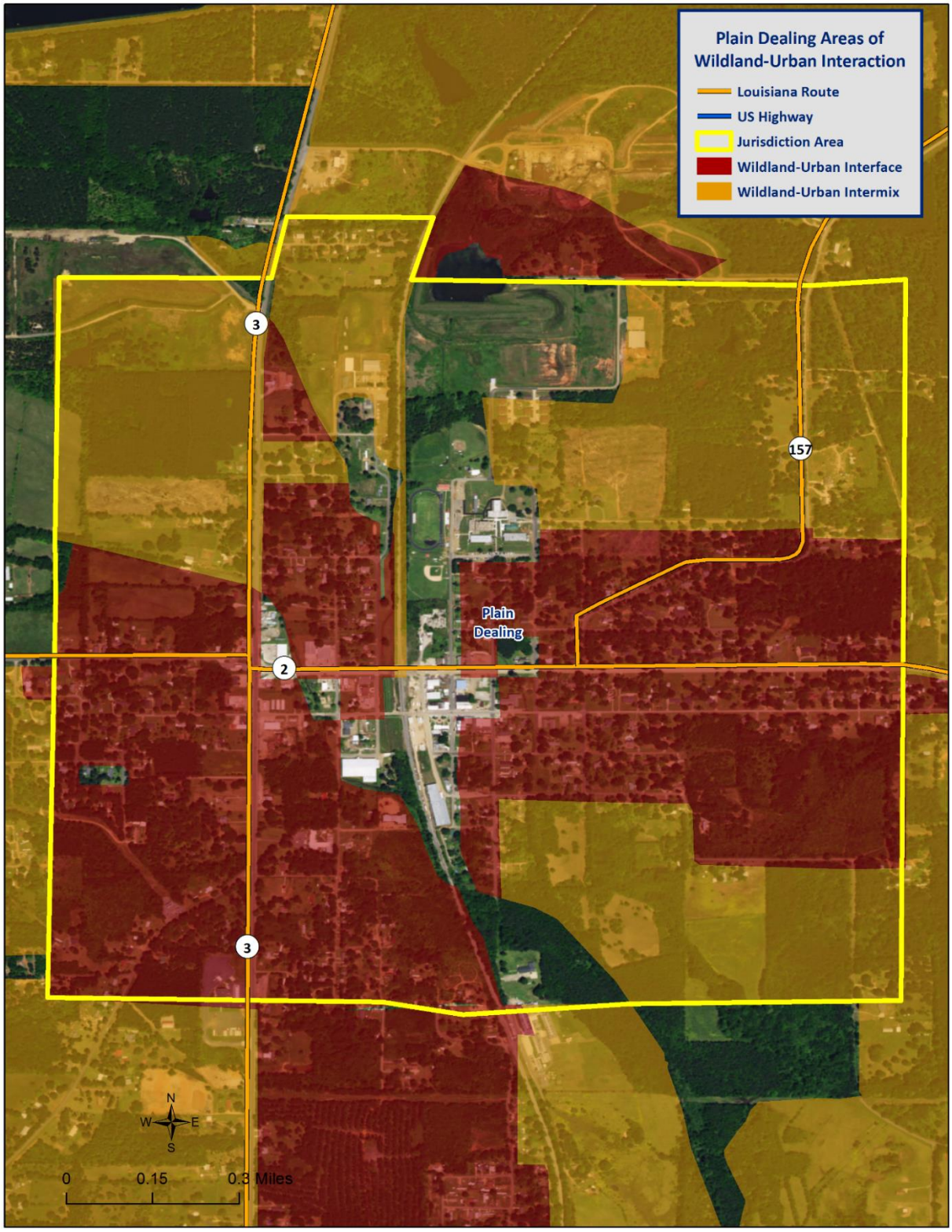


Figure 2-30: Wildland-Urban Interaction in Plain Dealing

Previous Occurrences / Extents

There have been no reported wildfire events that have occurred within the boundaries of Bossier Parish between the years of 1990 and 2015. Since 2010, there have been no reported wildfire events in the incorporated areas of Benton, Bossier City, Haughton, and Plain Dealing.

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

Table 2-66: Potential Wildfire Intensity Levels for Bossier Parish
(Source: Southern Wildfire Assessment Portal)

Potential Wildfire Intensity	
Bossier Parish (Unincorporated)	Highest Intensity Level 5
Benton	Low to Moderate Intensity Level 2.5
Bossier City	Low to Moderate Intensity Level 2.5
Haughton	High Intensity Level 4
Plain Dealing	Low Intensity Level 2

Frequency / Probability

With no recorded events in 25 years, wildfire events within the boundaries of Bossier Parish have an annual chance of occurrence calculated at less than 1%.

Estimated Potential Losses

There have been no wildfire events that have caused property damage, crop damage, injuries, or fatalities in Bossier 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 2-26* displays the areas of wildland-urban interaction in Bossier 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 2-67: Total Building Exposure by Wildland-Urban Interaction Areas
(Source: Hazus 2.2)

Jurisdiction	Estimated Total Building Exposure
Bossier Parish (Unincorporated)	$5,322,579,000
Benton	$303,700,000
Bossier City	$5,018,694,000
Haughton	$301,164,000
Plain Dealing	$139,144,000
Total	$11,085,281,000

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 2-68: Estimated Exposure for Unincorporated Bossier Parish by Sector (Source: Hazus 2.2)

Bossier Parish (Unincorporated)	Estimated Total Building Exposure by Sector
Agricultural	$15,470,000
Commercial	$452,873,000
Government	$8,575,000
Industrial	$154,968,000
Religious / Non-Profit	$94,764,000
Residential	$4,572,208,000
Schools	$23,721,000
Total	$5,322,579,000

Table 2-69: Estimated Exposure for Benton by Sector (Source: Hazus 2.2)

Benton	Estimated Total Building Exposure by Sector
Agricultural	$1,762,000
Commercial	$36,438,000
Government	$57,557,000
Industrial	$4,526,000
Religious / Non-Profit	$8,710,000
Residential	$191,961,000
Schools	$2,746,000
Total	$303,700,000

Table 2-70: Estimated Exposure for Bossier City by Sector (Source: Hazus 2.2)

Bossier City	Estimated Total Building Exposure by Sector
Agricultural	$8,918,000
Commercial	$538,077,000
Government	$40,542,000
Industrial	$84,930,000
Religious / Non-Profit	$48,776,000
Residential	$4,271,849,000
Schools	$25,602,000
Total	$5,018,694,000

Table 2-71: Estimated Exposure for Haughton by Sector
(Source: Hazus 2.2)

Haughton	Estimated Total Building Exposure by Sector
Agricultural	$918,000
Commercial	$19,244,000
Government	$2,013,000
Industrial	$3,051,000
Religious / Non-Profit	$8,310,000
Residential	$262,440,000
Schools	$5,188,000
Total	$301,164,000

Table 2-72: Estimated Exposure for Plain Dealing by Sector
(Source: Hazus 2.2)

Plain Dealing	Estimated Total Building Exposure by Sector
Agricultural	$1,676,000
Commercial	$30,181,000
Government	$1,668,000
Industrial	$2,981,000
Religious / Non-Profit	$5,728,000
Residential	$90,228,000
Schools	$6,682,000
Total	$139,144,000

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 2-73: 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**
Bossier (Unincorporated)	**49,247**	**40,715**	**82.7%**
Benton	**1,948**	**1,948**	**100%**
Bossier City	**61,315**	**28,245**	**46.1%**
Haughton	**3,454**	**3,454**	**100%**
Plain Dealing	**1,015**	**1,015**	**100%**
Total	**116,979**	**75,377**	**64.4%**

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

Bossier Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	40,715	82.7%
Persons Under 5 Years	3,017	7.4%
Persons Under 18 Years	7,435	18.3%
Persons 65 Years and Over	4,882	12.0%
White	29,388	72.2%
Minority	11,327	27.8%

Table 2-75: Population in Benton Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Benton		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	1,948	100.0%
Persons Under 5 Years	119	6.1%
Persons Under 18 Years	391	20.1%
Persons 65 Years and Over	275	14.1%
White	1,077	55.3%
Minority	871	44.7%

Table 2-76: Population in Bossier City Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Bossier City		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	28,245	46.1%
Persons Under 5 Years	2,291	8.1%
Persons Under 18 Years	5,078	18.0%
Persons 65 Years and Over	3,443	12.2%
White	18,467	65.4%
Minority	9,778	34.6%

Table 2-77: Population in Haughton Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Haughton		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	3,454	100.0%
Persons Under 5 Years	293	8.5%
Persons Under 18 Years	661	19.1%
Persons 65 Years and Over	321	9.3%
White	2,700	78.2%
Minority	754	21.8%

Table 2-78: Population in Plain Dealing Located within a Wildland-Urban Interaction Area (Source: 2010 U.S. Census Data)

Plain Dealing		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	1,015	100.0%
Persons Under 5 Years	53	5.2%
Persons Under 18 Years	170	16.8%
Persons 65 Years and Over	226	22.3%
White	530	52.2%
Minority	485	47.8%

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 2-79: 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 Bossier Parish as all of the adjacent parishes, the entire planning area for Bossier Parish is equally at risk for winter storms.

Previous Occurrences / Extents

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

Table 2-80: Previous Occurrences for Winter Storm Events

Date	Synopsis	Property Damage	Crop Damage
March 14, 1993	A widespread, damaging freeze occurred. Temperatures fell into the upper teens across the northern parishes and into the 20s elsewhere. Total agricultural losses are estimated to be about $8.9 million. Due to the relatively mild winter, many crops were in early bloom. The peach crop which is grown in the northern part of the state suffered a 60% loss valued around $2 million. The blueberry crop was almost totally destroyed for a loss of $1.1 million.	$0	$227,828

Date	Synopsis	Property Damage	Crop Damage
February 10, 1994	A severe ice stormed developed over Louisiana and adjacent states. Freezing rain spread across much of the northern 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 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. The result was widespread freezing rain, sleet, and freezing drizzle. Ice accumulated mainly across exposed surfaces such as trees and power lines as well as bridges and overpasses. Over a quarter million people were without power, some for over a week.	$85,433	$0
December 12, 2000	Ice accumulations on average of one inch were common in northwest Louisiana. 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. Numerous traffic accidents were reported from ice covered roads and bridges. In the Shreveport-Bossier metroplex, more than 205 streets were either blocked or partially blocked by limbs and fallen trees.	$10,158,049	$0
December 24, 2000	Freezing rain accumulations ranged from ¼ to near 1-inch north of Interstate 20. Widespread power outages were reported across north Louisiana. 50,000 residents lost power due to ice accumulations on power lines and fallen trees and snapped tree limbs.	$10,158,049	$0
January 7, 2010	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. Bossier’s Utility Department responded to more than 100 calls from people who had their water pipes burst in their homes, businesses, or on their property.	$108,567	$0
February 11, 2014	Moderate amounts of a wintery mix fell across the parish with ice accumulations of approximately ¼ of an inch.	$0	$0

Based on previous winter storm events, the worst-case scenario for the unincorporated area of Bossier Parish and its incorporated areas is approximately three to four inches of snow accumulation and approximately one to two inches of ice accumulation.

Frequency / Probability

With six recorded events in 25 years, winter storm events within the boundaries of Bossier Parish have an annual chance of occurrence calculated at 28% based on the SHELDUS dataset.

Estimated Potential Losses

Since 1990, there have been six 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 $22,050,456. 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 $882,018. 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 Bossier Parish based on the 2010 Census data:

Table 2-81: Estimated Annual Losses for Winter Weather Events in Bossier Parish

Estimated Annual Potential Losses from Winter Weather for Bossier Parish				
Unincorporated Bossier Parish (42.1% of Population)	**Benton (1.7% of Population)**	**Bossier City (52.4% of Population)**	**Haughton (3.0% of Population)**	**Plain Dealing (0.9% of Population)**
$371,321	$14,688	$462,313	$26,043	$7,653

From 1990 - 2015, there have been no injuries or fatalities as a result of winter weather in Bossier 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

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

Previous Occurrences / Extents

There have been no reported dam failures in Bossier Parish from 1990 to 2015. Dam information including the extent of dam failures has been requested from the USACE. Bossier 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 Bossier Parish planning area. Bossier 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

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

Previous Occurrences / Extents

There have been no reported levee failures in Bossier 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. Bossier 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 Bossier Parish planning area. Bossier Parish is awaiting a response from the USACE, and will continue to work to update this information as new data is received.

3. Capability Assessment

This section summarizes the results of the Bossier 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, Bossier 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

Bossier 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 Bossier 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 Bossier Parish and its jurisdictions are shown in the table on the following page.

