MOREHOUSE

PARISH HAZARD MITIGATION UPDATE - 2016

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MOREHOUSE PARISH

HAZARD MITIGATION PLAN UPDATE

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Morehouse Parish

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ACKNOWLEDGMENTS

This 2016 Morehouse Parish Hazard Mitigation Plan Update was coordinated by the Morehouse 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 Morehouse Parish
City of Bastrop
Village of Bonita
Village of Collinston
Village of Mer Rouge
Village of Oak Ridge

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

Name	Title	Agency
Arthur Jones	Mayor of Bastrop	City of Bastrop
Johnny McAdams	Mayor of Mer Rouge	Village of Mer Rouge
Kathy Moses	Mayor of Bonita	Village of Bonita
Frank Miller	Mayor of Collinston	Village of Collinston
Andy Barham	Mayor of Oak Ridge	Village of Oak Ridge
James Mardis	OHSEP Director	Morehouse OHSEP
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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 Morehouse 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 Morehouse 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 Morehouse Parish Hazard Mitigation Plan is a multi-jurisdictional plan that includes the following jurisdictions which participated in the planning process:

- Unincorporated Morehouse Parish
- City of Bastrop
- Village of Bonita
- Village of Collinston
- Village of Mer Rouge
- Village of Oak Ridge

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 Morehouse 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

Morehouse Parish lies mostly in the Mississippi River delta land in the northeastern part of Louisiana and is bound by the state of Arkansas to the north, the Boeuf River on the east and south, and the Ouachita River on the west. It is surrounded by Arkansas' Ashley County to the north, Union Parish to the west, Ouachita and Richland Parishes to the south, and West Carroll Parish to the east.

Bayou Bartholomew divides the parish diagonally from northeast to southwest and Bayou Bonne Idee flows southward into the Boeuf River through the eastern part of Morehouse Parish. Many smaller streams (including Bayou Galion) flow throughout the eight hundred and nine square miles of forested hill country, wooded swamps and alluvial land that make up Morehouse Parish.

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

The topography of the parish extends from a strip of hilly land running roughly north/south through Bastrop with flatter alluvial plains to the east and west. This strip of hilly land is known as the Bastrop Hills or Bastrop Ridge and is the un-eroded remains of larger loess deposits, a wind-blown silty clay mixture that are found in larger distribution in Mississippi and Arkansas.

The main transportation arteries through Morehouse Parish are U.S. Highways 165 and 425. The State Highways are 2, 133, 134, 137, 138, 139, 140, 142, 543, 554, 590, 591, 592, 593, 599, 833, 834, and 3051. U.S. Highways 425 and 165, State Routes 139, 142, 2 and 134 are significant evacuation routes for Morehouse Parish, as well as surrounding parishes during states of emergency.

The Union Pacific Railroad (UP) and the Delta Southern Railroad (DSR) serve Morehouse Parish. The UP railroad runs north/south through Mer Rouge with a spur line running to Bastrop where it connects to another UP line that runs from Monroe, through Bastrop to McGehee, Arkansas. DSR operates on the Monroe – McGehee line.

Morehouse Parish is located in Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) Region 8.

As noted above, Morehouse Parish is located in the northeastern region of Louisiana.

Figure 1-2: Louisiana Homeland Security Regions

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

	2010 Census	2014 Census	Current Year (If Available)	Percent Change 2010 - 2014
Total Population	27,979	26,760	____	-4.40%
Population Density (Pop/Sq. Mi.)	35.2	____	____	____
Total Households	12,423	12,535	____	____

Economy

A large portion of Morehouse Parish's economy is driven by agricultural farmers throughout the parish. Agriculture related businesses are currently predominant in the area, with cotton, corn, soybeans, sweet potatoes, rice, and sorghum. Timber is also a renewable resource in the parish. Its hardworking labor force, excellent transportation network, abundant raw materials, and land for commercial and industrial development make Morehouse Parish an ideal prospect for business investment.

Built on determination and perseverance, Morehouse Parish emerged stronger and more diversified after losing its main employer in 2008. After the shutdown of International Paper, the community rallied together to reinvent itself and re-envision its future. Today, Morehouse's economy has diversified beyond forestry and farming to include value-added agribusinesses, plastics automotive, specialty chemicals, plastic injection molding, wood molding, industrial fabrication and maintenance, and transportation/warehousing.

Industry data for business patterns in Morehouse Parish can be found in the table below:

Table 1-2: Business Patterns in Morehouse 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	1,022	86	23,065
Manufacturing	137	15	11,235
Health Care and Social Assistance	1,980	69	48,421
Mining, Quarrying, Oil and Gas Extraction	0-19	3	770
Transportation and Warehousing	61	13	2,543
Construction	235	23	8,439
Administration and Support and Waste Management and Remediation Services	50	9	903
Real Estate and Rental and Leasing	56	21	1,284
Wholesale Trade	227	15	11,235
Other Services (except Public Administration)	294	64	3,501
Accommodation and Food Services	425	24	5,725
Financial and Insurance	207	50	7,540
Professional, Scientific, and Technical Services	92	23	2,743
Information	60	6	2,653
Educational Services	100-249	3	___
Arts, Entertainment, and Recreation	0-19	5	___
Management of Companies and Enterprises	59	4	1,466
Agriculture, Forestry, Fishing and Hunting	20-99	8	3,897
Utilities	20-99	11	___

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 Morehouse 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 Morehouse 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.

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

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

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 Morehouse 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 Morehouse Hazard Mitigation Plan were as follows:

- Section One Table of Contents
- Section Two Executive Summary
- Section Three Context
- Section Four Adoption and Approval
- Section Five Planning Process
- Section Six Hazard Identification, Profiling, and Ranking
- Section Seven Risk Assessment
- Section Eight Capability Assessment
- Section Nine Mitigation Action Plan
- Section Ten Plan Monitoring and Maintenance
- Appendices

This plan update now also coheres with the Plain Writing Act of 2010, which requires federal agencies to use clear communication that is accessible, consistent, understandable, and useful to the public. While the state of Louisiana and its political subdivisions are not required to meet such standards, the Act aligns with best practices in hazard mitigation. Since successful hazard mitigation relies on full implementation and cooperation at all levels of government and community, a successful hazard mitigation plan must also be easily used at all of these levels. Nevertheless, the Morehouse 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 Morehouse Parish Hazard Mitigation Plan. The current goals are as follows:

- Pursue opportunities to mitigate repetitive and severe repetitive loss properties and other appropriate hazard mitigation projects, programs, and activities
- Improve education and outreach efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact
- Improve data collection, use, and sharing to reduce the impact of hazards
- Improve capabilities, coordination, and opportunities at municipal and parish levels to plan and implement hazard mitigation projects, programs, and activities

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: Table of Contents	Section 1: Introduction
Section 2: Executive Summary	Section 1: Introduction
Section 3: Context	Section 1: Introduction
Section 4: Adoption and Approval	Appendix D: Plan Adoption
Section 5: Planning Process	Appendix A: Planning Process
Section 6: Hazard Identification, Profiling and Ranking	Section 2: Risk Assessment
Section 7: Risk Assessment	Section 2: Risk Assessment
Section 8: Capability Assessment	Section 3: Capability Assessment
Section 9: Mitigation Action Plan	Section 4: Mitigation Strategy
Section 10: Plan Monitoring and Maintenance	Appendix B: Plan Maintenance
Appendices	Appendices

Despite changes in this plan update, the plan remains consistent in its emphasis on the few types of hazards that pose the most risk to loss of life, injury, and property in Morehouse Parish and its municipalities. The extent of this risk is dictated primarily by its geographic location. Most significantly, Morehouse 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 Morehouse 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 Morehouse 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			
Expansive Soils			
Fog			
Flooding	X	X	X
Extreme Heat	X		X
Sinkholes			
Thunderstorms (Hail, Lightning, & Wind)	X	X	X
Tornadoes	X	X	X
Tropical Cyclones	X	X	X
Tsunamis			
Wildfires	X		X
Winter Storms	X		X
Dam Failure	X		+
Levee Failure	X		+

+ 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 which claim a data deficiency.

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

a) Flooding (backwater, riverine, localized stormwater event)
b) Thunderstorms (hail, lightning, wind)
c) Tornadoes
d) Tropical Cyclones (flooding and high winds)
e) Wildfires
f) Drought
g) Extreme Heat
h) Dam Failure
i) 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 wildfires, drought, extreme heat

The potential destructive power of tropical cyclones and flooding were determined to be the most prevalent hazards to the parish. Nine of the twelve Presidential Declarations that Morehouse Parish has received have resulted from either tropical cyclones (4 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 Morehouse Parish is included in the hurricane risk assessment.

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

Table 2-2: Morehouse Parish Major Disaster Declarations

Disaster Declaration Number	Date	Type of Disaster
3031	2/22/1977	Drought and Freezing
675	1/11/1983	Severe Storms and Flooding
829	5/20/1989	Severe Storms and Flooding
902	4/23/1991	Severe Storms and Flooding
904	5/3/1991	Severe Storms, Tornadoes, and Flooding
1264	1/21/1999	Severe Ice Storm
3172	2/1/2003	Loss of Space Shuttle Columbia
1603	8/29/2005	Tropical Cyclone – Hurricane Katrina
1607	9/24/2005	Tropical Cyclone – Hurricane Rita
1668	11/2/2006	Severe Storms and Flooding
1786	9/2/2008	Tropical Cyclone – Hurricane Gustav
4080	8/29/2012	Tropical Cyclone – Hurricane Isaac

Probability of Future Hazard Events

The probability of a hazard event occurring in Morehouse 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					
	Morehouse Parish (Unincorporated)	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge
Drought	8%	8%	8%	8%	8%	8%
Extreme Heat	8%	8%	8%	8%	8%	8%
Flooding	84%	68%	52%	44%	52%	52%
Thunderstorms (Hail)	100%	100%	100%	100%	100%	100%
Thunderstorms (Lightning)	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Thunderstorms (Wind)	100%	100%	100%	100%	100%	100%
Tornadoes	44%	44%	44%	44%	44%	44%
Tropical Cyclones	20%	20%	20%	20%	20%	20%
Wildfires	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Dam Failure	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Levee Failure	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%

As shown in *Table 2-3*, thunderstorm winds and hailstorms for the entire planning area, have the highest annual chance of occurrence in the parish (100%), followed by flooding for the unincorporated area of Morehouse Parish (84%). Flood events in the remaining incorporated areas have a slightly lower chance of occurring annually. Tornadoes have a 44% annual chance of reoccurrence, followed by tropical cyclones (20%), droughts (8%), and extreme heat (8%). Wildfires and lightning have the lowest annual chance of occurrence in Morehouse Parish at less than 1%. 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 $3,800,795,000 in structures throughout the parish. The tables 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 Morehouse Parish

Occupancy	Morehouse Parish	Unincorporated Morehouse	Bastrop	Bonita
Agricultural	$40,660,000	$30,296,000	$1,852,000	$942,000
Commercial	$502,558,000	$145,027,000	$320,945,000	$6,458,000
Government	$44,675,000	$6,034,000	$29,726,000	$1,038,000
Industrial	$115,738,000	$44,042,000	$70,882,000	$270,000
Religion	$174,614,000	$93,650,000	$71,388,000	$2,666,000
Residential	$2,881,812,000	$1,582,714,000	$1,155,957,000	$28,912,000
Education	$40,738,000	$12,522,000	$22,074,000	$2,674,000
Total	$3,800,795,000	$1,914,285,000	$1,672,824,000	$42,960,000