Table 3-1: Bossier Parish Planning and Regulatory Capabilities

Planning and Regulatory						
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.						
	Bossier Unincorporated	Benton	Bossier City	Haughton	Plain Dealing	
Plans	Yes / No					
Comprehensive / Master Plan	Yes	Yes	Yes	No	No	
Capital Improvements Plan	Yes	No	Yes	No	No	
Economic Development Plan	Yes	Yes	No	No	No	
Local Emergency Operations Plan	Yes	Yes	Yes	Yes	No	
Continuity of Operations Plan	No	No	No	No	No	
Transportation Plan	Yes	No	Yes	No	No	
Stormwater Management Plan	Yes	No	Yes	Yes	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	Yes	Yes	Yes	
Building Code Effectiveness Grading Schedule (BCEGS) Score	No	Yes	Yes	N/A	Unknown	
Fire Department ISO/PIAL rating	No	Yes, 2	Yes	Yes, 3	4	
Site plan review requirements	Yes	Yes	Yes	N/A	Yes	
Land Use Planning and Ordinances	Yes / No					
Zoning Ordinance	Yes	Yes	Yes	Yes	No	
Subdivision Ordinance	Yes	Yes	Yes	Yes	No	
Floodplain Ordinance	Yes	Yes	Yes	Yes	Yes	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	Yes	No	Yes	No	No	
Flood Insurance Rate Maps	Yes	Yes	Yes	Yes	Yes	
Acquisition of land for open space and public recreation uses	Yes	No	Yes	Yes	No	
Other	No	No	No	No	No	

Building Codes, Permitting, Land Use Planning and Ordinances

The Bossier Parish Police Jury provides oversight for building permits and codes for the unincorporated areas of the parish, as well as the jurisdictions of Benton, Bossier City, and Haughton, and all parish ordinances.

As of the 2016 update, Bossier 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 Bossier Parish Police Jury is also responsible for enforcing the Parish Ordinances relating to health and safety, property maintenance standards, condemnation of unsafe structures, and zoning compliance.

The Bossier 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, Bossier Parish as a whole has a system in place to coordinate and share these capabilities through Bossier 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, Bossier 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 Bossier Parish and its jurisdictions.

Table 3-2: Bossier Parish Administrative and Technical Capabilities

	Bossier Unincorporated	Benton	Bossier City	Haughton	Plain Dealing	Comments
Administration	Yes / No					
Planning Commission	Yes	Yes	Yes	Yes	No	Bossier and Benton MPC
Mitigation Planning Committee	No	No	No	Yes	No	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	Yes	Yes	Yes	Yes	Yes	
Mutual Aid Agreements	Yes	No	No	No	No	
Staff	Yes / No; FT/PT; % Hazard Mitigation					
Chief Building Official	No	Yes	Yes	No	Yes	
Floodplain Administrator	Yes	Yes	Yes	Yes	Yes	
Emergency Manager	Yes	Yes	Yes	No	No	
Community Planner	Yes	No	Yes	No	No	Bossier and Benton MPC
Civil Engineer	Yes	Yes	Yes	No	No	
GIS Coordinator	Yes	No	Yes	Yes	No	
Grant Writer	No	Yes	Yes	No	No	
Other	No	No	No	No	No	Haughton- Zoning Administrator
Technical	Yes / No					
Warning Systems / Service (Reverse 911, outdoor warning signals)	Yes	Yes	Yes	Yes	Yes	
Hazard Data & Information	Yes	No	Yes	Yes	No	
Grant Writing	No	Yes	Yes	No	No	
Hazus Analysis	No	No	Yes	No	No	
Other	No	No	No	No	No	

Financial capabilities are the resources that Bossier 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 Bossier Parish and its jurisdictions:

Table 3-3: Bossier Parish Financial Capabilities

Financial						
Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.						
	Bossier Uninvorporated	Benton	Bossier City	Haughton	Plain Dealing	
Funding Resource	Yes / No					
Capital Improvements project funding	Yes	Yes	Yes	Yes	No	
Authority to levy taxes for specific purposes	Yes	Yes	No	Yes	No	
Fees for water, sewer, gas, or electric services	Yes	Yes	Yes	Yes	No	
Impact fees for new development	No	Yes	Yes	Yes	No	
Stormwater Utility Fee	No	No	No	No	No	
Community Development Block Grant (CDBG)	Yes	Yes	Yes	Yes	No	
Other Funding Programs	No	Yes	Yes	No	No	

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.

Bossier 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: Bossier Parish Education and Outreach Capabilities

	Boisser Unincorporated	Benton	Bossier City	Haughton	Plain Dealing	Comments
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	Yes	No	Haughton- A.C.T.I.O.N.
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	No	No	No	Yes	No	Haughton Fire Prevention Program
Natural Disaster or safety related school program	No	No	No	Yes	Yes	
Storm Ready certification	No	No	No	No	No	
Firewise Communities certification	No	No	No	No	No	
Public/Private partnership initiatives addressing disaster-related issues	Yes	No	No	Yes	No	
Other	No	No	No	No	No	

In some cases, the jurisdictions rely on Bossier Parish OHSEP and/or Bossier 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, Bossier Parish and its jurisdiction remains committed to expanding and improving on the existing capabilities within the parish. Each participating jurisdiction will work toward increased participation in funding opportunities and available mitigation programs. Should funding become available, the hiring of additional personnel to dedicate to hazard mitigation initiatives and programs, as well as increasing ordinances within the jurisdictions, will 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 Bossier 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 Benton
- City of Bossier City
- Town of Haughton
- Town of Plain Dealing

Flood Insurance and Community Rating System

Bossier Parish is not a participant in the Community Rating System (CRS). However, the City of Bossier City does participate. 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, including the City of Bossier City (class 8). 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 jurisdiction 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 jurisdiction 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.

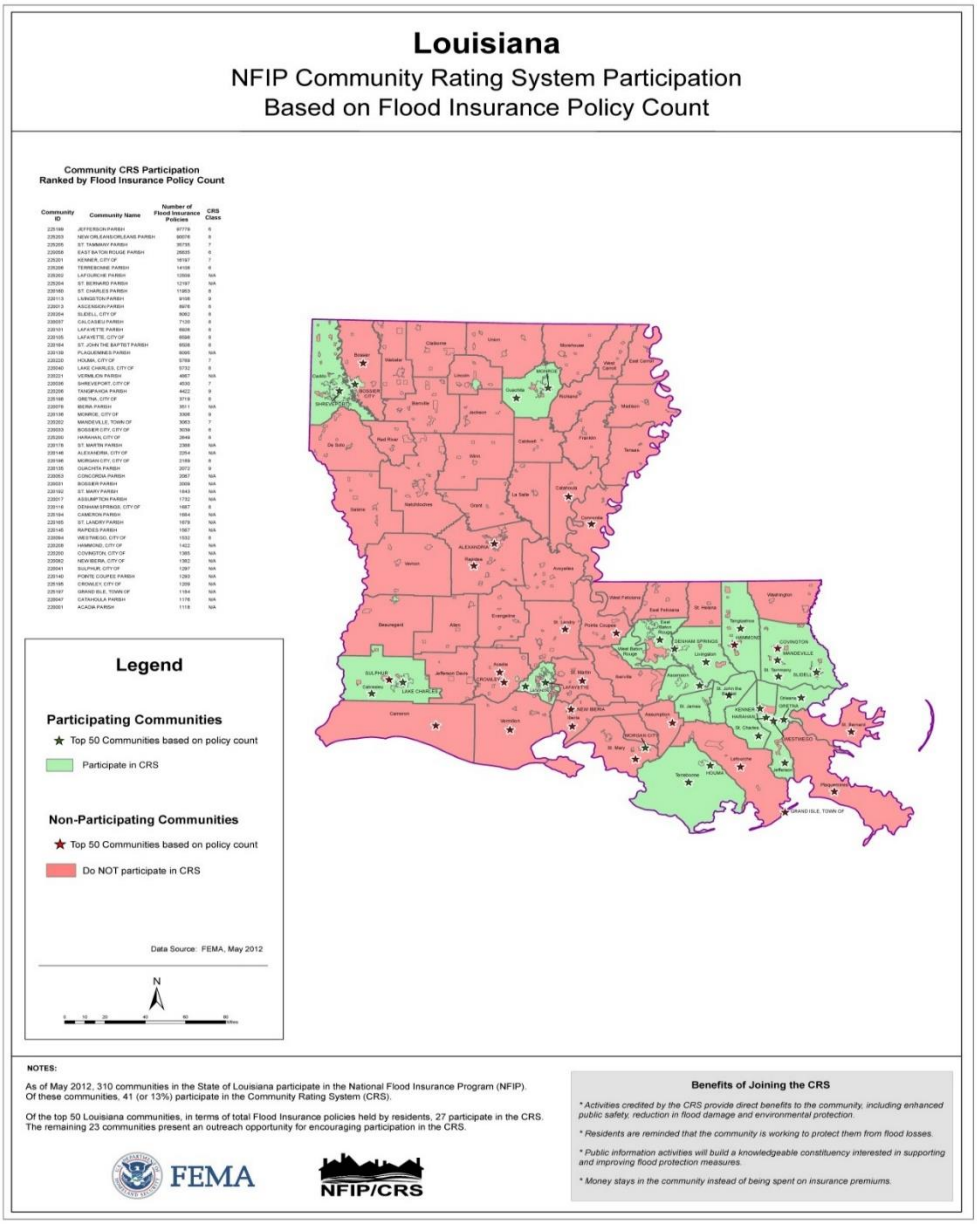


Figure 3-2: Louisiana CRS NFIP Participation
(Source: FEMA[2])

[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

Bossier 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.

Bossier 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 Bossier Parish Hazard Mitigation Plan Steering Committee, under the coordination of the Bossier 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 – November 2016.

An online public opinion survey was conducted of Bossier Parish residents between March and November 2016. The survey was designed to capture public perceptions and opinions regarding natural hazards in Bossier 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 Bossier 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 Bossier Parish survey can be found at the following link:

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

During the public meeting in August, 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 Bossier 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, Bossier 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 Bossier 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 two goals remain valid.

The goals are as follows:

- Enhance and develop emergency services, including response
- Protect lives and property from the dangers of natural hazards

The Mitigation Action Plan focuses on actions to be taken by Bossier 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 Bossier Parish Hazard Mitigation Plan Steering Committee and participating jurisdictions each identified actions that would reduce and/or prevent future damage within Bossier 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 table below.

Bossier Parish and Jurisdictions 2011 Hazard Mitigation Action Update

Bossier Parish and All Jurisdictions 2011 Mitigation Action Update					
Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B1: Auxiliary Power Generators	Purchase and install auxiliary power generators at critical facilities in the Parish. Benefits: Maintains operability of water systems for pressure necessary to maintain fire protection and other critical facilities necessary for livability in the Parish during power failures caused by storm events.	FEMA Mitigation Grant; Parish Budget	Bossier Parish Police Jury	Floods / Hurricanes / Tropical Storms / Tornadoes / Dam Failure / Levee Failure / Thunderstorms (Lightning and High Wind) / Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over
B2: Light Towers	Purchase and deploy light towers to enhance public safety at critical facilities. Benefits: Provides for the safety of the public at critical facilities during major power outages.	FEMA Mitigation Grant; Parish Budget	Bossier Parish Police Jury	Floods / Hurricanes / Tropical Storms/ Tornadoes / Thunderstorms (Lightning and High Wind)/ Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over
B3: Portable Stormwater Pump	Purchase and deploy a portable stormwater pump with generator as needed at critical flood-prone locations. Benefits: Can help to reduce threat of flooding, thereby limiting property damage during heavy rain events.	Mitigation Grant; Parish Budget	Bossier Parish Police Jury	Floods / Hurricanes / Tropical Storms / Tornadoes / Dam Failure / Levee Failure / Thunderstorms (Lightning and High Wind) / Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over

Bossier Parish and All Jurisdictions 2011 Mitigation Action Update					
Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B4: Retrofit Public Shelters	Retrofit public buildings currently used as shelters to provide with air-conditioning, kitchens, and bathroom / shower facilities; wind-protection measures (storm shutters, hurricane straps, etc.) where needed and inspect for structural soundness. Benefits: Greatly increases public safety at shelter facilities (that are so improved).	HMGP; GOHSEP	Bossier Parish Police Jury; ARC; Public Works Departments in Parish and Jurisdictions	Floods / Hurricanes / Tropical Storms / Tornadoes / Dam Failure / Levee Failure / Thunderstorms (Lightning and High Wind) / Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over
B5: Parish Critical Buildings Wind Retrofitting	Harden all Parish critical buildings against wind-related hazards by wind-retrofitting with wind-proof windows and/or shutters, doors, roof tie-down fittings, etc. Also include at appropriate critical buildings safe rooms to afford emergency protection to personnel operating these buildings and facilities. Benefits: Reduces or eliminates wind-related damages at such facilities, provides emergency protection to critical personnel operating such facilities during wind hazard events.	Mitigation Grant; Parish Budget	Bossier Parish Police Jury	Floods / Hurricanes / Tropical Storms/ Tornadoes / Thunderstorms (Lightning and High Wind)/ Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over
B6: Remove Repetitive Loss Structures	Acquire and remove repetitive loss structures from flood-prone areas of the Parish. Benefits: Removes flood-prone properties from flood hazard areas, reducing costs to taxpayers to cover future flood damages, and ultimately helping to reduce the cost of flood insurance.	FEMA Mitigation Grant; Parish Budget	Bossier Parish Police Jury; Parish Floodplain Manager	Floods	Carried Over