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

Occupancy	Collinston	Mer Rouge	Oak Ridge
Agricultural	$504,000	$1,852,000	$5,214,000
Commercial	$4,838,000	$22,948,000	$2,342,000
Government	$720,000	$1,479,000	$5,678,000
Industrial	$124,000	$0	$420,000
Religion	$0	$2,454,000	$4,456,000
Residential	$25,963,000	$72,373,000	$15,893,000
Education	$2,586,000	$470,000	$412,000
Total	$34,735,000	$101,576,000	$34,415,000

Essential Facilities of the Parish

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

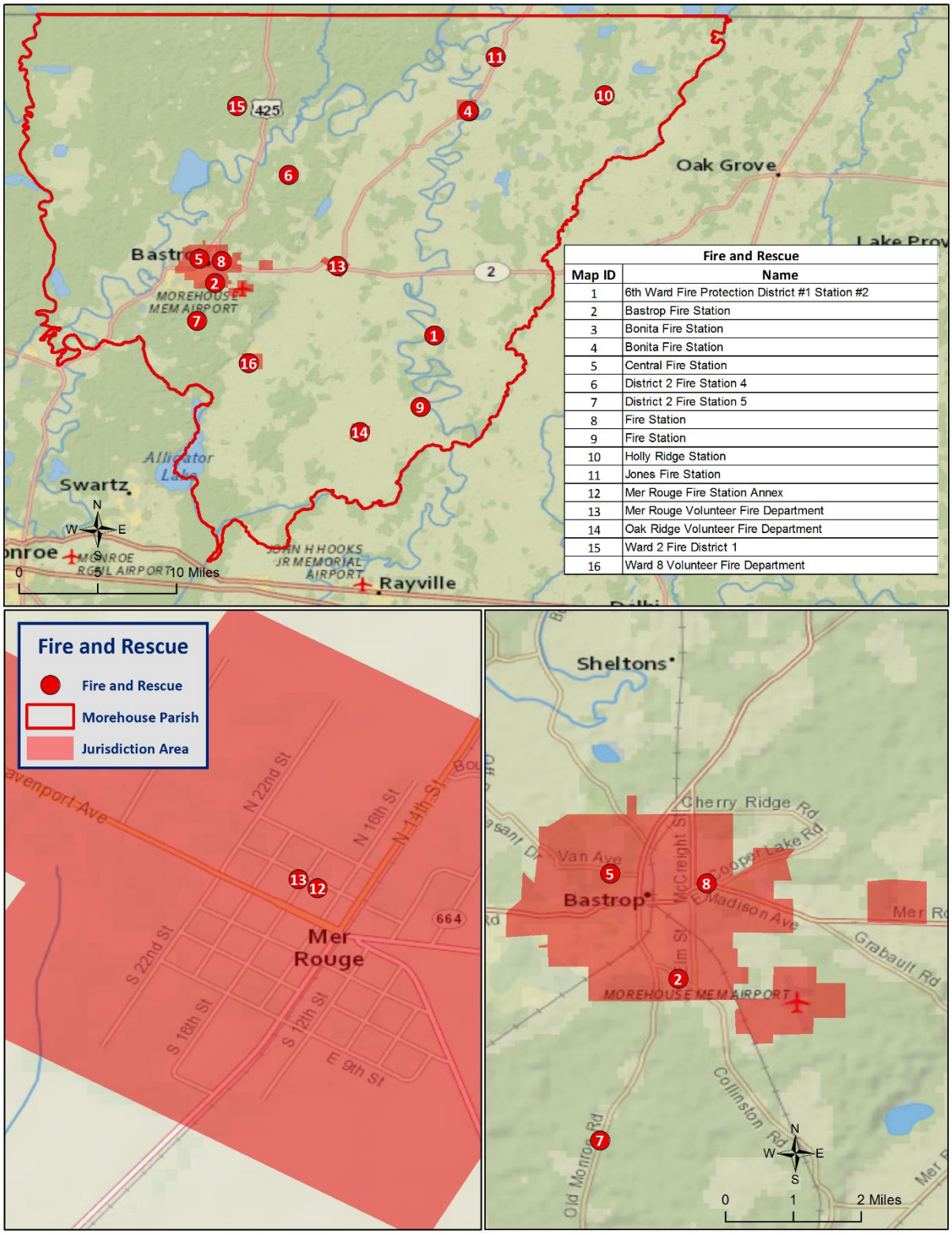

Figure 2-1: Fire and Rescue Buildings in Morehouse Parish

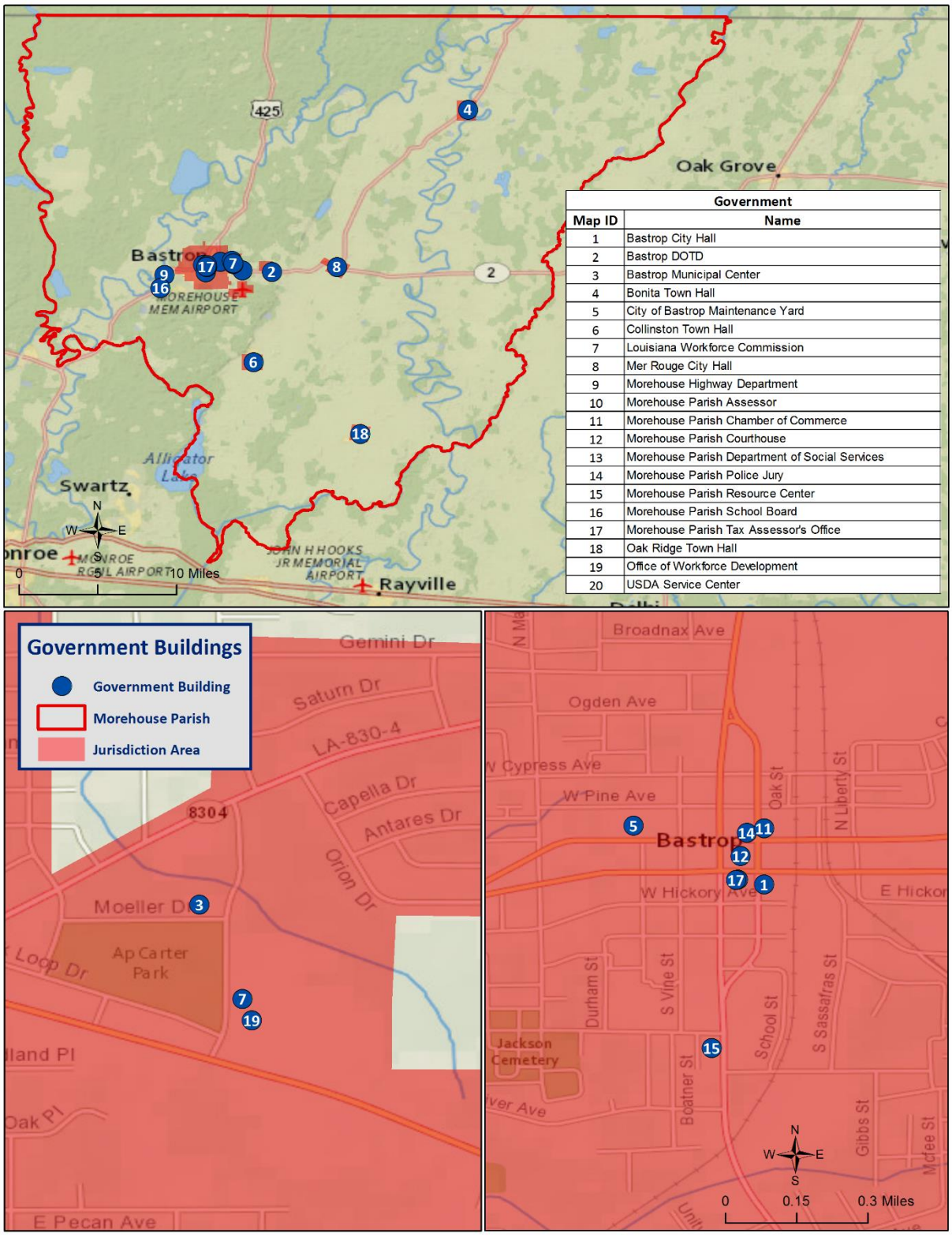

Figure 2-2: Government Buildings in Morehouse Parish

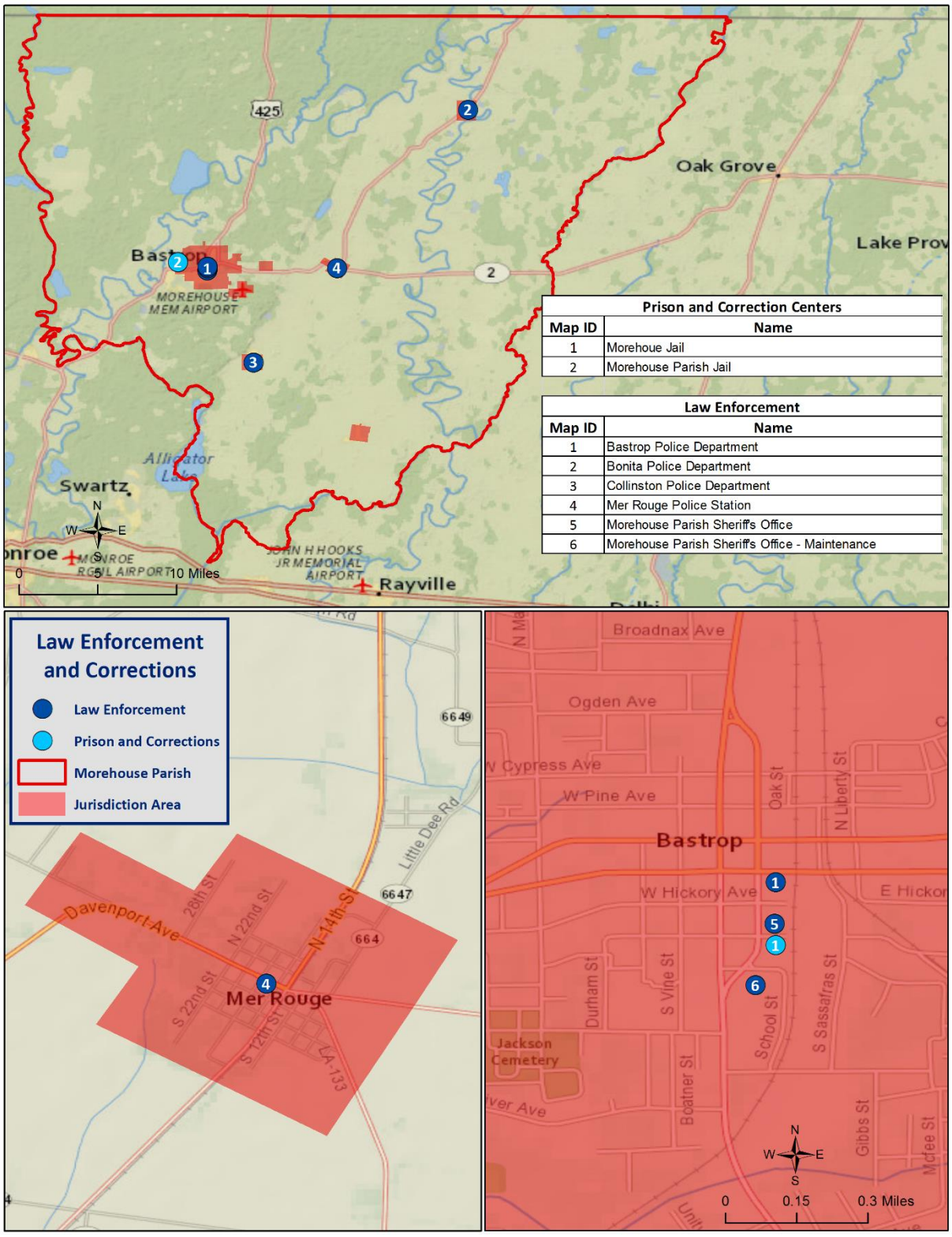

Figure 2-3: Law Enforcement and Correction Buildings in Morehouse Parish

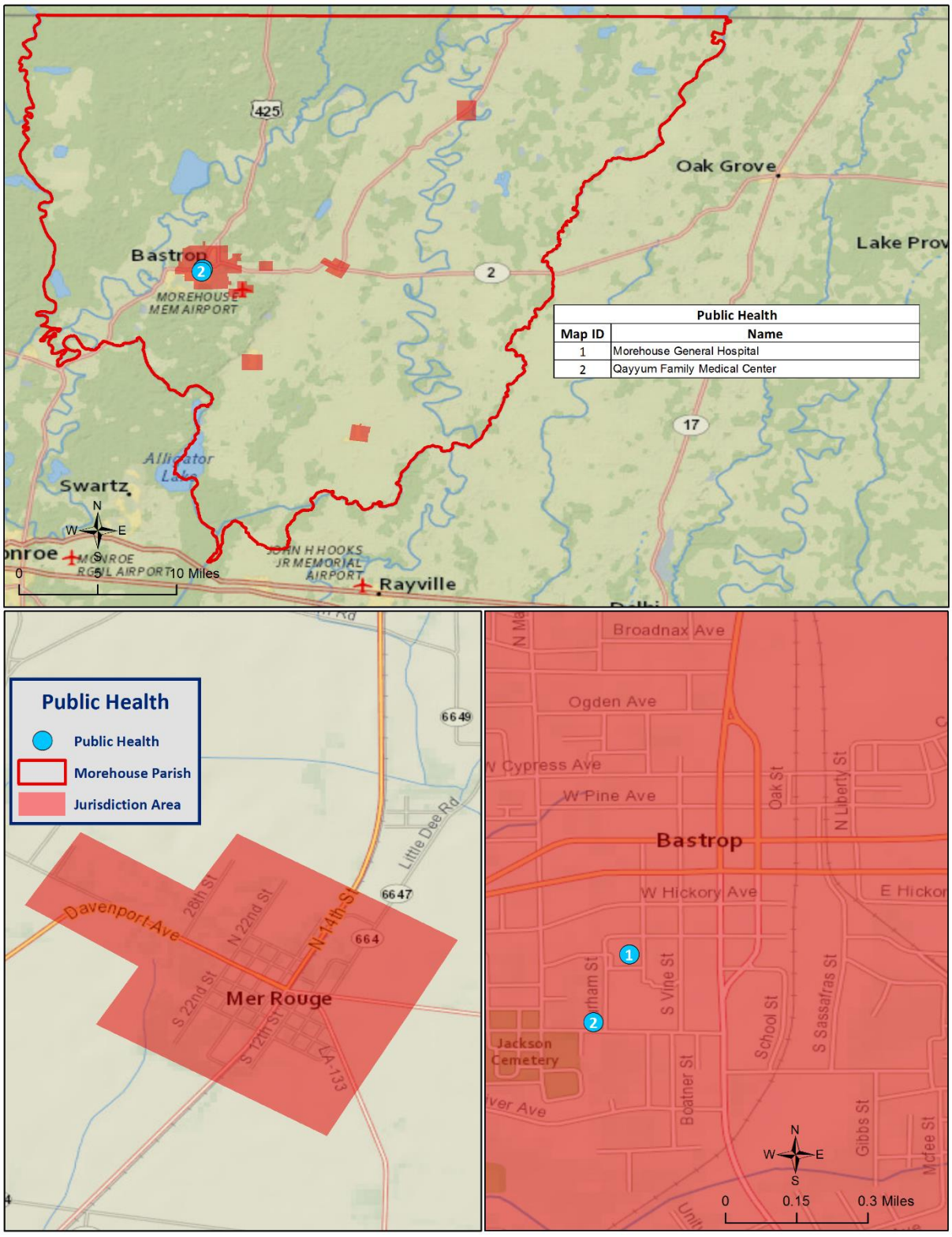

Figure 2-4: Public Health Buildings in Morehouse Parish

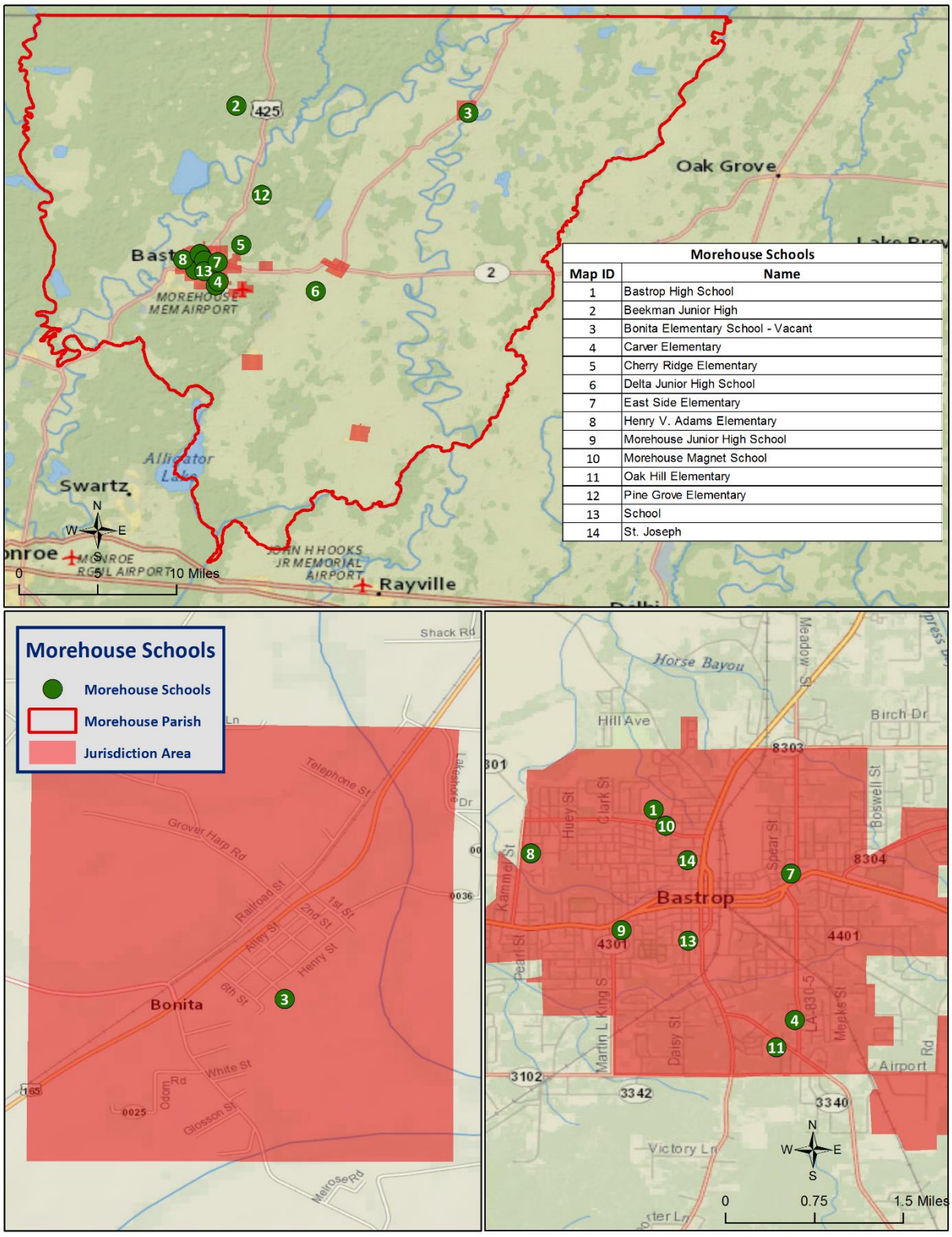

Figure 2-5: School Buildings in Morehouse Parish

Future Development Trends

Morehouse Parish experienced a decline in population and housing between the years of 2000 and 2014, declining from a population of 30,961 with 12,711 housing units in 2000 to a population of 27,319 with 12,463 housing units in 2014. This decline was largely in the incorporated areas of Bonita and Bastrop from the years 2000 to 2010, and in the incorporated areas of Bonita and Collinston 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 Morehouse Parish

Total Population	Morehouse Parish	Morehouse (Unincorporated)	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge
1-Apr-00	30,961	16,455	13,008	340	323	685	150
1-Apr-10	27,925	15,242	11,343	283	286	627	144
1-Jul-14	27,319	15,104	11,075	197	199	624	120
Population Growth between 2000 – 2010	-9.8%	-7.4%	-12.8%	-16.8%	-11.5%	-8.5%	-4.0%
Average Annual Growth Rate between 2000 – 2010	-1.0%	-0.7%	-1.3%	-1.7%	-1.1%	-0.8%	-0.4%
Population Growth between 2010 – 2014	-2.2%	-0.9%	-2.4%	-30.4%	-30.4%	-0.5%	-16.7%
Average Annual Growth Rate between 2010 – 2014	-0.54%	-0.23%	-0.59%	-7.60%	-7.60%	-0.12%	-4.17%

Table 2-6: Housing Growth Rate for Morehouse Parish

Total Housing Units	Morehouse Parish	Morehouse (Unincorporated)	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge
1-Apr-00	12,711	6,762	5,292	143	149	293	72
1-Apr-10	12,423	6,955	4,857	130	146	255	80
1-Jul-14	12,463	6,952	4,940	118	159	230	64