Bossier Parish and All Jurisdictions 2011 Mitigation Action Update					
Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B7: Strengthen Flood Damage Prevention	Continue to use joint committee to strengthen flood damage prevention and floodplain management ordinances within the Parish and each jurisdiction in order to reduce or prevent storm-related damages to buildings and infrastructure. Benefits: Such ordinance improvements will help mitigate the risk of damage to buildings and infrastructure by increasing restrictions on (new) construction in flood-prone areas of the Parish.	GOHSEP (grant); Parish Budget	Bossier Parish Police Jury	Floods	Carried Over
B8: Enhance Building Inspection Capabilities	Continue to enhance building inspection capabilities of Parish's building inspection department to verify compliance with IBC, including fire resistant materials for (new) homes built in high fire risk areas of Parish. Benefits: Better training and other improvements to capabilities of this department will help to mitigate a variety of hazards throughout the Parish.	HMGP; GOHSEP	Bossier Parish Police Jury	Floods / Hurricanes / Tropical Storms/ Tornadoes / Thunderstorms (Lightning and High Wind)/ Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over
B9: Elevate Flood-Prone Properties	Initiate a program to elevate identified flood-prone properties where feasible including, but not limited to, properties in a dam inundation area, or employ a variety of flood-proofing techniques. Benefit: Reduces future vulnerability from flooding and helps to reduces losses and flood insurance premiums.	FEMA Mitigation Grant; Parish Budget	Bossier Parish Police Jury; Parish Floodplain Manager	Floods/Dam Failure/Levee Failure	Carried Over

Bossier Parish and All Jurisdictions 2011 Mitigation Action Update					
Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B10: Raise and Harden Levees	Raise and harden levees in the Parish to reduce the threat of levee failure and/or overtopping during flood events. Benefits: Will greatly reduce the threat of flooding in vulnerable adjacent communities.	FEMA Mitigation Grant; USACE	Bossier Parish Police Jury; Bossier Levee District; USACE; Parish Floodplain Manager	Floods/Levee Failure	Carried Over
B11: Masters of Disasters Education Program	Implement the Red Cross "Masters of Disasters" education program in local school system to provide public awareness of local hazard (exposure). Benefits: Very cost-effective program has the possibility of reaching the greatest number of people (in the Parish).	HMGP; GOHSEP	Bossier Parish Police Jury; American Red Cross; Bossier Parish School Systems (Superintendents)	Floods / Hurricanes / Tropical Storms / Tornadoes / Dam Failure / Levee Failure / Thunderstorms (Lightning and High Wind) / Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over
B12: All Hazards Activities	Sponsor "All-Hazards Activities" in the Parish to educate citizens and/or homeowners on the causes and impacts of all natural hazards that threaten public safety and property in the Parish. Benefits: Attendees will have access to presentations, pamphlets, and flyers offering tips for hazard prevention, preparedness, and response, as well as contact information for additional guidance and information.	Parish Budget	Bossier Parish Police Jury	Floods / Hurricanes / Tropical Storms / Tornadoes / Dam Failure / Levee Failure / Thunderstorms (Lightning and High Wind) / Severe Winter Storms (Ice and Snow) / Hailstorms	Carried Over
B13: New Program Flyer	Develop, print, and distribute a new flyer explaining benefits of NFIP program to residents of Parish, its eligibility for CRS program, and benefits of this program to property owners. Benefits: Potential expansion of the NFIP programs in the	Parish Budget	Bossier Parish Police Jury; Parish Floodplain Manager	Floods	Carried Over

Bossier Parish and All Jurisdictions 2011 Mitigation Action Update					
Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
	Parish and, through participation in CRS program, the lowering of flood insurance premiums.				
B14: Complete Drainage Projects	After completion of engineering studies by USACE, undertake and complete various drainage projects including, but not limited to, dam areas around the Parish. Benefits: When complete, proposed drainage projects will help to significantly limit property damage due to flooding, as well as (over time) reduce property costs and insurance premiums, and protect public health and safety.	USACE; Parish Budget; Bossier Levee Board; Bossier City; FEMA Mitigation Grant	Bossier Parish Police Jury, USACE, Bossier Parish Levee Board, Bossier City	Floods	Carried Over
B15: Mobile Generators	Maintain functionality of water treatment facilities by purchasing mobile generators. Benefits: Ensures functionality of water treatment and public sewer systems during power outages, limiting risk to public health and the environment.	FEMA Mitigation Grant; Parish Budget	Bossier Parish Police Jury	Floods / Severe Winter Storms (Ice and Snow / Tornadoes / Hailstorms / Thunderstorms (Lightning and High Wind) / Hurricanes Tropical Storms / Wildland Fire	Carried Over
B16: Sandbagging Equipment	Purchase sandbagging equipment so that sandbags can be quickly packed and delivered to at-risk locations in the Parish. Benefits: Faster response to expected river/stream level rise or to heavy rains can help to reduce property damage from flooding.	Parish Budget	Bossier Parish Police Jury	Floods	Carried Over

Bossier Parish and All Jurisdictions 2011 Mitigation Action Update					
Action	**Action Description**	**Funding Source**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B17: Metal and Poly-Cade Barricades	Purchase metal/poly-cade barricades to provide warning for hazardous situations. Benefit: Helps to direct traffic away from hazardous areas, limit delays, and ease stress of motorists; during (pre-storm) event planning, barricades can be used to protect critical structures and provide logistical benefits for first-responders.	GOHSEP (Grant); Parish Budget	Bossier Parish Police Jury	Floods/Hurricanes/Tropical Storms/Wildland Fires	Deleted
B18: Diversion Channel Construction	Protect critical assets in at-risk areas by construction of diversion channel from Red Chute to Flat River Benefits: Diversion channel will improve local economy, (reduce flooding risk and subsequent property damage) by lowering property insurance premiums in area of significant growth in Parish.	USACE; Parish Budget; Bossier Levee Board; Bossier City	Bossier Parish Police Jury, USACE, Bossier Parish Levee Board, Bossier City	Floods	Carried Over

Unincorporated Bossier Parish New Mitigation Actions

Bossier Unincorporated - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B1: 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	Bossier Parish OHSEP	High Wind, Tropical Cyclones, Hail, Tornadoes	New
B2: 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	Bossier Parish OHSEP	Flooding, Tropical Cyclones	New
B3: 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	Bossier Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
B4: Safe Room Projects	Construction of a safe room for first responders located in Bossier Parish. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Bossier Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones	New

Bossier Unincorporated - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness of risks and safety for Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Wildfires, Drought, Dam Failure, Levee Failure and Winter Storms 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	Bossier Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Winter Storms, Wildfires, Drought, Dam Failure, Levee Failure	New
B6: 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	Bossier Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail)	New
B7: 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	Bossier Parish OHSEP	Lightning	New
B8: Warning Systems	Update/upgrade public warning system components throughout Bossier Parish as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Bossier Parish OHSEP	Winter Storms, Dam Failure, Levee Failure, Tornadoes, Tropical Cyclones, Wildfires	New
B9: 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	Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New
B10: Dam and Levee Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam and/or levee failure.	FEMA HMGP, Local	1-5 years	Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New

Bossier Unincorporated - New Mitigation Actions						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B11: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of Drought.	FEMA HMGP, Local	1-5 years	Bossier Parish OHSEP	Drought	New
B12: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Bossier Parish OHSEP	Wildfires	New
B13: 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	Bossier Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	New

Town of Benton - New Mitigation Actions

Town of Benton						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B1: 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 Benton/Bossier Parish OHSEP	High Wind, Tropical Cyclones, Hail, Tornadoes	New
B2: 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 Benton/Bossier Parish OHSEP	Flooding, Tropical Cyclones	New
B3: 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 Benton/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
B4: Safe Room Projects	Construction of a safe room for first responders located in Benton. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Town of Benton/Bossier Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones	New

Town of Benton						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness of risks and safety for Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Wildfires, Drought, Dam Failure, Levee Failure and Winter Storms 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 Benton/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Winter Storms, Wildfires, Drought, Dam Failure, Levee Failure	New
B6: 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 Benton/Bossier Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail)	New
B7: 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 Benton/Bossier Parish OHSEP	Lightning	New
B8: Warning Systems	Update/upgrade public warning system components throughout Benton as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Town of Benton/Bossier Parish OHSEP	Winter Storms, Dam Failure, Levee Failure, Tornadoes, Tropical Cyclones, Wildfires	New
B9: 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 Benton/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New

Town of Benton						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B10: Dam and Levee Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam and/or levee failure.	FEMA HMGP, Local	1-5 years	Town of Benton/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New
B11: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of Drought.	FEMA HMGP, Local	1-5 years	Town of Benton/Bossier Parish OHSEP	Drought	New
B12: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Town of Benton/Bossier Parish OHSEP	Wildfires	New
B13: 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 Benton/Bossier Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	New

City of Bossier City - New Mitigation Actions

City of Bossier City						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B1: 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 Bossier City/Bossier Parish OHSEP	High Wind, Tropical Cyclones, Hail, Tornadoes	New
B2: 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 Bossier City/Bossier Parish OHSEP	Flooding, Tropical Cyclones	New
B3: 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 Bossier City/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
B4: Safe Room Projects	Construction of a safe room for first responders located in Bossier City. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	City of Bossier City/Bossier Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones	New

City of Bossier City						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness of risks and safety for Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Drought, Wildfires, Dam Failure, Levee Failure and Winter Storms 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 Bossier City/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Winter Storms, Wildfires, Drought, Dam Failure, Levee Failure	New
B6: 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 Bossier City/Bossier Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail)	New
B7: 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 Bossier City/Bossier Parish OHSEP	Lightning	New
B8: Warning Systems	Update/upgrade public warning system components throughout Bossier City as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	City of Bossier City/Bossier Parish OHSEP	Winter Storms, Dam Failure, Levee Failure, Tornadoes, Tropical Cyclones, Wildfires	New
B9: 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 Bossier City/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New

City of Bossier City						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
B10: Dam and Levee Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam and/or levee failure.	FEMA HMGP, Local	1-5 years	City of Bossier City/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New
B11: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of Drought.	FEMA HMGP, Local	1-5 years	City of Bossier City/Bossier Parish OHSEP	Drought	New
B12: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	City of Bossier City/Bossier Parish OHSEP	Wildfires	New
B13: 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 Bossier City/Bossier Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	New

Town of Haughton - New Mitigation Actions

Town of Haughton						
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 Haughton/Bossier Parish OHSEP	High Wind, Tropical Cyclones, Hail, 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 Haughton/Bossier Parish OHSEP	Flooding, Tropical Cyclones	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 Haughton/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New
H4: Safe Room Projects	Construction of a safe room for first responders located in Haughton. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Town of Haughton/Bossier Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones	New

Town of Haughton						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
H5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness of risks and safety for Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Drought, Wildfires, Dam Failure, Levee Failure and Winter Storms 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 Haughton/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Winter Storms, Wildfires, Drought, Dam Failure, Levee Failure	New
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 Haughton/Bossier Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail)	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 Haughton/Bossier Parish OHSEP	Lightning	New
H8: Warning Systems	Update/upgrade public warning system components throughout Haughton as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Town of Haughton/Bossier Parish OHSEP	Winter Storms, Dam Failure, Levee Failure, Tornadoes, Tropical Cyclones, Wildfires	New
H9: 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 Haughton/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New

Town of Haughton						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
H10: Dam and Levee Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam and/or levee failure.	FEMA HMGP, Local	1-5 years	Town of Haughton/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New
H11: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of Drought.	FEMA HMGP, Local	1-5 years	Town of Haughton/Bossier Parish OHSEP	Drought	New
H12: Wildfires Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Town of Haughton/Bossier Parish OHSEP	Wildfires	New
H13: 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 Haughton/Bossier Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	New

Town of Plain Dealing - New Mitigation Actions

Town of Plain Dealing						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
P1: 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 Plain Dealing/Bossier Parish OHSEP	High Wind, Tropical Cyclones, Hail, Tornadoes	New
P2: 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 Plain Dealing/Bossier Parish OHSEP	Flooding, Tropical Cyclones	New
P3: 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 Plain Dealing/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	New

Town of Plain Dealing						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
P4: Safe Room Projects	Construction of a safe room for first responders located in Plain Dealing. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Town of Plain Dealing/Bossier Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones	New
P5: Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness of risks and safety for Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Drought, Wildfires, Dam Failure, Levee Failure and Winter Storms 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 Plain Dealing/Bossier Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Thunderstorms (lightning, high wind, hail), Winter Storms, Wildfires, Drought, Dam Failure, Levee Failure	New
P6: 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 Plain Dealing/Bossier Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail)	New
P7: 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 Plain Dealing/Bossier Parish OHSEP	Lightning	New

Town of Plain Dealing						
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
P8: Warning Systems	Update/upgrade public warning system components throughout Plain Dealing as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Town of Plain Dealing/Bossier Parish OHSEP	Winter Storms, Dam Failure, Levee Failure, Tornadoes, Tropical Cyclones, Wildfires	New
P9: 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 Plain Dealing/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New
P10: Dam and Levee Working Group	Create a working group in order to assess the extent and determine the possible effects of a dam and/or levee failure.	FEMA HMGP, Local	1-5 years	Town of Plain Dealing/Bossier Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	New
P11: Drought Ordinances	Adopt ordinances requiring water-saving measures in time of Drought.	FEMA HMGP, Local	1-5 years	Town of Plain Dealing/Bossier Parish OHSEP	Drought	New
P12: Wildfire Ordinances	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 years	Town of Plain Dealing/Bossier Parish OHSEP	Wildfires	New
P13: 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 Plain Dealing/Bossier Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	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 Bossier 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.