Housing Growth between 2000 – 2010	-2.3%	2.9%	-8.2%	-9.1%	-2.0%	-13.0%	11.1%
Average Annual Growth Rate between 2000 – 2010	-0.2%	0.3%	-0.8%	-0.9%	-0.2%	-1.3%	1.1%
Housing Growth between 2010 – 2014	0.3%	0.0%	1.7%	-9.2%	8.9%	-9.8%	-20.0%
Average Annual Growth Rate between 2010 – 2014	0.1%	0.0%	0.4%	-2.3%	2.2%	-2.5%	-5.0%

As shown in the previous tables, Morehouse Parish has experienced a decline in both population and housing units. Housing growth rates fell at -0.2% annually from 2000 to 2010, and grew slightly at 0.1% annually from 2010 to 2014. Population growth rates were -1% annually from 2000 to 2010, and -0.54% annually from 2010 to 2014. From 2000 to 2014, all incorporated areas and unincorporated area experienced a decline in population.

The incorporated area of Oak Ridge experienced the largest increase in housing units from 2000 to 2010 at 11.1% overall, followed by the unincorporated area of Morehouse Parish at 2.9% overall. From 2010 to 2014, the incorporated area of Collinston experienced the largest increase in housing units at 8.9% overall. The incorporated area of Oak Ridge experienced the largest decrease in housing units at -20%, followed by Mer Rouge at -9.8%.

Future Hazard Impacts

Hazard impacts were estimated for five years and ten years in the future (2019 and 2024). Yearly population and housing growth rates were applied to parish inventory assets for composite flood and tropical cyclones. Based on a review of available information, it is assumed that population and housing units will grow slightly within Morehouse 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	12,473	1,349	1,354	1,359
Value of Structures	$3,842,653,798	$415,592,780	$438,987,402	$458,647,792
# of People	27,346	2,958	2,972	2,984
Tropical Cyclones				
Structures	12,473	12,473	12,523	12,564
Value of Structures	$3,842,653,798	$3,842,653,798	$4,058,965,143	$4,240,749,037
# of People	27,346	27,346	27,483	27,593

Land Use

The Morehouse Parish Land Use table is provided on the following page. Residential, commercial, and industrial areas account for only 5% of the parish's land use. Agricultural land is the largest category at 289,116 acres, accounting for 56% of parish land. At 109,557 acres, forest lands account for 21% of parish lands, while 78,606 acres of wetlands account for 15% of parish lands. The parish also consists of 13,534 acres of water areas, accounting for 3% of all parish lands.