Bossier 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 HMGP's hazard mitigation planning process per the FEMA HMGP 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 Bossier Parish Hazard Mitigation Plan Update

The Bossier 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.

Bossier 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 Benton, City of Bossier City, Town of Haughton, and Town of Plain Dealing. Bossier 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.
2/18/2016	Kick-Off Meeting	Bossier City, LA	No	Discuss with the plan steering committee expectations and requirements of the project. Assign plan worksheets to jurisdictions.
8/10/2016	Risk Assessment Overview	Bossier City, LA	No	Discuss and review the risk assessment with the steering committee discuss and review expectations for public meeting.
8/10/2016	Public Meeting	Bossier City, 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 Bossier 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 Bossier 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/BossierParish
2 Week Period	Public Plan Review (Digital)		Yes	Parish Website and Bossier Parish OHSEP

Planning

The plan update process consisted of several phases:

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

Coordination

The Bossier Parish OHSEP oversaw the coordination of the 2016 Hazard Mitigation Plan Update Steering Committee during the update process. The Bossier 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 Committees 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 HMGP

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

- Bossier Parish Police Jury
- Bossier Office of Homeland Security and Emergency Preparedness
- Town of Benton
- City of Bossier City
- Town of Haughton
- Town of Plain Dealing

The Parish Directors of Caddo and Webster were invited by the Bossier Parish OHSEP via email 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
Lorenzo James Walker	Mayor of Bossier City	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ollie Tyler	Mayor of Shreveport	City of Shreveport	505 Travis St. Suite 200 Shreveport, LA	(318) 673-5050
Wayne Cathcart	Mayor of Benton	Town of Benton	105 Sibley Street Benton, LA	(318) 965-2781
Carlton Anderson	Mayor of Haughton	Town of Haughton	PO Box 729 Haughton, LA 71037	(318) 949-9401
Wiley Robinson	Mayor of Plain Dealing	Town of Plain Dealing	205 West Palmetto Plain Dealing, LA	(318) 326-4234
Cliff Oliver	Chief Administration Officer	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ian Snellgrove	Director	Bossier Parish OHSEP	1115 Doctors Drive Bossier City, LA	(318) 425-5352
Jenny Reynolds	Director	Webster Parish OHSEP	Webster Parish OHSEP Minden, LA	(318) 371-1128
Robert Jump	Deputy Director	Caddo OHSEP	Caddo OHSEP Shreveport, LA	(318) 675-2255

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 Bossier 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 Bossier 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 HMGP, 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 (Parish and Jurisdictions)
- 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 Bossier 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: Bossier Parish OHSEP, SDMI Staff

Meeting #2: Hazard Mitigation Plan Update Kick-Off

Date: February 18, 2016

Location: Bossier City, 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	Address	Phone
Lorenzo James Walker	Mayor of Bossier City	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ollie Tyler	Mayor of Shreveport	City of Shreveport	505 Travis St. Suite 200 Shreveport, LA	(318) 673-5050
Wayne Cathcart	Mayor of Benton	Town of Benton	105 Sibley Street Benton, LA	(318) 965-2781
Carlton Anderson	Mayor of Haughton	Town of Haughton	PO Box 729 Haughton, LA 71037	(318) 949-9401
Wiley Robinson	Mayor of Plain Dealing	Town of Plain Dealing	205 West Palmetto Plain Dealing, LA	(318) 326-4234
Cliff Oliver	Chief Administration Officer	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ian Snellgrove	Director	Bossier Parish OHSEP	1115 Doctors Drive Bossier City, LA	(318) 425-5352
Jenny Reynolds	Director	Webster Parish OHSEP	Webster Parish OHSEP, Minden, LA	(318) 371-1128
Robert Jump	Deputy Director	Caddo OHSEP	Caddo OHSEP Shreveport, LA	(318) 675-2255

Meeting #3: Risk Assessment Overview

Date: August 10, 2016

Location: Bossier City, 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	Address	Phone
Lorenzo James Walker	Mayor of Bossier City	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ollie Tyler	Mayor of Shreveport	City of Shreveport	505 Travis St. Suite 200 Shreveport, LA	(318) 673-5050
Wayne Cathcart	Mayor of Benton	Town of Benton	105 Sibley Street Benton, LA	(318) 965-2781
Carlton Anderson	Mayor of Haughton	Town of Haughton	PO Box 729 Haughton, LA 71037	(318) 949-9401
Wiley Robinson	Mayor of Plain Dealing	Town of Plain Dealing	205 West Palmetto Plain Dealing, LA	(318) 326-4234
Cliff Oliver	Chief Administration Officer	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ian Snellgrove	Director	Bossier Parish OHSEP	1115 Doctors Drive Bossier City, LA	(318) 425-5352
Jenny Reynolds	Director	Webster Parish OHSEP	Webster Parish OHSEP Minden, LA	(318) 371-1128
Robert Jump	Deputy Director	Caddo OHSEP	Caddo OHSEP Shreveport, LA	(318) 675-2255

Meeting #4: Public Meeting

Date: August 10, 2016

Location: Bossier City, 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 Bossier Parish communities were provided for the meeting attendees to identify specific areas where localized hazards occur.

Public Initiation: Yes

Invitees Included:

Name	Title	Agency	Address	Phone
Lorenzo James Walker	Mayor of Bossier City	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ollie Tyler	Mayor of Shreveport	City of Shreveport	505 Travis St. Suite 200 Shreveport, LA	(318) 673-5050
Wayne Cathcart	Mayor of Benton	Town of Benton	105 Sibley Street Benton, LA	(318) 965-2781
Carlton Anderson	Mayor of Haughton	Town of Haughton	PO Box 729 Haughton, LA 71037	(318) 949-9401
Wiley Robinson	Mayor of Plain Dealing	Town of Plain Dealing	205 West Palmetto Plain Dealing, LA	(318) 326-4234
Cliff Oliver	Chief Administration Officer	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ian Snellgrove	Director	Bossier Parish OHSEP	1115 Doctors Drive Bossier City, LA	(318) 425-5352
Jenny Reynolds	Director	Webster Parish OHSEP	Webster Parish OHSEP Minden, LA	(318) 371-1128
Robert Jump	Deputy Director	Caddo OHSEP	Caddo OHSEP Shreveport, LA	(318) 675-2255

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

Meeting Public Notice

LSU STEPHENSON DISASTER MANAGEMENT INSTITUTE

BOSSIER OFFICE OF HOMELAND SECURITY & EMERGENCY PREPAREDNESS

MEETING NOTICE – August 10, 2016

Bossier Parish to hold Public Meetings for Hazard Mitigation Plan Update

Bossier City, LA – Bossier Parish Office of Homeland Security & Emergency Preparedness is in the process of updating the Bossier Parish Hazard Mitigation Plan and are required to hold public meetings on the plan update. The Public meeting will be held on August 10, 2016 in the Bossier Sheriff Substation 2510 Viking Drive at 2:30pm.

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 Bossiers. 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.

Bossier Parish is in the beginning stages of updating its hazard mitigation plan. Public meeting will be held on August 10th for all citizens interested in learning about and participating in discussions concerning the Bossier Parish Hazard Mitigation Plan.

Residents of Bossier 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/BossierParish

For more information, please contact: Bossier 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

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.

Public Plan Review Documentation

The Bossier Parish Hazard Mitigation Draft Plan was placed on the Bossier 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.

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 Bossier 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

Bossier 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

Bossier 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 Bossier 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 indicates a substantial change in hazard profile and risk assessment in the parish.

Additionally, the public will be canvassed to solicit public input to continue Bossier 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 Bossier Parish Hazard Mitigation Plan Steering Committee and participating jurisdictions to determine additional implementation procedures when appropriate. This may include integrating the requirements of the Bossier Parish Hazard Mitigation Plan into each jurisdiction's planning documents, processes, or mechanisms as follows:

- Ordinances, Resolutions, Regulations
- Floodplain Ordinances
- Comprehensive Master Plan
- Capital Improvements Plan
- Economic Development Plan
- Emergency Operations Plan
- Transportation 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 Bossier 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 Bossier 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 Unincorporated Bossier Parish, the Town of Benton, the City of Bossier City, the Town of Haughton, and the Town of Plain Dealing, Bossier 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:

Unincorporated Bossier Parish
Comprehensive Master Plan/Updated as needed/Bossier Parish Police Jury
Capital Improvements Plan/Updated as needed/Bossier Parish Police Jury
Economic Development Plan/Updated as needed/Bossier Parish Police Jury
Local Emergency Operations Plan/Updated as needed/Bossier Parish OHSEP
Transportation Plan/Updated as needed/Bossier Parish Police Jury
Stormwater Management Plan/Updated as needed/Bossier Parish Police Jury

Town of Benton
Comprehensive Master Plan/Updated as needed/Bossier Parish Police Jury and Mayor of Benton
Economic Development Plan/Updated as needed/Bossier Parish Police Jury and Mayor of Benton
Local Emergency Operations Plan/Updated as needed/Bossier Parish OHSEP and Mayor of Benton

City of Bossier City
Capital Improvements Plan/Updated as needed/Bossier Parish Police Jury and Mayor of Bossier City
Local Emergency Operations Plan/Updated as needed/Bossier Parish OHSEP and Mayor of Bossier City
Transportation Plan/Updated as needed/Bossier Parish Police Jury and Mayor of Bossier City
Stormwater Management Plan/Updated as needed/Bossier Parish Police Jury and Mayor of Bossier City

Town of Haughton
Local Emergency Operations Plan/Updated as needed/Bossier Parish OHSEP and Mayor of Haughton
Stormwater Management Plan/Updated as needed/Bossier Parish Police Jury and Mayor of Haughton

Town of Plain Dealing

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

Bossier Parish Essential Facilities – All Jurisdictions

Bossier Unincorporated Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclones	Wildfires	Winter Storms*
Fire and Rescue	Benton Fire District #3 Station				X	X	X	X	X		
	Benton Fire District #3 Station				X	X	X	X	X		
	Benton Fire District #4 Station				X	X	X	X	X		
	Benton Fire District #4 Station				X	X	X	X	X		
	Benton Fire District #4 Station				X	X	X	X	X		
	Benton Fire District #4 Station				X	X	X	X	X		
	Bossier Parish Fire District				X	X	X	X	X		
	Bossier Parish Fire District				X	X	X	X	X		
	Bossier Parish Fire District #7				X	X	X	X	X		
	Bossier Parish Fire District #7				X	X	X	X	X		

Bossier Parish Fire District 1 Central Station				X	X	X	X	X		
Bossier Parish Fire District 1 Station 3				X	X	X	X	X		
Bossier Parish Fire District 1 Station 5				X	X	X	X	X		
Bossier Parish Fire District 1 Station 6			X	X	X	X	X	X		
East 80 Volunteer Fire Department				X	X	X	X	X		
Fire Station				X	X	X	X	X		
Northeast Bossier Fire District 5 Station 4				X	X	X	X	X		
Northwest Bossier Fire District 7				X	X	X	X	X		
South Bossier Fire District			X	X	X	X	X	X		
South Bossier Fire District				X	X	X	X	X		
South Bossier Fire District 2				X	X	X	X	X		
South Bossier Fire District 2				X	X	X	X	X		

Government	Bossier Parish Communications District 1			X	X	X	X	X	X	X	
	Justice of the Peace			X	X	X	X	X	X	X	
	State Representative District 9			X	X	X	X	X	X	X	
	US Department of Ag Service Center			X	X	X	X	X	X	X	
Law Enforcement	Bossier Parish Sheriff's Office Substation				X	X	X	X	X		
Corrections	Bossier Maximum Security Facility				X	X	X	X	X		
Schools	Benton Elementary School				X	X	X	X	X		
	Benton High School				X	X	X	X	X		
	Benton Middle School				X	X	X	X	X		
	Carrie Martin Elementary				X	X	X	X	X		
	Elm Grove Elementary School				X	X	X	X	X		
	Legacy Elementary School			X	X	X	X	X	X		

	Parkway High School				X	X	X	X	X		
	Platt Elementary School				X	X	X	X	X		
	Princeton Elementary School				X	X	X	X	X		
	Providence Classical Academy			X	X	X	X	X	X		
	T.D. Rodes Elementary School				X	X	X	X	X		
	WT Lewis Elementary				X	X	X	X	X		

Benton Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclones	Wildfires	Winter Storms*
Fire and Rescue	Benton Fire District #4 Station			X	X	X	X	X	X	X	
Government	26th Judicial District Public Defenders Office				X	X	X	X	X	X	
	Bossier Parish Courthouse Annex				X	X	X	X	X	X	
	Bossier Parish Public Works Highway Department				X	X	X	X	X	X	
	Bossier Parish School Board Annex B				X	X	X	X	X	X	
	Bossier Parish School Board Child Nutrition Program Annex				X	X	X	X	X	X	
	Bossier Parish School Board Warehouse				X	X	X	X	X	X	
	Town of Benton Mayor's Office				X	X	X	X	X	X	

	Town of Benton Public Services Department				X	X	X	X	X	X	
Law Enforcement	Benton Police Department				X	X	X	X	X	X	
	Bossier Parish Sheriff's Office				X	X	X	X	X	X	

Bossier City Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclones	Wildfires	Winter Storms*
Fire and Rescue	Bossier City Fire Department			X	X	X	X	X	X		
	Bossier City Fire Department #3			X	X	X	X	X	X		
	Bossier Fire Department Station			X	X	X	X	X	X		
	Bossier Fire Department Station #2				X	X	X	X	X		
	Bossier Fire Station				X	X	X	X	X		
	Bossier Fire Station			X	X	X	X	X	X		
	Fire Station				X	X	X	X	X		
Government	Bossier City District				X	X	X	X	X	X	
	Bossier Community Services				X	X	X	X	X	X	
	Bossier Levee District				X	X	X	X	X	X	
	Bossier Parish Assessor Substation			X	X	X	X	X	X	X	
	Bossier Parish Chamber of Commerce				X	X	X	X	X	X	

	Bossier Parish Council on Aging				X	X	X	X	X	X	
	Bossier Parish Municipal Complex				X	X	X	X	X	X	
	Bossier Parish Office Complex				X	X	X	X	X	X	
	Bossier Parish Office of Community Service				X	X	X	X	X	X	
	Bossier Parish School Board				X	X	X	X	X	X	
	State Representative				X	X	X	X	X	X	
	LA Department of Transportation				X	X	X	X	X	X	
	LA DOTD District 4 Headquarters				X	X	X	X	X	X	
	LA Highway Commission				X	X	X	X	X	X	
	Public Service Complex				X	X	X	X	X	X	
	US Army Corps of Engineers				X	X	X	X	X	X	
Law Enforcement	Bossier City Police Department				X	X	X	X	X		

	Bossier Parish Sheriff's Office Substation			X	X	X	X	X	X		
	Bossier Parish Sheriff's Office Substation				X	X	X	X	X		
	Bossier Parish Sheriff's Office Substation			X	X	X	X	X	X		
	LA State Police Troop G				X	X	X	X	X		
Public Health	Christus Schumpert Health Plaza			X	X	X	X	X	X		
	Cornerstone Hospital of Bossier City				X	X	X	X	X		
	Promise Hospital of Louisiana			X	X	X	X	X	X		
	Willis Knighton Medical Center			X	X	X	X	X	X		
	WK Bossier Health Center			X	X	X	X	X	X		
Schools	Airline High School				X	X	X	X	X		
	Bellaire Elementary School				X	X	X	X	X		
	Bossier Elementary				X	X	X	X	X		
	Butler School				X	X	X	X	X		

	Central Park Elementary				X	X	X	X	X		
	Charlotte Mitchell Education Center				X	X	X	X	X		
	Cope Middle School				X	X	X	X	X		
	Curtis Elementary				X	X	X	X	X		
	Elm Grove Middle School			X	X	X	X	X	X		
	Green Acres Middle			X	X	X	X	X	X		
	Meadowview Elementary				X	X	X	X	X		
	Plantation Park School				X	X	X	X	X		
	R.V. Kerr Elementary				X	X	X	X	X		
	Rusheon Middle School				X	X	X	X	X		
	Stockwell Place Elementary				X	X	X	X	X		
	Waller Elementary				X	X	X	X	X		

Haughton Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclones	Wildfires	Winter Storms*
Fire and Rescue	Haughton Fire Department				X	X	X	X	X	X	
Government	Haughton Town Hall				X	X	X	X	X	X	
Law Enforcement	Haughton Police Department				X	X	X	X	X	X	
Schools	Haughton High School				X	X	X	X	X	X	
	Haughton Middle School				X	X	X	X	X	X	

Plain Dealing Essential Facilities											
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornadoes	Tropical Cyclones	Wildfires	Winter Storms*
Government	Plain Dealing Municipal Complex			X	X	X	X	X	X	X	
	Plain Dealing Voting Precinct			X	X	X	X	X	X	X	
Law Enforcement	Plain Dealing Police Department				X	X	X	X	X	X	
Schools	Plain Dealing High School				X	X	X	X	X	X	

* Hazard does not impact any critical facility.

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Appendix D: Plan Adoption

APA Letter from FEMA

Placeholder for Jurisdiction and Parish Adoptions

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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
Lorenzo James Walker	Mayor of Bossier City	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ollie Tyler	Mayor of Shreveport	City of Shreveport	505 Travis St. Suite 200 Shreveport, LA	(318) 673-5050
Wayne Cathcart	Mayor of Benton	Town of Benton	105 Sibley Street Benton, LA	(318) 965-2781
Carlton Anderson	Mayor of Haughton	Town of Haughton	PO Box 729 Haughton, LA 71037	(318) 949-9401
Wiley Robinson	Mayor of Plain Dealing	Town of Plain Dealing	205 West Palmetto Plain Dealing, LA	(318) 326-4234
Cliff Oliver	Chief Administration Officer	City of Bossier	620 Benton Rd P.O. Box 5337 Bossier City, LA	(318) 741-8501
Ian Snellgrove	Director	Bossier Parish OHSEP	1115 Doctors Drive Bossier City, LA	(318) 425-5352
Jenny Reynolds	Director	Webster Parish OHSEP	Webster Parish OHSEP Minden, LA	(318) 371-1128
Robert Jump	Deputy Director	Caddo OHSEP	Caddo OHSEP Shreveport, LA	(318) 675-2255

Capability Assessment

Bossier Unincorporated

Worksheet 4.1: Capability Assessment Worksheet

Local mitigation capabilities are existing authorities, polices and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible.

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
Bossier Parish - Unincorporated		
Plans	Yes/No	Comments
Comprehensive / Master Plan	Yes	
Capital Improvements Plan	Yes	
Economic Development Plan	Yes	
Local Emergency Operations Plan	Yes	
Continuity of Operations Plan	No	
Transportation Plan	Yes	
Stormwater Management Plan	Yes	
Community Wildfire Protection Plan	No	
Other plans (redevelopment, recovery, coastal zone management)		
Building Code, Permitting and Inspections		
Building Code	Yes	
Building Code Effectiveness Grading Schedule (BCEGS) Score	No	
Fire Department ISO/PIAL rating	No	
Site plan review requirements	Yes	
Land Use Planning and Ordinances		
Zoning Ordinance	Yes (Bossier and Benton MPC)	Within city or town MPC
Subdivision Ordinance	Yes	
Floodplain Ordinance	Yes	

Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	Yes	Stormwater
Flood Insurance Rate Maps	Yes	
Acquisition of land for open space and public recreation uses	Yes	
Other		

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.

Administration	Yes/No	Comments
Planning Commission	Yes (Bossier and Benton MPC)	Within city or town MPC
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	Yes	
Staff		
Chief Building Official	No	(Third party)
Floodplain Administrator	Yes	
Emergency Manager	Yes	
Community Planner	Yes (Bossier and Benton MPC)	Within city or town MPC
Civil Engineer	Yes	
GIS Coordinator	Yes	
Grant Writer	No	
Other		
Technical		
Warning Systems / Service (Reverse 911, outdoor warning signals)	Yes	
Hazard Data & Information	Yes	
Grant Writing	No	
Hazus Analysis	No	
Other		

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Yes/No	Comments
Capital Improvements project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric services	Yes	(water/sewer)limited areas
Impact fees for new development	No	
Stormwater Utility Fee	No	
Community Development Block Grant (CDBG)	Yes	
Other Funding Programs		

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.

Program / Organization	Yes/No	Comments
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	No	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	No	
Natural Disaster or safety related school program	No	
Storm Ready certification	No	
Firewise Communities certification	No	
Public/Private partnership initiatives addressing disaster-related issues	Yes	
Other		

Town of Benton

Worksheet 4.1: Capability Assessment Worksheet

Local mitigation capabilities are existing authorities, polices and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible.

Planning and Regulatory

Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.

Benton		
Plans	Yes/No	Comments
Comprehensive / Master Plan	Yes	
Capital Improvements Plan	No	
Economic Development Plan	Yes	
Local Emergency Operations Plan	Yes	
Continuity of Operations Plan	No	
Transportation Plan	No	
Stormwater Management Plan	No	
Community Wildfire Protection Plan	No	
Other plans (redevelopment, recovery, coastal zone management)	No	
Building Code, Permitting and Inspections		
Building Code	Yes	
Building Code Effectiveness Grading Schedule (BCEGS) Score	Yes	
Fire Department ISO/PIAL rating	Yes	
Site plan review requirements	Yes	
Land Use Planning and Ordinances		
Zoning Ordinance	Yes	Bossier and Benton MPC
Subdivision Ordinance	Yes	
Floodplain Ordinance	Yes	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	No	

Flood Insurance Rate Maps	Yes	
Acquisition of land for open space and public recreation uses	No	
Other	no	

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.

Administration	Yes/No	Comments
Planning Commission	Yes	Bossier and Benton MPC
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	Yes	
Staff		
Chief Building Official	Yes	
Floodplain Administrator	Yes	
Emergency Manager	Yes	
Community Planner	No	Bossier and Benton MPC
Civil Engineer	Yes	
GIS Coordinator	No	
Grant Writer	Yes	
Other	no	
Technical		
Warning Systems / Service (Reverse 911, outdoor warning signals)	Yes	
Hazard Data & Information	No	
Grant Writing	Yes	
Hazus Analysis	No	
Other	no	

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Yes/No	Comments
Capital Improvements project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric services	Yes	
Impact fees for new development	Yes	
Stormwater Utility Fee	No	
Community Development Block Grant (CDBG)	Yes	
Other Funding Programs	Yes	

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.

Program / Organization	Yes/No	Comments
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	No	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	No	
Natural Disaster or safety related school program	No	
Storm Ready certification	No	
Firewise Communities certification	No	
Public/Private partnership initiatives addressing disaster-related issues	No	
Other	no	

City of Bossier City

Worksheet 4.1: Capability Assessment Worksheet

Local mitigation capabilities are existing authorities, polices and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible.

Planning and Regulatory

Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.

Bossier City		
Plans	Yes/No	Comments
Comprehensive / Master Plan	Yes	
Capital Improvements Plan	Yes	
Economic Development Plan	No	
Local Emergency Operations Plan	Yes	
Continuity of Operations Plan	No	
Transportation Plan	Yes	
Stormwater Management Plan	Yes	
Community Wildfire Protection Plan	No	
Other plans (redevelopment, recovery, coastal zone management)	No	
Building Code, Permitting and Inspections		
Building Code	Yes	
Building Code Effectiveness Grading Schedule (BCEGS) Score	Fourth Class	
Fire Department ISO/PIAL rating	Yes	2
Site plan review requirements	Yes	
Land Use Planning and Ordinances		
Zoning Ordinance	Yes	
Subdivision Ordinance	Yes	
Floodplain Ordinance	Yes	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	Yes	Stormwater

Flood Insurance Rate Maps	Yes	
Acquisition of land for open space and public recreation uses	Yes	
Other	No	

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.

Administration	Yes/No	Comments
Planning Commission	Yes	
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	Yes	
Staff		
Chief Building Official	Yes	
Floodplain Administrator	Yes	
Emergency Manager	Yes	
Community Planner	Yes	
Civil Engineer	Yes	
GIS Coordinator	Yes	
Grant Writer	Yes	
Other	No	
Technical		
Warning Systems / Service (Reverse 911, outdoor warning signals)	Yes	
Hazard Data & Information	Yes	
Grant Writing	Yes	
Hazus Analysis	Yes	
Other	No	

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Yes/No	Comments
Capital Improvements project funding	Yes	
Authority to levy taxes for specific purposes	No	
Fees for water, sewer, gas, or electric services	Yes	Water & Sewer Outside City Limits
Impact fees for new development	Yes	Water & Sewer Outside City Limits
Stormwater Utility Fee	No	
Community Development Block Grant (CDBG)	Yes	
Other Funding Programs	Yes	State Capital Outlay

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.

Program / Organization	Yes/No	Comments
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	No	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	No	
Natural Disaster or safety related school program		
Storm Ready certification	No	
Firewise Communities certification	No	
Public/Private partnership initiatives addressing disaster-related issues	No	
Other	No	

Town of Haughton

Worksheet 4.1: Capability Assessment Worksheet

Local mitigation capabilities are existing authorities, polices and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible.

Planning and Regulatory

Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.

Haughton		
Plans	Yes/No	Comments
Comprehensive / Master Plan	NO	
Capital Improvements Plan	NO	
Economic Development Plan	NO	
Local Emergency Operations Plan	YES	
Continuity of Operations Plan	NO	
Transportation Plan	NO	
Stormwater Management Plan	YES	
Community Wildfire Protection Plan	NO	
Other plans (redevelopment, recovery, coastal zone management)	NO	
Building Code, Permitting and Inspections		
Building Code	YES	
Building Code Effectiveness Grading Schedule (BCEGS) Score		
Fire Department ISO/PIAL rating	YES	RATING: 3
Site plan review requirements		
Land Use Planning and Ordinances		
Zoning Ordinance	YES	
Subdivision Ordinance	YES	
Floodplain Ordinance	YES	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	NO	IN PROGRESS

Flood Insurance Rate Maps	YES	
Acquisition of land for open space and public recreation uses	YES	IN PROGRESS
Other	NO	

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.