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

Land Use	Acres	Percentage
Agricultural Land, Cropland, and Pasture	289,116	56%
Wetlands	78,606	15%
Forest Land (not including forested wetlands)	109,557	21%
Urban/Development	24,900	5%
Water	13,534	3%

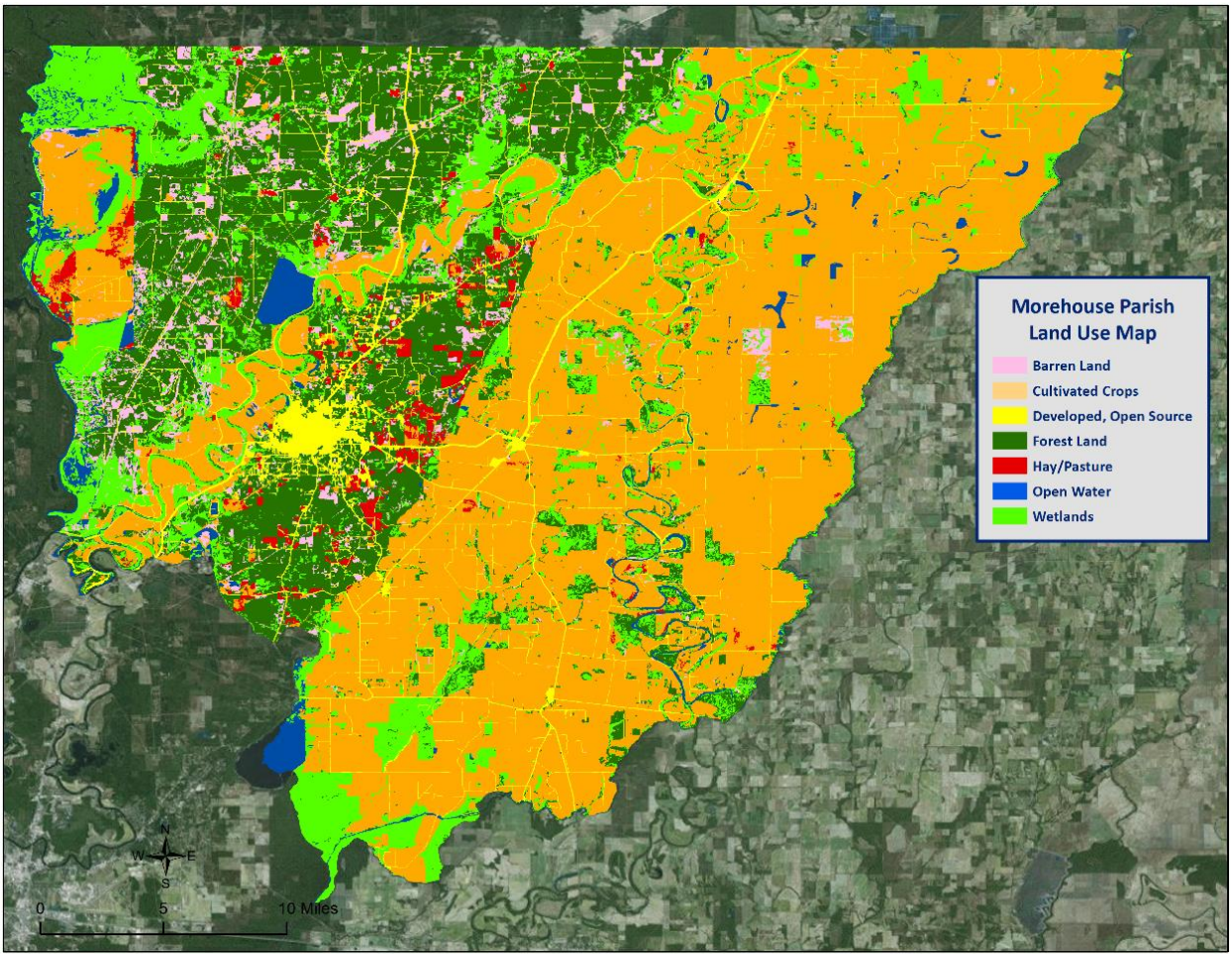

Figure 2-6: Morehouse Parish Land Use Map
(Source: USGS Land Use Map)

Hazard Identification

Drought

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

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

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

On the next page, *Table 2-9* displays the range and Palmer classifications of the PDSI index. *Figure 2-7* displays the current drought monitor for the State of Louisiana and its parishes.

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

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

The PDSI best measures the duration and intensity of drought-inducing circulation patterns at a somewhat long-term time scale, although not as long-term as the PHDI. Long-term drought is cumulative, so the intensity of drought during the current month is dependent on the current weather patterns in addition to the effects of cumulative patterns of previous months. Although weather patterns can change almost overnight from a long-term drought pattern to a long-term wet pattern, as a medium-response indicator, the PDSI responds relatively rapidly. Data compiled by the National Drought Mitigation Center indicates abnormally dry conditions exist in Morehouse Parish at the time this plan went to publication (*Figure 2-7*).

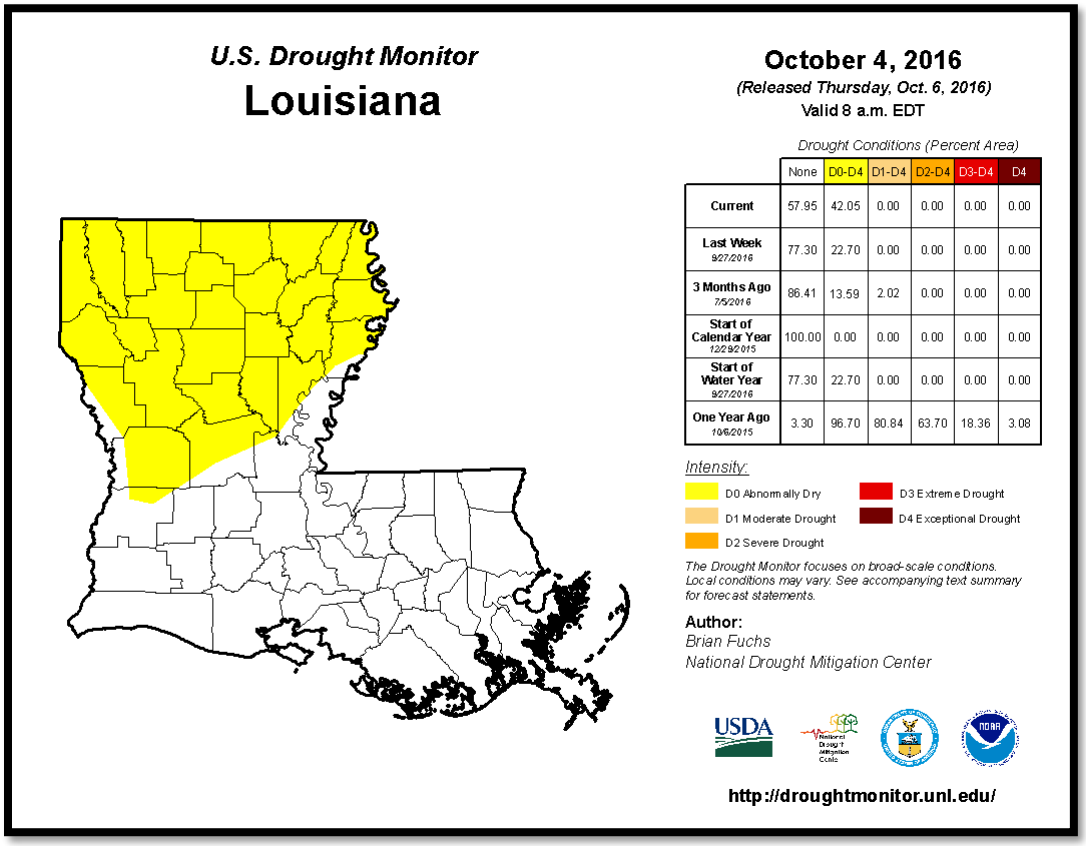

Figure 2-7: United States Drought Monitor for the State of Louisiana and its Parishes (Source: The National Drought Mitigation Center)

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 Morehouse Parish is on the agricultural community.

Previous Occurrences / Extents

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

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

Date	Crop Damage	Palmer Classification
October 2006	$965,524	Moderate Drought
June – October 2010	$2,822,732	Severe Drought

Frequency / Probability

Based on previous occurrences of three 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 $3,788,256, with an average cost of $1,894,128 per drought event. When annualizing the total cost over the 25-year record, total annual losses based on drought is estimated to be $151,530. *Table 2-11* presents an analysis of agricultural exposure that is susceptible to drought by major crop type for Morehouse Parish.

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

Agricultural Exposure by Type for Drought				
Pecans	Rice	Sweet Potatoes	Wheat	Total
$1,205,750	$40,994,216	$6,020,112	$4,285,996	$52,506,074

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

Extreme Heat

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

However, temperature alone is insufficient to describe the stress placed on humans (as well as flora and fauna) in hot weather. It is crucial to consider the effect of relative humidity since it is essential to the body's ability to perspire and cool. Once air temperature reaches 95 °F, perspiration becomes a very significant biophysical mechanism to ensure heat loss. Perspiration is ineffective as a cooling mechanism if the water cannot evaporate (i.e., sweating in high relative humidity is reduced as compared to during dry conditions). To communicate this relationship between temperature and humidity, the National Weather Service (NWS) developed the Heat Index (HI), which provides a warning system based on a combination of air temperature and relative humidity. The HI is presented in *Table 2-12*, and *Table 2-13* summarizes the HI risk levels and protective measures. The NWS devised the index for shady, light wind conditions, and thus advises that the HI value can be increased by as much as 15 °F if a person is in direct sunlight with strong, hot winds present.

Most heat disorders (e.g., sunburn, heat cramps, heat exhaustion, and heat stroke) occur because the victim has been overexposed to heat, or has over-exercised in relation to their age and physical condition. Other circumstances that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Seniors and children are most at risk from adverse heat effects.

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

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

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

According to NOAA, extreme heat is the leading weather-related cause of death in the United States. And while heat-related deaths in Louisiana are not common, due in part to the consistency and predictability of high seasonal temperatures, they do occur and are still very intense and dangerous. Such deaths happen in a variety of circumstances, often in ways that are not easily categorized due to their unexpectedness. For instance, although exposure to heat is higher at the beach than usual, NOAA does not track heat-related deaths there because such deaths happen infrequently.

Table 2-12: Heat Index Advisor based on Air Temperature (°F) and Relative Humidity (Source: National Weather Service)

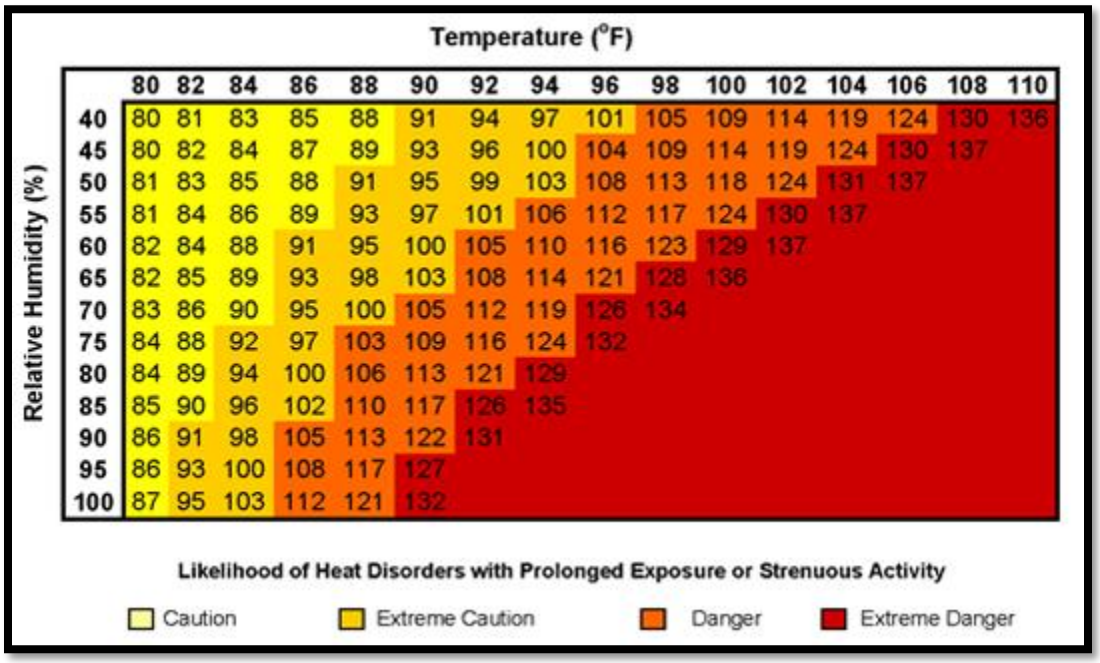

Table 2-13: Summary of Heat Index Risk Levels with Protective Measures (Source: National Weather Service)

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

Location

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

Previous Occurrences / Extents

There have been reports of two significant extreme heat events occurring within the boundaries of Morehouse Parish between the years of 1990 to 2015. *Table 2-14* provides an overview of extreme heat events that have impacted the Morehouse Parish planning area since 1960. Based on historical data, the worst case scenario for Morehouse Parish involving extreme heat would be a high risk level event on the HI scale with temperatures ranging from 103 °F to 115 °F.

Table 2-14: Previous Occurrences of Extreme Heat in Morehouse Parish (Source: NOAA)

Date	Temperature (°F)
August 8, 2011	103
August 14, 2015	103

Frequency / Probability

Based on the geographical location of the State of Louisiana, and Morehouse Parish in particular, extreme heat events occur frequently. The probability of occurrence is estimated at approximately 8%.

Estimated Potential Losses

According to the SHELDUS database, crop damage due to extreme heat in Morehouse Parish has totaled approximately $21,411 since 1990. To estimate the potential losses of an extreme heat event on an annual basis, the total damages recorded for an extreme event is divided by the total number of years of available extreme heat data in SHELDUS (1960 – 2015). This provides an annual estimated potential loss of $856. The following table, based on the 2010 Census data, provides an estimate of potential crop losses for Morehouse Parish:

Table 2-15: Estimated Annual Crop Losses in Morehouse Parish for Extreme Heat

Estimated Annual Potential Losses from Extreme Heat for Morehouse Parish					
Unincorporated Morehouse Parish (54.6% of Population)	Bastrop (40.6% of Population)	Bonita (1.0% of Population)	Collinston (1.0% of Population)	Mer Rouge (2.2% of Population)	Oak Ridge (0.5% of Population)
$467	$348	$9	$9	$19	$4

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

Vulnerability

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

Flooding

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

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

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

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

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

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

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

Mississippi River, floodwaters from Lake Maurepas and Lake Pontchartrain crept into the community on the side of town opposite the Mississippi River.

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

For purposes of this assessment, ponding, flash flood, and urban flooding are considered to be flooding as a result of storm water from heavy precipitation thunderstorms

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

- **Flood Categories**
  - Minor Flooding: Minimal or no property damage, but possibly some public threat.
  - Moderate Flooding: Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations.
  - Major Flooding: Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
  - Record Flooding: Flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping.

- **Flood Warning**
  - Issued along larger streams when there is a serious threat to life or property.

- **Flood Watch**
  - Issued when current and developing hydrometeorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent.

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

It is essential to understand that the magnitude of an X-year flood event for a particular area depends on the source of flooding and the area's location. The size of a specific flood event is defined through historic data of precipitation, flow, and discharge rates. Consequently, different 100-year flood events can have very different impacts. The 100-year flood event in two separate locations have the same likelihood to occur, but they do not necessarily have the same magnitude. For example, a 100-year event for the Mississippi River means something completely different in terms of discharge values (ft^3/s) than for the Amite River. Not only are the magnitudes of 100-year events different between rivers, they can be different along any given river. A 100-year event upstream is different from one downstream due to the variation of river characteristics (volume, discharge, and topography). As a result, the definition of what constitutes a 100-year flood event is specific to each location, river, and time, since floodplain and river characteristics temporally fluctuate. Finally, it is important to note that each flood event is unique. Two hypothetical events at the same location, given the same magnitude of stream flow, may still produce substantially different impacts if there were different antecedent moisture characteristics, different times of day of occurrence (which indicates the population's probable activities at the flood's onset), or other characteristic differences.

The 100-year flood event is of particular significance since it is the regulatory standard that determines the obligation (or lack thereof) to purchase flood insurance. Flood insurance premiums are set depending on the flood zone, as modeled by National Flood Insurance Program (NFIP) Rate Maps. The NFIP and FEMA suggest insurance rates based on Special Flood Hazard Areas (SFHAs), as diagrammed in *Figure 2-8*.

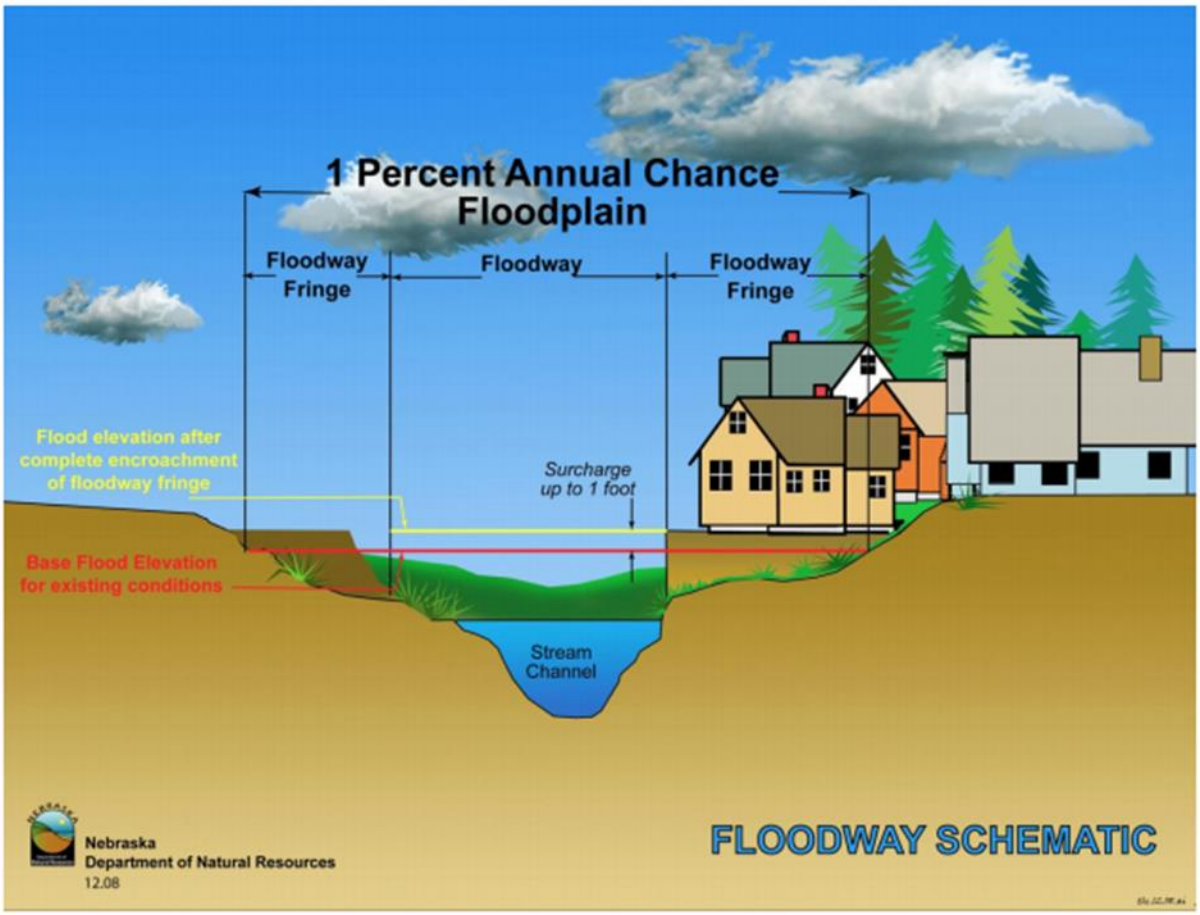

Figure 2-8: Schematic of 100-Year Floodplain. The Special Flood Hazard Area (SFHA) extends to the end of the floodway fringe.
(Source: Nebraska Department of Natural Resources)

A SFHA is the land area covered by the floodwaters of the base flood (red line in *Figure 2-8*), 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 Morehouse Parish are provided in the table below:

Table 2-16: Repetitive Loss Structures for Morehouse Parish

Jurisdiction	Number of Structures	Residential	Commercial	Government	Total Claims	Total Claims Paid	Average Claim Paid
Morehouse Parish (Unincorporated)	9	7	2	0	24	$283,262	$11,803
Bastrop	5	5	0	0	10	$176,319	$17,632
Bonita	0	0	0	0	0	$0	$0
Collinston	0	0	0	0	0	$0	$0
Mer Rouge	0	0	0	0	0	$0	$0
Oak Ridge	0	0	0	0	0	$0	$0
Total	14	12	2	0	34	$459,581	$13,517

Of the 14 repetitive loss structures, 13 were able to be geocoded in order to provide an overview of where the repetitive loss structures were located throughout the parish. *Figure 2-9* shows the approximate location of the 13 structures, while *Figure 2-10* 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 Bastrop.