Administration	Yes/No	Comments
Planning Commission	YES	
Mitigation Planning Committee	YES	PARISH LEVEL
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	YES	
Staff		
Chief Building Official	NO	CONTRACT OUT
Floodplain Administrator	YES	
Emergency Manager	NO	
Community Planner	NO	
Civil Engineer	NO	CONTRACT OUT
GIS Coordinator	YES	PARISH LEVEL
Grant Writer	NO	
Other	YES	ZONING ADMINISTRATOR
Technical		
Warning Systems / Service (Reverse 911, outdoor warning signals)	YES	PARISH LEVEL
Hazard Data & Information	YES	PARISH LEVEL
Grant Writing	NO	
Hazus Analysis	NO	
Other	NO	

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Yes/No	Comments
Capital Improvements project funding	YES	
Authority to levy taxes for specific purposes	YES	
Fees for water, sewer, gas, or electric services	YES	
Impact fees for new development	YES	
Stormwater Utility Fee	NO	
Community Development Block Grant (CDBG)	YES	
Other Funding Programs	NO	

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.

Program / Organization	Yes/No	Comments
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	YES	A.C.T.I.O.N.
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	HAUGHTON FIRE PREVENTION PROGRAM
Natural Disaster or safety related school program	YES	PARISH LEVEL
Storm Ready certification	NO	
Firewise Communities certification	NO	
Public/Private partnership initiatives addressing disaster-related issues	YES	
Other	NO	

Town of Plain Dealing

Worksheet 4.1: Capability Assessment Worksheet

Local mitigation capabilities are existing authorities, polices and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible.

Planning and Regulatory

Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.

Plain Dealing		
Plans	Yes/No	Comments
Comprehensive / Master Plan	No	
Capital Improvements Plan	No	
Economic Development Plan	No	
Local Emergency Operations Plan	No	
Continuity of Operations Plan	No	Emergency generators are in place to continue water/sewer services
Transportation Plan	No	
Stormwater Management Plan	No	
Community Wildfire Protection Plan	No	
Other plans (redevelopment, recovery, coastal zone management)	No	
Building Code, Permitting and Inspections		
Building Code	Yes/State of LA	IBTS provides Third Party Building Code Compliance Services for the Town
Building Code Effectiveness Grading Schedule (BCEGS) Score	Unknown	IBTS
Fire Department ISO/PIAL rating	4	
Site plan review requirements	Yes	IBTS
Land Use Planning and Ordinances		
Zoning Ordinance	No	
Subdivision Ordinance	No	
Floodplain Ordinance	Yes	

Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	No	
Flood Insurance Rate Maps	Yes	IBTS/Bossier Parish
Acquisition of land for open space and public recreation uses	No	

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.

Administration	Yes/No	Comments
Planning Commission	No	
Mitigation Planning Committee	No	Bossier Parish
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	Yes	Provided as needed by Town Employees
Staff		
Chief Building Official	Yes	Mayor
Floodplain Administrator	Yes	Scott Devaney, IBTS
Emergency Manager	No	
Community Planner	No	
Civil Engineer	No	
GIS Coordinator	No	
Grant Writer	No	
Other		
Technical		
Warning Systems / Service (Reverse 911, outdoor warning signals)	Yes	Outdoor Warning Signal
Hazard Data & Information	No	
Grant Writing	No	
Hazus Analysis	No	
Other	no	

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Yes/No	Comments
Capital Improvements project funding	No	
Authority to levy taxes for specific purposes	No	
Fees for water, sewer, gas, or electric services	No	
Impact fees for new development	No	
Stormwater Utility Fee	No	
Community Development Block Grant (CDBG)	No	
Other Funding Programs	No	

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.

Program / Organization	Yes/No	Comments
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	No	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	No	
Natural Disaster or safety related school program	Yes	Fire Safety Programs at Local Schools
Storm Ready certification	No	
Firewise Communities certification	No	
Public/Private partnership initiatives addressing disaster-related issues	No	
Other	no	

Building Inventory

Critical Facility (If Yes, Mark X)	Name of Building	Purpose of Building	Address	City	Lat	Long	Assessed Value	Date Built	Construction Type
Bossier									
X	South Bossier Volunteer	Fire Search and Rescue	3551 Louisiana 527	Elm Grove	32.42399075	-93.51316615	$ 872,445.00	1980	concrete
X	Bossier Parish Fire District	Fire Search and Rescue	10 Rodgers Marina Drive	Elm Grove	32.39896743	-93.43598511	$ 197,775.00	1975	metal
X	South Bossier Fire District	Fire Search and Rescue	13601-13999 U.S. 71	Elm Grove	32.28706275	-93.49601787	$ 263,035.00	1990	concrete
X	South Bossier Fire District	Fire Search and Rescue	1325 Robinson Road	Elm Grove	32.36052158	-93.47528339	$ 162,750.00	1990	concrete
X	Bossier Parish Fire Station 1	Fire Search and Rescue	4493 Highway 80	Haughton	32.555472	-93.57432	$ 570,150.00	1990	metal
X	Bossier Parish Fire Station 2	Fire Search and Rescue	West Fire Station Road	Haughton	32.566756	-93.609194	$ 145,530.00	1975	concrete
X	Bossier Parish Fire Station 3	Fire Search and Rescue	911 Creekside Ln	Haughton	32.564403	-93.51477	$ 166,320.00	1980	metal
X	Bossier Parish Fire Station 4	Fire Search and Rescue	13333 Highway 157	Haughton	32.671331	-93.524303	$ 144,165.00	1975	concrete
X	Bossier Parish Fire Station 5	Fire Search and Rescue	3645 Bellevue Rd	Haughton	32.622528	-93.569011	$ 160,335.00	1990	concrete
X	Bossier Parish Fire Station 6	Fire Search and Rescue	1599 Oliver Rd	Haughton	32.497869	-93.473421	$ 264,600.00	1975	concrete
X	So. Bossier Parish Fire Station 1	Fire Search and Rescue	3551 LA-527	Elm Grove	32.423773	-93.513072	$ 861,210.00	1980	concrete

X	So. Bossier Parish Fire Station 2	Fire Search and Rescue	1325 Robinson Rd.	Elm Grove	32.360527	-93.475448	$ 168,105.00	1975	concrete
X	So. Bossier Parish Fire Station 3	Fire Search and Rescue	Rogers Marina Dr.	Elm Grove	32.398931	-93.435867	$ 135,450.00	1990	concrete
X	So. Bossier Parish Fire Station 4	Fire Search and Rescue	2452 Sligo Road	Haughton	32.449783	-93.577026	$ 105,840.00	1990	metal
X	So. Bossier Parish Fire Station 5	Fire Search and Rescue	8730 U.S. 71	Elm Grove	32.384664	-93.594045	$ 161,280.00	1980	metal
X	So. Bossier Parish Fire Station 6	Fire Search and Rescue	U.S. 71	Elm Grove	32.287057	-93.496176	$ 275,310.00	1980	concrete
X	Benton Fire Station 2	Fire Search and Rescue	807 Park Road	Benton	32.651725	-93.670698	$ 275,415.00	2000	concrete
X	Benton Fire Station 3	Fire Search and Rescue	4275 Swan Lake Road	Benton	32.615291	-93.711187	$ 130,305.00	1990	metal
X	Benton Fire Station 4	Fire Search and Rescue	14634 Louisiana 157	Benton	32.708303	-93.576105	$ 135,240.00	1995	concrete
X	Benton Fire Station 5	Fire Search and Rescue	107 Allen Road	Benton	32.789685	-93.717262	$ 128,100.00	2000	metal
X	Benton Fire Station 6	Fire Search and Rescue	1039 Seven Pines Road	Benton	32.774217	-93.648712	$ 289,905.00	2000	concrete
X	Bossier Parish Fire Station 1	Fire Search and Rescue	156 Lelia Road	Plain Dealing	32.975322	-93.681963	$ 132,825.00	2000	
X	Bossier Parish Fire Station 2	Fire Search and Rescue	20177 Louisiana 157	Plain Dealing	32.974116	-93.580136	$ 301,350.00	1980	metal
X	Bossier Parish Fire Station 3	Fire Search and Rescue	3524 Louisiana 2	Plain Dealing	32.90692	-93.563669	$ 132,615.00	1985	metal
X	Bossier Parish Fire Station 4	Fire Search and Rescue	463 Fire Tower Road	Cotton Valley	32.838471	-93.602179	$ 138,600.00	1990	Metal

X	Bossier Parish Fire Station 2	Fire Search and Rescue	120 Abe Martin Road	Plain Dealing	32.845173	-93.714684	$ 167,475.00	2000	Metal
X	Bossier Parish Fire Station 3	Fire Search and Rescue	397 Louisiana 537	Plain Dealing	32.906417	-93.791559	$ 167,475.00	2010	Metal
X	Bossier 911	Fire Search and Rescue	4601 Palmetto Rd	Benton	32.650395	-93.712701	$ 545,685.00	1975	Metal
	Bossier Central Library	Library	2206 Beckett Street	Bossier City	32.52613	-93.715806	$ 2,277,315.00	2000	concrete
	Henry L. Aulds Memorial Library	Library	3950 Wayne Avenue	Bossier City	32.481864	-93.668954	$ 1,690,335.00	2000	concrete
	Benton Branch Library	Library	115 Courthouse Drive	Benton	32.679993	-93.739693	$ 1,700,865.00	1981	concrete
	Alford Memorial Library	Library	116 West McKinley	Haughton	32.533456	-93.505484	$ 681,480.00	1990	metal
	Keoun Memorial Library	Library	300 East Mary Lee Avenue	Plain Dealing	32.906769	-93.700324	$ 994,950.00	2000	metal
	Tooke Memorial Library	Library	451 Fairview Point Road	Elm Grove	32.41733	-93.453851	$ 1,026,000.00	1975	concrete
	East 80 Library	Library	1050 Bellevue Rd	Haughton	32.557789	-93.613057	$ 1,908,630.00	1970	metal
X	Bossier Parish Police Jury Complex and Annex	Parish operations	204 Burt Blvd	Benton	32.679843	-93.74311	$ 5,699,295.00	1980	metal
X	Bossier Parish Highway Department	Maintenance and storage	410 Mayfield St	Benton	32.70085	-93.744825	$ 670,150.00	1990	metal
X	Bossier Parish Sheriff's Administrative Office	Sheriff's office	204 Burt Blvd	Benton	32.679843	-93.74311	$ 5,699,295.00	1980	metal
X	Bossier Parish Emergency Operations Center	Emergency preparedness	1511 Doctors Dr	Bossier City	32.533876	-93.710549	$ 510,840.00	1980	concrete

	Benton High School	Education	562 HWY 162	Benton	32.6659 4204	-93.7465 7933	$ 10,153,350.00	1975	Metal
	Benton Elementary School	Education	301 COLQUITT ST	Benton	32.6957 3693	-93.7199 0611	$ 6,473,520.00	1960	concrete
	Benton Middle School	Education	6136 HWY 3	Benton	32.6675 1784	-93.7460 9697	$ 9,010,305.00	1965	concrete
	Bossier Parish EMS	Emergency Medical Services	Nearby: 102 6th Street	Benton	32.6967 7796	-93.7407 0984	$ 378,675.00	1965	Metal
	Bossier Parish Courthouse	Civil Government	204 Burt Boulevard #3	Benton	32.6798 9109	-93.7436 5998	$ 5,487,210.00	1960	concrete
	Bossier Parish School Board	Civil Government	Bossier Parish School Board	Benton	32.6947 2396	-93.7395 5667	$ 1,897,560.00	1970	concrete
	Bossier Parish School Board Annex B	Civil Government	School Board Square	Benton	32.6940 7259	-93.7393 4846	$ 599,670.00	1970	concrete
	Bossier Parish School Board Warehouse	Civil Government	200-306 Kelly Street	Benton	32.6937 4541	-93.7382 896	$ 1,363,180.00	1780	Metal
	Caddo-Bossier OHSEP	Municipal Government	1511 Doctors DR	Bossier City	32.5338 179	-93.7106 6948	$ 42,760.00	1985	Reinforced Masonry
	Rusheon Middle School	Education	2401 Old Minden Road	Bossier City	32.5206 348	-93.7047 8371	$ 124,610.00	1965	Reinforced Masonry
	Stockwell Place Elementary	Education	5801 SHED RD	Bossier City	32.5623 5374	-93.6451 3207	$ 110,444.00	1977	Reinforced Masonry
	Butler School	Education	541 DETROIT ST	Bossier City	32.5240 6898	-93.7299 4227	$ 35,720.00	1952	Reinforced Masonry
	Legacy Elementary School	Education	4830 SWAN LAKE RD	Bossier City	32.6184 8102	-93.6961 3495	$ 1,015,880.00	2008	Reinforced Masonry
	Cope Middle School	Education	4814 SHED RD	Bossier City	32.5453 4802	-93.6665 8953	$ 337,840.00	1977	Reinforced Masonry