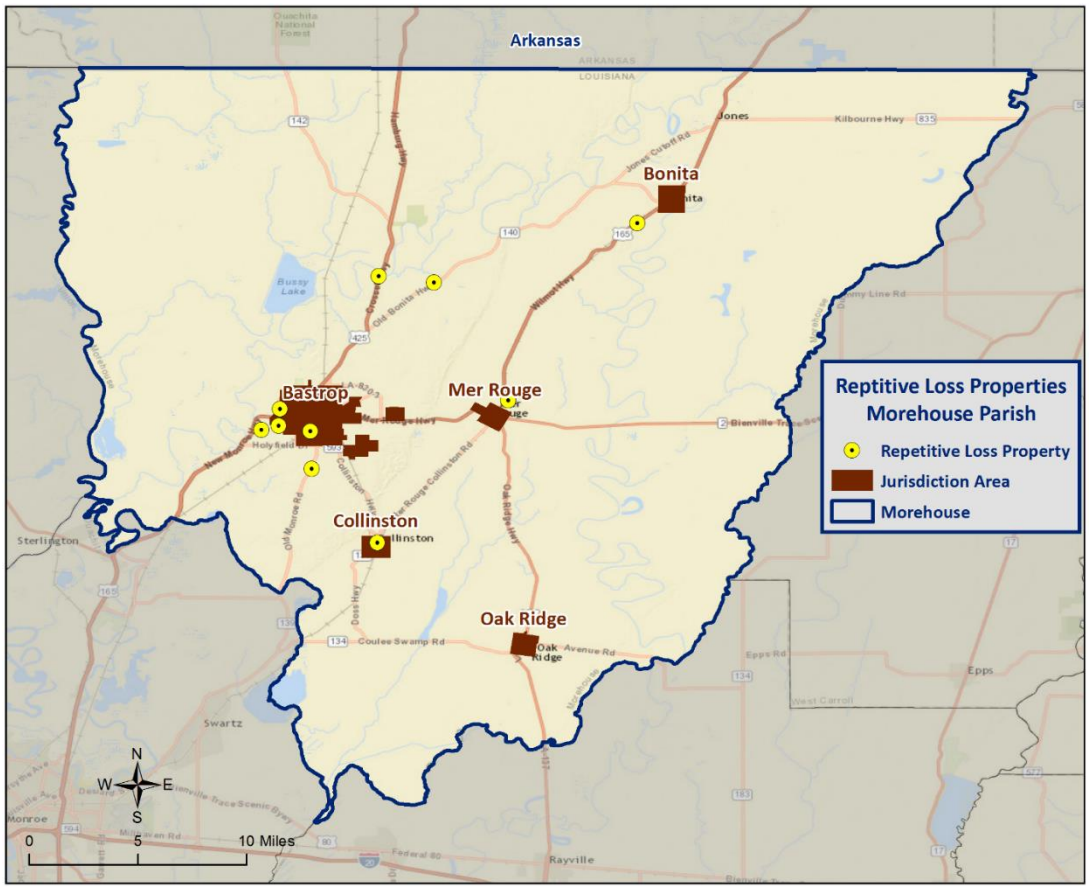

Figure 2-9: Repetitive Loss Properties in Morehouse Parish

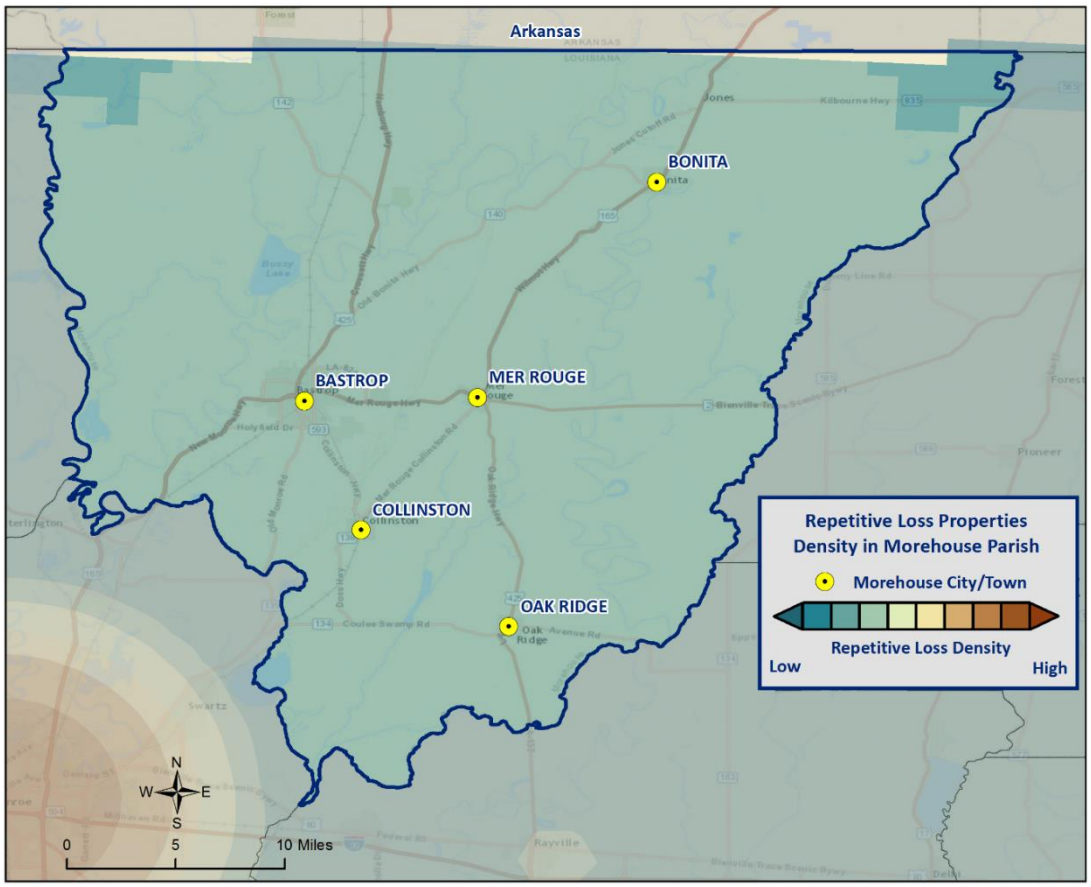

Figure 2-10: Repetitive Loss Property Densities in Morehouse Parish

National Flood Insurance Program

Flood insurance statistics indicate that Morehouse Parish has 226 flood insurance policies with the NFIP, with total annual premiums of $146,331. Morehouse Parish and the incorporated areas of Bastrop, Bonita, Collinston, Mer Rouge, and Oak Ridge are all participants in the NFIP. Morehouse 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 Morehouse Parish are provided in the tables to follow.

Morehouse 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 will continue to seek and attend floodplain management and NFIP continuing education.

Table 2-17: Summary of NFIP Policies for Morehouse Parish

Location	No. of Insured Structures	Total Insurance Coverage Value	Annual Premiums Paid	No. of Insurance Claims Filed Since 1978	Total Loss Payments
Morehouse Parish (Unincorporated)	174	$26,341,700	$117,039	88	$1,039,104
Bastrop	32	$5,595,800	$17,208	27	$377,376
Bonita	4	$424,000	$2,049	0	$0
Collinston	0	$0	$0	0	$0
Mer Rouge	11	$3,206,300	$6,079	2	$15,917
Oak Ridge	5	$2,180,000	$3,956	0	$0
Total	226	$37,747,800	$146,331	117	$1,432,397

*While the Village of Collinston does not have any active NFIP policies, the jurisdiction will continue to promote NFIP participation through education and outreach.

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

CID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Date Joined the NFIP	Tribal
220127#	Bastrop	3/15/1974	12/16/1980	12/16/1980	12/16/1980	No
220316	Bonita	8/22/1975	4/1/2007	4/1/2007 (L)	4/1/2007	No
220399	Collinston	-	7/6/2016	7/6/2016	7/6/2016	No
220128	Mer Rouge	5/17/1974	6/27/1978	6/27/1978 (M)	6/27/1978	No
220367#	Morehouse Parish*	8/5/1978	10/15/1985	10/15/1985 (M)	10/15/1985	No
220303	Oak Ridge	11/12/1976	7/6/2016	7/6/2016	3/27/1997	No

According to the Community Rating System (CRS) list of eligible communities dated June 1, 2014, Morehouse Parish and its incorporated areas do not participate in the CRS.

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 Morehouse 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 Morehouse 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 Boeuf River crests at flood stage levels, causing extensive flooding in low-lying areas.

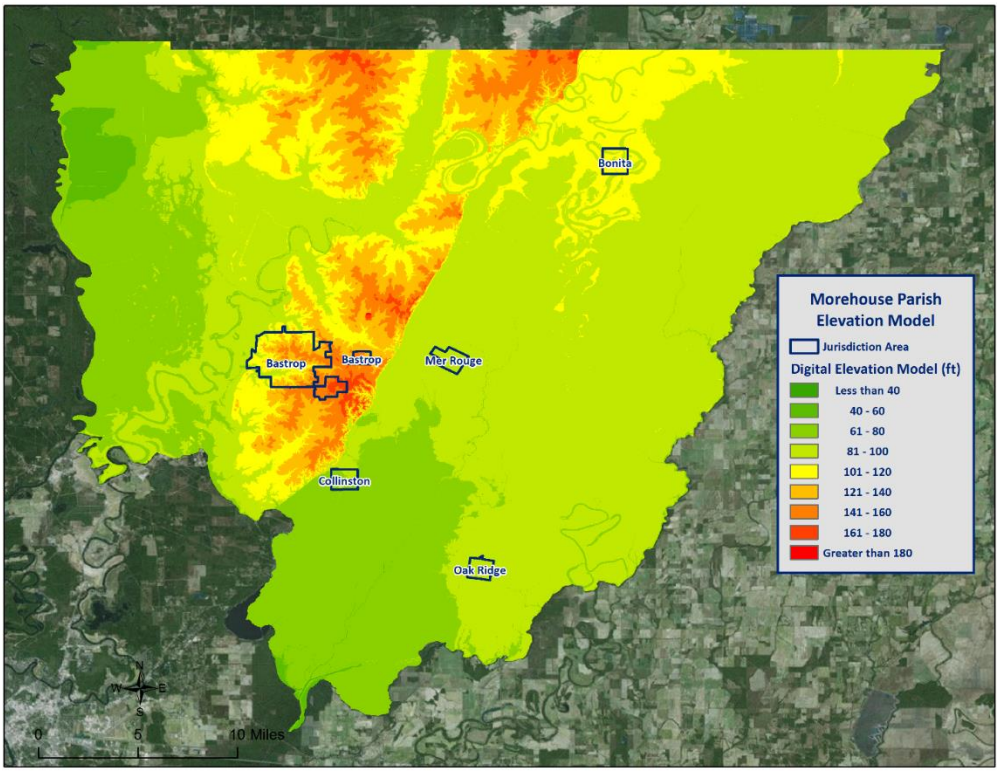

Figure 2-11: Elevation throughout Morehouse Parish

Looking at the digital elevation model (DEM) in the previous figure for Morehouse 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 40 feet to over 180 feet. The highest elevations in the parish are approximately 190 feet, located in the

central and northern portions of the parish. The incorporated areas range in elevation from 85 to 167 feet, with Collinston averaging 85 feet, Oak Ridge averaging 89 feet, Mer Rouge averaging 95 feet, Bonita averaging 105, and Bastrop averaging 167 feet.

Location

Morehouse Parish has experienced significant flooding in its history and can expect more in the future. The majority of Morehouse Parish is located in the Tensas River basin. The encompassed area includes the alluvial lands lying between Bastrop Ridge and the Boeuf River to the east. Included in this area is the city of Bastrop and the villages of Bonita, Collinston, Mer Rouge, and Oak Ridge. Drainage is provided principally by Camp Bayou, Cypress Bayou, and Bayou Bonne Idee, all of which flow into the Boeuf River. Bayou Galion and its tributaries that flow into the diversion canal between Bayou Lafourche and Little Bayou Boeuf also drain part of the area.

The northwestern corner of Morehouse Parish, the area west and northwest of Bastrop is located within the Ouachita River Basin. This area drains directly into the Ouachita River through small streams such as Halfway Bayou, Shiloh Creek, and Bayou de Butte. A significant drainage channel for this area is Bayou Bartholomew and its tributaries. In severe flooding conditions Bayou Bartholomew flows around the ends of detached levees, causing flooding in the adjacent lands.