	WT Lewis Elementary	Education	4701 MODICA LOTT RD	Bossier City	32.5643642	-93.6782 8459	$ 1,412,210.00	2008	Reinforced Masonry
	Meadowview Elementary	Education	4312 SHED RD	Bossier City	32.5433 5775	-93.6814 4482	$ 109,613.00	1980	Reinforced Masonry
	Airline High School	Education	2801 AIRLINE DR	Bossier City	32.5535 7668	-93.7114 9474	$ 1,973,500.00	1974	Reinforced Masonry
	Plantation Park School	Education	2410 PLANTATION DR	Bossier City	32.5406 321	-93.7156 4597	$ 174,030.00	1968	Reinforced Masonry
	Green Acres Middle	Education	2220 Airline Drive	Bossier City	32.5421 8036	-93.7073 2069	$ 504,350.00	1976	Reinforced Masonry
	Bossier Elementary	Education	1000 Traffic Street	Bossier City	32.5224 4968	-93.7365 4739	$ 243,520.00	1953	Reinforced Masonry
	Charlotte Mitchell Educational Center	Education	415 Monroe Street	Bossier City	32.5239 6511	-93.7222 5849	$ 30,860.00	1950	Reinforced Masonry
	R.V. Kerr Elementary	Education	1700 AIRLINE DR	Bossier City	32.5183 4232	-93.6944 989	$ 60,090.00	1970	Reinforced Masonry
	Waller Elementary	Education	1130 Patricia Drive	Bossier City	32.5089 2814	-93.6975 0626	$ 58,820.00	1959	Reinforced Masonry
	Parkway High School	Education	2010 Colleen Drive	Bossier City	32.4335 7117	-93.6446 7524	$ 3,510,140.00	2009	Reinforced Masonry
	Curtis Elementary	Education	5600 Barksdale Boulevard	Bossier City	32.4412 9108	-93.6490 7013	$ 82,037.00	1978	Reinforced Masonry
	Elm Grove Middle School	Education	4301 PANTHER DR	Bossier City	32.4737 4512	-93.6686 4622	$ 876,070.00	1985	Reinforced Masonry
	Bellaire Elementary School	Education	1310 BELLAIRE BLVD	Bossier City	32.4858 3264	-93.6782 3451	$ 169,278.00	1997	Reinforced Masonry
	Central Park Elementary	Education	900 CENTRAL PARK BLVD	Bossier City	32.5102 7359	-93.7139 6605	$ 38,470.00	1970	Reinforced Masonry

	Fire Department Shelter Warehouse	Municipal Government	725 McArthur DR	Bossier City	32.52571791	-93.71901254	$ 500.00	Unknown	Reinforced Masonry
	Fire Station 2	Bossier City Fire Station	1101 Waller AVE	Bossier City	32.50913214	-93.70359833	$ 223,878.00	2005	Reinforced Masonry
	Fire Station 3	Bossier City Fire Station	2910 Plantation DR	Bossier City	32.54008681	-93.70656545	$ 140,630.00	2013	Reinforced Masonry
	Fire Station 4	Bossier City Fire Station	1200 Shady Grove DR	Bossier City	32.47926519	-93.67570849	$ 136,080.00	2002	Reinforced Masonry
	Fire Station 5	Bossier City Fire Station	971 Swan Lake RD	Bossier City	32.53608909	-93.67105329	$ 261,020.00	2011	Reinforced Masonry
	Fire Station 6	Bossier City Fire Station	420 Riverside DR	Bossier City	32.51207237	-93.73067614	$ 91,482.00	2010	Reinforced Masonry
	Fire Station 7	Bossier City Fire Station	5900 Shed RD	Bossier City	32.56141549	-93.64347277	$ 303,970.00	1998	Reinforced Masonry
	Fire Station 8	Bossier City Fire Station	2001 River Bend DR	Bossier City	32.44483418	-93.65169969	$ 72,510.00	Unknown	Reinforced Masonry
	Fire Station 9	Bossier City Fire Station	2621 Brownlee RD	Bossier City	32.5759978	-93.71544692	$ 1,360.00	Unknown	Reinforced Masonry
	Fire Water Rescue Facility	Municipal Government	3133 Arthur Ray Teague PKWY	Bossier City	32.49361716	-93.69672152	Unknown	2000	Reinforced Masonry
	Haughton Middle School	Education	Haughton	Haughton	32.52426152	-93.51033701	$ 8,790,390.00	1975	Concrete
	Haughton High School	Education	210 East McKinley Avenue	Haughton	32.5343326	-93.50068514	$ 16,963,020.00	1975	Concrete
	Haughton Fire Department	Fire Search and Rescue	224 West McKinley Avenue	Haughton	32.53364573	-93.51061993	$ 1,158,045.00	1990	Metal
	Haughton Fire Communications Tower	Radio Tower	825 West McKinley Ave	Haughton	32.532800	-93.529411	$ 122,040.00	2000	Metal

	Bossier Medium Security Facility	Prisons and Correctional Facilities	Nearby: 2994-3098 Old Plain Dealing Road	Plain Dealing	32.8388 7203	-93.7459 7994	$ 15,000,000.00	1970	Concrete
	Bossier Maximum Security Facility	Prisons and Correctional Facilities	Nearby: 2985 Old Plain Dealing Road	Plain Dealing	32.8395 9025	-93.7482 9199	$ 15,000,000.00	1970	Concrete
	Bossier Minimum Security Facility	Prisons and Correctional Facilities	2960 OLD PLAIN DEALING RD	Plain Dealing	32.8329 3174	-93.7473 9321	$ 15,000,000.00	1970	Concrete
	Carrie Martin Elementary	Education	600 South Perrin Street	Plain Dealing	32.8975 0655	-93.6976 6545	$ 9,940,590.00	1980	Concrete
	Plain Dealing High School	Education	300 N PERRIN ST	Plain Dealing	32.9102 7676	-93.6989 0073	$ 7,539,750.00	1960	Concrete
	Northwest Bossier Fire District 7	Fire Search and Rescue	718 W PALMETTO RD	Plain Dealing	32.9062 356	-93.7104 4599	$ 100,000.00	2000	Metal
	Northeast Bossier Fire District 5 Station No. 4	Fire Search and Rescue	405-463 Fire Tower Road	Plain Dealing	32.8384 1839	-93.6023 5944	$ 100,000.00	2000	Metal
	Bossier Parish Sheriff's Office Rifle Range	Law Enforcement	3006 RIFLE RANGE RD	Plain Dealing	32.8327 7775	-93.7534 7882	$ 1,500,000.00	1980	Metal
X	Bossier Parish Health Unit Complex	Parish health	3022 Old Minden Rd	Bossier City	32.5218 22	-93.6923 02	$ 2,027,700.00	1995	Metal
X	Bossier Parish EMS Administrative Office	Fire Search and Rescue	5275 Swan Lake Rd	Bossier City	32.6151 66	-93.7106 67	$ 994,680.00	1990	concrete
Benton									
X	Benton Police Department	Law Enforcement	106 Sixth St	Benton	32.6969 436	-93.7404 658	$ 384,075.00	1980	concrete
X	Town of Benton Public Works Department	Civil Government	302 Fifth Street	Benton	32.6975 62	-93.7385 55	$ 200,000.00	1995	concrete
X	Town of Benton Town Hall	Civil Government	105 Sibley Street	Benton	32.6971 1101	-93.7404 6321	$ 519,750.00	1960	concrete

Bossier City									
	Bicentennial Park/Community Development	City Park	100 John Wesley BLVD	Bossier City	32.5175 0735	-93.7073 0389	$ 43,870.00	1988	Reinforced Masonry
	Bossier Arts Council	Municipal Government	630 Barksdale BLVD	Bossier City	32.5155 4882	-93.7323 8978	$ 223,878.00	Unknown	Reinforced Masonry
	Bossier Arts Council Creativity Center	Municipal Government	709 Barksdale BLVD	Bossier City	32.5159 8493	-93.7317 4413	$ 5,880.00	1960	Reinforced Masonry
	Bossier City Building Maintenance	Municipal Government	1503 Hamilton RD	Bossier City	32.5320 6521	-93.7267 9619	$ 10,000.00	1968	Reinforced Masonry
	Bossier City Fire/Police Training Center	Municipal Government	5850 Shed RD	Bossier City	32.5613 3577	-93.6441 298	$ 303,970.00	2012	Reinforced Masonry
	Bossier City Recycling Center	Municipal Government	3301 Old Shed RD	Bossier City	32.5343 5926	-93.6884 78	$ 506,943.00	1985	Steel
	Bossier Police Training Center	Municipal Government	1549 E Texas ST	Bossier City	32.5264 4461	-93.7317 6432	$ 223,878.00	1996	Reinforced Masonry
	BPAR - Ft. Smith Pool	City Park	700 Bearkat DR	Bossier City	32.5184 5797	-93.7322 53	$ 16,242.00	1988	Reinforced Masonry
	Environmental Control	Municipal Government	3700 Cook RD	Bossier City	32.4822 414	-93.6831 4285	$ 15,180.00	1984	Steel
	Field Of Dreams Park	City Park	4716 Hazel Jones RD	Bossier City	32.5476 7713	-93.6708 8478	$ 65,880.00	1980	Reinforced Masonry
	Mike Woods Community Park	City Park	2200 Dennis ST	Bossier City	32.4834 821	-93.6578 5976	$ 24,736.00	1985	Reinforced Masonry
	Mitchell Neighborhood Park	City Park	1514 Cox ST	Bossier City	32.5210 4721	-93.7221 8952	$ 13,540.00	unknown	Reinforced Masonry
	North Bossier Park Tennis Center	City Park	1651 Mondello Way	Bossier City	32.5816 6754	-93.7261 0035	$ 276,170.00	2010	Reinforced Masonry

	Northeast Bossier Treatment Plant	Municipal Government	8000 Shed RD	Bossier City	32.56183858	-93.63135932	$ 36,750.00	1986	Reinforced Masonry
	Patricia Drive Community Park	City Park	3051 Patricia DR	Bossier City	32.51479503	-93.6912142	$ 31,900.00	Unknown	Reinforced Masonry
	Police Narcotics Building	Municipal Government	100 Gibbs ST	Bossier City	32.53191903	-93.72798368	$ 10,890.00	Unknown	Reinforced Masonry
	Public Works	Municipal Government	3223 Old Shed RD	Bossier City	32.53310289	-93.68995087	$ 506,943.00	1985	Reinforced Masonry
	Red River Waste Water Treatment Plant	Municipal Government	3512 Barksdale BLVD	Bossier City	32.48379343	-93.68406014	$ 600.00	Unknown	Reinforced Masonry
	Shady Grove Neighborhood Park	City Park	3949 Wayne AVE	Bossier City	32.48167555	-93.66755668	$ 93,090.00	1975	Reinforced Masonry
	Shed Road Neighborhood Park	City Park	4208 Shed RD	Bossier City	32.54200724	-93.68309467	$ 57,200.00	2015	Reinforced Masonry
	Swan Lake Community Park	City Park	4801 Swan Lake RD	Bossier City	32.54641446	-93.66921517	$ 65,880.00	1985	Reinforced Masonry
	Tinsley Softball Complex	City Park	3201 Old Shed RD	Bossier City	32.53395515	-93.69360059	$ 54,270.00	2009	Concrete
	Walbrook Park	City Park	2400 Shed RD	Bossier City	32.53067333	-93.71564399	$ 22,550.00	1989	Reinforced Masonry
X	CenturyLink Center Arena	Multi Purpose Arena	2000 CenturyLink Center Drive	Bossier City	32.4650176	-93.6738135	$ 3,606,490.00	2000	Reinforced Masonry
	Bossier City Municipal Complex	Municipal Government	620 Benton Road	Bossier City	32.5252426	-93.7141402	$ 421,870.00	1985	Reinforced Masonry
X	Bossier City Civic Center	Municipal Government	620 Benton Road	Bossier City	32.5252426	-93.7141402	$ 446,580.00	1985	Reinforced Masonry

Haughton									
X	Haughton Police Department	Law Enforcement	120 West McKinley Avenue	Haughton	32.533566	-93.506188	$ 352,485.00	1970	Concrete
X	Haughton Town Hall	Civil Government	118 West McKinley Avenue	Haughton	32.533574	-93.505748	$ 395,010.00	1965	Concrete
X	Haughton Municipal Complex	Civil Government	149 South Elm Street	Haughton	32.531086	-93.514534	$ 1,885,410.00	1965	Metal
	Haughton Public Library	Library	116 West McKinley Avenue	Haughton	32.533603	-93.505535	$ 693,765.00	1990	Concrete
	Haughton Public Works	Utility/Fresh Water Supply	123 South Myrtle Street	Haughton	32.530812	-93.503522	$ 243,810.00	1970	Metal
	Haughton Elevated Tank	Water Supply	123 South Myrtle Street	Haughton	32.530624	-93.503491	$ 101,465.00	1975	Metal
	Haughton Water Well #1	Fresh Water Supply	123 South Myrtle Street	Haughton	32.530658	-93.503385	$ 10,000.00	Unknown	Metal
	Haughton Water Well #2	Fresh Water Supply	202 North Elm Street	Haughton	32.534825	-93.515639	$ 46,215.00	Unknown	Metal
	Haughton Water Well #3	Fresh Water Supply	434 East McKinley Ave	Haughton	32.535206	-93.489168	$ 47,580.00	Unknown	Metal
	Haughton Water Well #4	Fresh Water Supply	300 Cedar Street	Haughton	32.523346	-93.494091	$ 10,000.00	Unknown	Metal
	Haughton Water Well #5	Fresh Water Supply	300 Lincoln Avenue	Haughton	32.516346	-93.502677	$ 83,005.00	Unknown	Metal
	Haughton Water Well #6	Fresh Water Supply	111 Sligo Industrial Dr.	Haughton	32.463500	-93.512893	$ 38,285.00	Unknown	Metal
	Haughton Water Well #7	Fresh Water Supply	7185 Hwy 157	Haughton	32.501030	-93.510735	$ 10,000.00	Unknown	Metal

	Haughton Water Well #8	Fresh Water Supply	735 Allentown Road	Haughton	32.547137	-93.489861	$ 37,180.00	Unknown	Metal
X	Haughton Wastewater Treatment Plant	Utility/Sewer	300 Lincoln Avenue	Haughton	32.516061	-93.503251	$ 200,525.00	1975	Metal
	Haughton Sewer Lift Station #1	Sewer Lift Station	408 East McKinley Avenue	Haughton	32.535602	-93.493727	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #2	Sewer Lift Station	300 Lincoln Avenue	Haughton	32.516351	-93.504129	$ 242,645.00	Unknown	Concrete
	Haughton Sewer Lift Station #3	Sewer Lift Station	200 North Elm Street	Haughton	32.534514	-93.515338	$ 7,475.00	Unknown	Concrete
	Haughton Sewer Lift Station #4	Sewer Lift Station	232 South Foster Drive	Haughton	32.503143	-93.510194	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #5	Sewer Lift Station	375 West McKinley Avenue	Haughton	32.533036	-93.513178	$ 15,275.00	Unknown	Concrete
	Haughton Sewer Lift Station #6	Sewer Lift Station	208 Galilee Street	Haughton	32.526992	-93.495451	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #7	Sewer Lift Station	492 North Elm Street	Haughton	32.545654	-93.515430	$ 4,615.00	Unknown	Concrete
	Haughton Sewer Lift Station #8	Sewer Lift Station	470 East McKinley Avenue	Haughton	32.534995	-93.488428	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #9	Sewer Lift Station	1235 Camp Street	Haughton	32.536520	-93.533603	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #10	Sewer Lift Station	248 Owl Lane	Haughton	32.512844	-93.512331	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #11	Sewer Lift Station	7469 Hwy 157	Haughton	32.509271	-93.512836	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #12	Sewer Lift Station	590 West McKinley Avenue	Haughton	32.533184	-93.522282	$ 6,435.00	Unknown	Concrete

	Haughton Sewer Lift Station #13	Sewer Lift Station	425 Monroe Avenue	Haughton	32.520393	-93.519407	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #14	Sewer Lift Station	7228 Hwy 157	Haughton	32.502679	-93.510833	$ 10,000.00	Unknown	Concrete
	Haughton Sewer Lift Station #15	Sewer Lift Station	352 Mountain Ash Street	Haughton	32.531824	-93.495178	$ 5,980.00	Unknown	Concrete
	Haughton Sewer Lift Station #16	Sewer Lift Station	825 West McKinley Ave	Haughton	32.532912	-93.529236	$ 18,460.00	Unknown	Concrete
Plain Dealing									
X	Plain Dealing Police Department	Law Enforcement	209 West Mary Lee St	Plain Dealing	32.906298 11	-93.702441 93	Unknown/ Exempt	Unknown	Reinforced Masonry
X	Plain Dealing Municipal Complex	Civil Government	205 West Palmetto Ave	Plain Dealing	32.905209 2	-93.702403 89	Unknown/ Exempt	1979	Reinforced Masonry
	Plain Dealing Voting Precinct	Civil Government/ Community Center	109 S. Cotton Belt St	Plain Dealing	32.905222 89	-93.703450 67	Unknown/ Exempt	2000	Metal

Vulnerable Populations

Vulnerable Populations Worksheet

Bossier Parish

Name	Street	City	Zip Code	Lat	Long
All Hospitals (Private or Public)					
Willis Knighton Medical Center (Pavilion)	2449 HOSPITAL DR	Bossier City	71111	32.55837353	-93.71254484
Willis Knighton Medical Center	2105 AIRLINE DR	Bossier City	71111	32.53320488	-93.7075696
WK Bossier Health Center	2400 Hospital Drive	Bossier City	71111	32.55835888	-93.71829083
Cornerstone Hospital of Bossier City	4900 Medical Drive	Bossier City	71112	32.46069254	-93.66960667
Promise Hospital of Louisiana	2525 VIKING DR	Bossier City	71111	32.55596734	-93.71688361
Christus Schumpert Health Plaza	2539 VIKING DR	Bossier City	71111	32.55594483	-93.71483299
NCMC Plain Dealing Medical	112 N Forrest Rd	Plain Dealing	71064	32.90609119	-93.70193084
Nursing Homes (Private or Public)					
Pilgrims Manor	1524 DOCTORS DR	Bossier City	71111	32.53588057	-93.70908376
Colonial Oaks	4921 MEDICAL DR	Bossier City	71112	32.46011527	-93.6669042
Northwest Louisiana War Veterans Home	3130 Arthur Ray Teague Parkway	Bossier City	71112	32.49240924	-93.69221682
Horizon Bay Retirement Living	2540 BEENE BLVD	Bossier City	71111	32.56026424	-93.71276381
Riverview Care Center	4820 MEDICAL DR	Bossier City	71112	32.46268583	-93.66913031
Whispering Pines Community Care Center	309 South Louisiana St	Plain Dealing	71064	32.90220851	-93.70307375
Mobile Home Parks					
Bayou Mobile Estates	5901 E TEXAS ST #67	Bossier City	71111	32.54095216	-93.65424982

Southern Living Mobile Home Park	5303 E TEXAS ST #98	Bossier City	71111	32.53963916	-93.66275306
Pecan Valley Mobile Home Park	6507 BARKSDALE BLVD #224	Bossier City	71112	32.423847	-93.631751
South Bossier Mobile Home Community	1920 Alfred Lane	Bossier City	71112	32.46011082	-93.65812389
Sabta Fe Village Mobile Homes	4803 E TEXAS #12	Bossier City	71111	32.53575095	-93.66839334
Pepper Point	6219 East Texas Street # 30	Bossier City	71111	32.543245	-93.651855
Brooke RV Park	4790 Louisiana 154	Elm Grove	71051	32.33502957	-93.44217982
Acorn Hill MHP (Circle W MHP)	Acorn Hill Loop	Haughton	71037	32.564187	-93.50711
Timberline Village	Timberline Lane	Princeton	71067	32.56753471	-93.50672898
Eastwook Park	136 MCSWAIN DR	Princeton	71067	32.56579466	-93.50227011
Pine Creek Estates	215 LAFAYETTE CIR	Princeton	71067	32.560872	-93.547749
Angelwood Village	Rodgers Ln	Haughton	71037	32.468396	-93.512444
Briarwood MHP (Barlett MHP)	Briarwood Ln	Haughton	71037	32.586704	-93.567324
Cashpoint RV Park	Cash Point Landing	Bossier City	71111	32.613572	-93.750858
Walker's Trailer Park	Theresa Ln	Benton	71006	32.761369	-93.771033
Country Road MHP	2600 Horacek Road	Haughton	71037	32.601948	-93.60096
East Highland MHP	Ferndale Blvd	Haughton	71037	32.554678	-93.616868
Eastwood MHP	Robbin Ln.	Haughton	71037	32.564914	-93.502557
Haymeadow MHP		Bossier City	71111		
Oak Haven MHP	125 Oak Haven Dr	Haughton	71037	32.557109	-93.598915
Oak Tree Mobile Estates	100 Holly Ln	Haughton	71037	32.55102	-93.602774
Peaceful Pines MHP	Peaceful Pines Dr.	Haughton	71037	32.562023	-93.521486
Pine Creek Ridge MHP	1000 Acadian Blvd	Princeton	71067	32.55861	-93.546833
Shady Grove MHP	Jodie Drive	Haughton	71037	32.555888	93.576334
Southgate MHP	75 Davidson Dr	Bossier City	71112	32.453254	93.657118
Pine Hill MHP	Pine Hill Cr	Haughton	71037	32.559093	-93.616672
Foster Trailer Park	3728 Highway 527	Elm Grove	71051	32.424948	-93.510327
Plantation Acres MHP	200 Bodcau Loop	Bossier City	71112	32.44717	-93.597306
The Farm MHP	Windamore Dr.	Haughton	71037	32.554488	93.580743
Walkers MHP	142 Theresa Ln	Benton	71006	32.761761	93.771124

Plantation Trace MHP (J&N)	Davidson Dr.	Bossier City	71112	32.452712	93.656758
Sunset Villa	Sunset Villa	Elm Grove	71051	32.394375	93.577366
Maplewood Park	Maplewood Ct.	Bossier City	71111	32.601029	-93.735399
Unknown Trailer Park	266 Crestwood Circle	Benton	71006	32.68409313	-93.7514197
Unknown Trailer Park	6362 Louisiana 3	Benton	71006	32.68087827	-93.74473741
Unknown Trailer Park	6376 HWY 3	Benton	71006	32.68171366	-93.74479662
Unknown Trailer Park	123-131 Brunson Lane	Benton	71006	32.69757467	-93.74386501
Academy Mobile Home Park	Academy, Marland, Pact (Hwy 157)	Haughton	71037	32.515346	-93.514733
Deer Valley Mobile Home Park	Deer Valley (Hwy 157)	Haughton	71037	32.535859	-93.514648
Foster Mobile Home Park	S. Foster & N. Foster Dr. (Hwy 157)	Haughton	71037	32.503826	-93.510428
Fox Creek Estates	Fox Creek Drive	Haughton	71037	32.531145	-93.511449
Hanson Mobile Home Park	Hanson Creek	Haughton	71037	32.531200	-93.508886
Haughton Estates	Placker Lane	Haughton	71037	32.534059	-93.512491
J's Mobile Home Park	J's Lane	Haughton	71037	32.534907	-93.524862
Thurman Mobile Home Park	S. Thurman & N. Thurman (Hwy 157)	Haughton	71037	32.521335	-93.516139
Woodland Park	368-380 Birchwood Drive	Haughton	71037	32.530642	-93.495185

National Flood Insurance Program (NFIP)

Bossier Parish

ELEMENT F: STATE REQUIREMENT

National Flood Insurance Program (NFIP)

Bossier Parish

	Bossier Unincorporated	Benton	Bossier City	Haughton	Plain Dealing
Insurance Summary					
How many NFIP policies are in the community? What is the total premium and coverage?	1,844 Policies (Premium-$1,191,388, Coverage-$473,102,400)	4 Policies (Premium-$2,166, Coverage-$927,000)	2,960 Policies (Premium-$2,057,551, Coverage-$674,523,300)	46 Policies (Premium-$17,488, Coverage-$10,000,600)	20 Policies (Premium-$29,301, Coverage-$3,865,800)

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?	636 Claims Paid, $13,425,171	No Claims Paid	64 Claims Paid, $1,085,646	11 Claims Paid, $412,125	4 Claims Paid, $62,361
How many structures are exposed to flood risk with in the community?	2,939	unknown	6,047	52	Unknown
Describe any areas of flood risk with limited NFIP policy coverage.	N/A	none	None	Fox Chase Subdivision	None
Staff Resources					
Is the Community FPA or NFIP Coordinator certified?	No	No	No	No	Yes
Is flood plain management an auxiliary function?	Yes	Yes	Yes	Yes	Yes
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Engineering/Administration is handled by the parish. Permit, plan review, and inspection are performed by third party.	Engineering/Administration is handled by the parish. Permit, plan review, and inspection are performed by third party.	All	Permit review, inspections and engineering is contracted out	Yes
What are the barriers to running an effective NFIP program in the community, if any?	Coordination / Teamwork	personnel and funding	None	Personnel and funding	None
Compliance History					

Is the community in good standing with the NFIP?	Yes	Yes	Yes	Yes	Yes
Are there any outstanding compliance issues(i.e., current violations)?	No	No	No	No	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact(CAC)?	6/8/2016	unknown	November 8,2004	Unknown	05/14/2007
Is a CAV or CAC scheduled or needed? If so when?	No	No	no	Unknown	No
Regulation					
When did the community enter the NFIP?	3/18/1983	7/26/1977	4/4/1983	6/28/1974	4/15/1981
Are the FIRMs digital or paper?	Digital	Both	Both	Paper	Digital
Do floodplain development regulations meet or exceed FEMA HMGP or State minimum requirements? If so, in what ways?	Exceed. The parish requires structures to be elevated one foot or more above the base flood elevation	Yes	Yes	Yes, adoption of parish level building codes, currently upgrading stormwater development criteria	Yes we do meet minimum requirements
Community Rating System (CRS)					

Does the community participate in CRS?	No	No	Yes	No	No
What is the community's CRS Class Ranking?	N/A	Unknown	8	Unknown	No
Does the plan include CRS planning requirements?	N/A	Unknown	Yes	Unknown	No