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

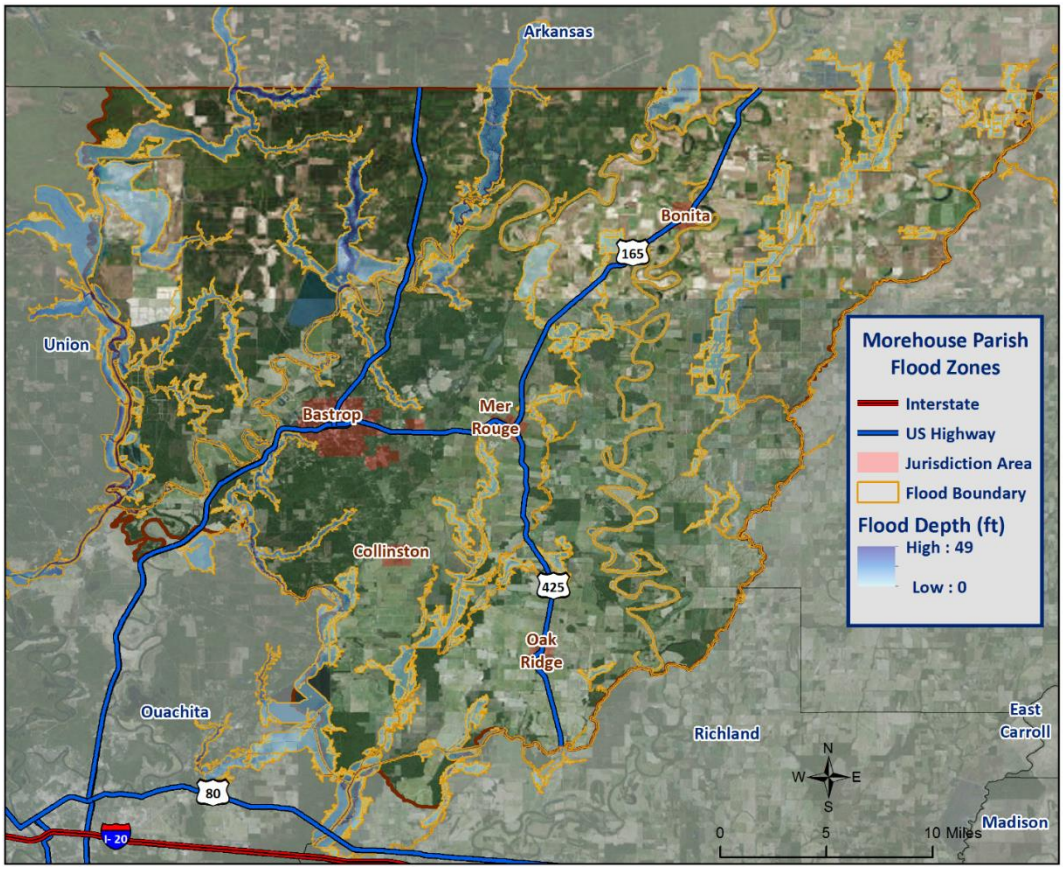

Figure 2-12: Morehouse Parish Areas within the Flood Zones

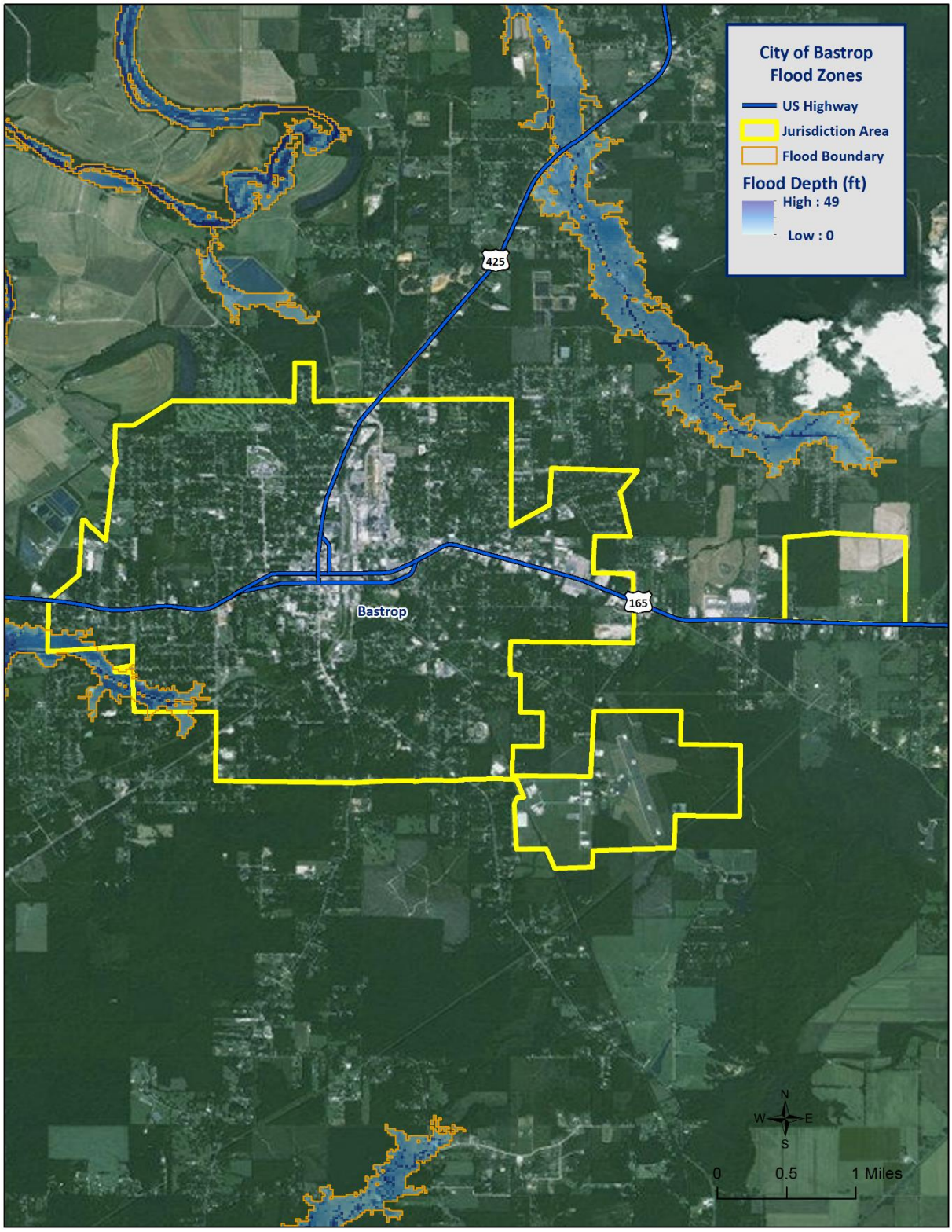

Figure 2-13: City of Bastrop Areas within the Flood Zones

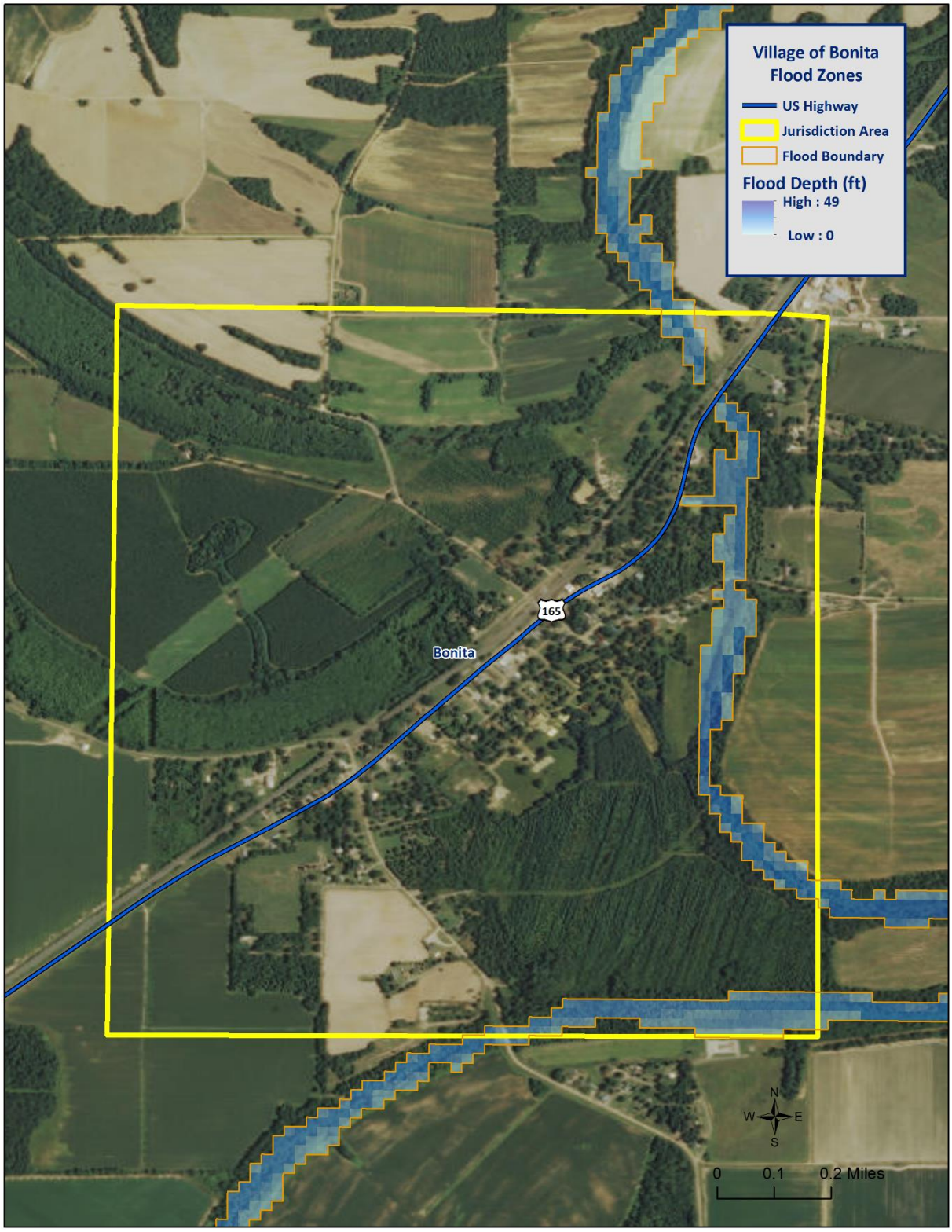

Figure 2-14: Village of Bonita Areas within the Flood Zones

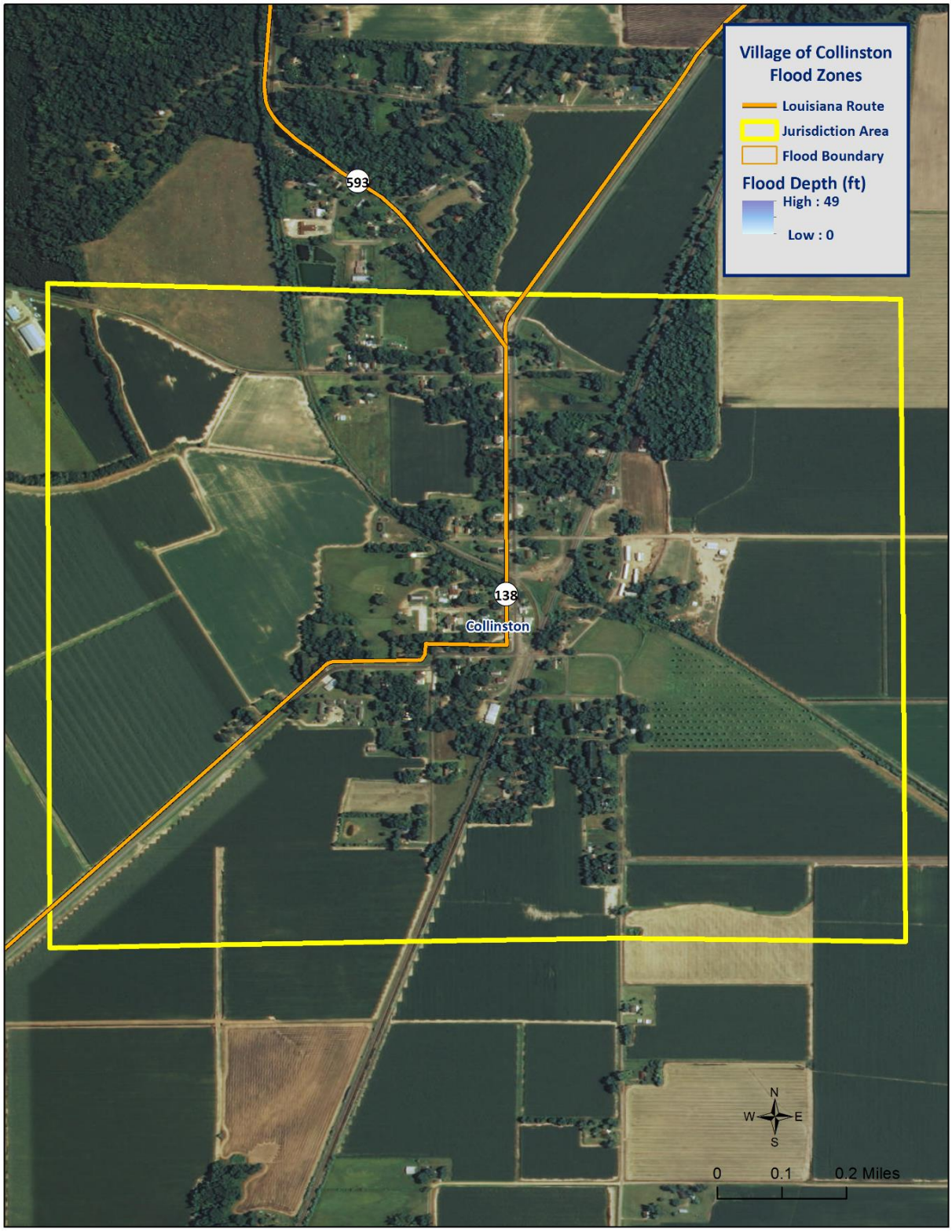

Figure 2-15: Village of Collinston Areas within the Flood Zones

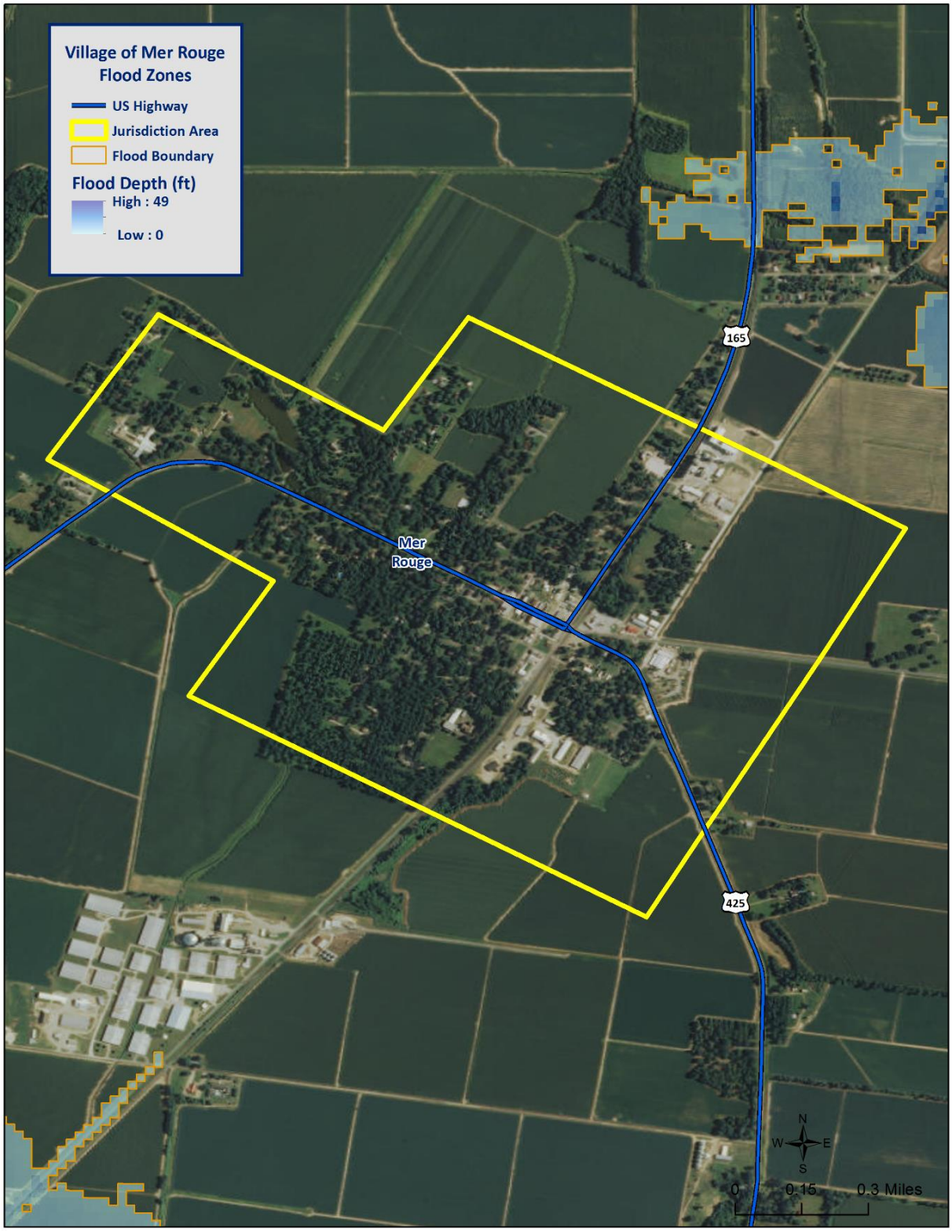

Figure 2-16: Village of Mer Rouge Areas within the Flood Zones

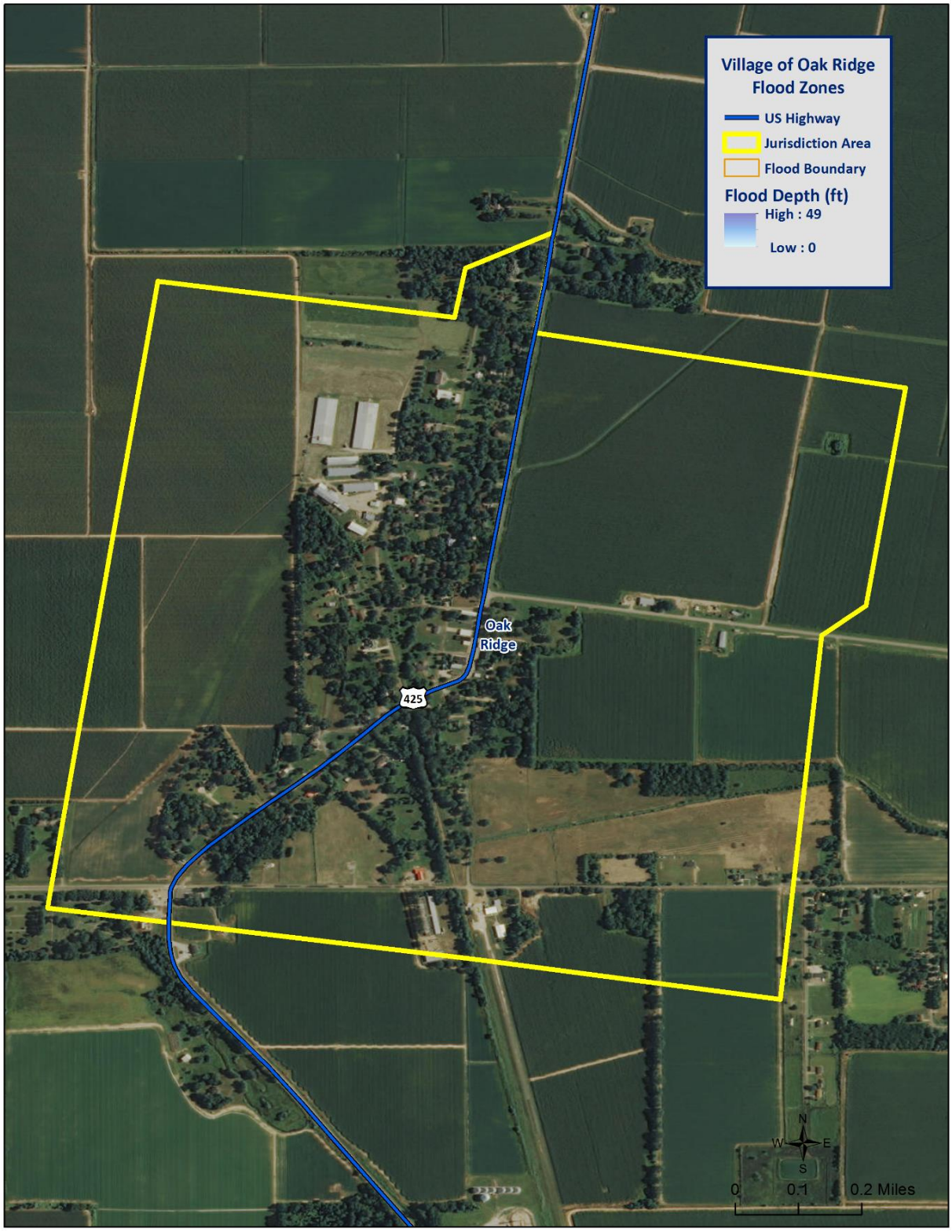

Figure 2-17: Village of Oak Ridge Areas within the Flood Zones

Previous Occurrences / Extents

Historically, there have been 33 flooding events that have created significant flooding in Morehouse Parish between 1990 and 2015. Below is a brief synopsis of the six flooding events that have occurred since 2010, including flooding events that have occurred since the parish's last planning update.

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

Date	Extents	Type of Flooding	Estimated Damages	Location
June 9, 2010	High water was observed on Old Bonita Road.	Flash Flood	$2,174	BONITA
April 27, 2011	Heavy rainfall caused a few roads around Mer Rouge to be covered by water.	Flash Flood	$2,107	MER ROUGE
March 11, 2012	Several roads were under water around Bastrop. Several rural roads east of Bastrop showed evidence of significant flash flooding with some areas near intersections showing damage along the sides of the roads near ditches.	Flash Flood	$10,323	NEWBLOCK
January 10, 2013	Water covered Highway 140.	Flash Flood	$0	LOG CABIN
January 13, 2013	Several roads were flooded across the parish. Shelton Cutoff Road was closed.	Flash Flood	$10,174	BASTROP
October 26, 2015	Several inches of standing water was on Lord Road. This occurred from continuous steady rain.	Flood	$1,000	BRODENAX

Since 2010, there have been no significant flooding events in the incorporated areas of Collinston and Oak Ridge.

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 six feet can be expected in the unincorporated areas of the parish and in the incorporated areas of Bastrop and Bonita. The incorporated areas of Collinston, Mer Rouge, and Oak Ridge can expect flood depths up 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 Morehouse Parish having multiple jurisdictions, it was necessary to assess the historical data found in the National Climatic Data Center for Morehouse Parish and its jurisdictions to properly determine probability for future flood events. The table on the next page shows the probability and return frequency for each jurisdiction.

Table 2-20: Annual Flood Probabilities for Morehouse Parish

Jurisdiction	Annual Probability	Return Frequency
Morehouse Parish (Unincorporated)	84%	1 – 2 years
Bastrop	68%	1 – 2 years
Bonita	52%	1 – 2 years
Collinston	44%	2 – 3 years
Mer Rouge	52%	1 – 2 years
Oak Ridge	52%	1 – 2 years

Based on historical record, the overall flooding probability for the entire Morehouse Parish planning area is 100%, with 33 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 2-21* shows the total economic losses that would result from this occurrence.

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

Jurisdiction	Estimated Total Losses from 100-Year Flood Event
Morehouse Parish (Unincorporated)	$11,743,000
Bastrop	$340,000
Bonita	$41,000
Collinston	$0
Mer Rouge	$0
Oak Ridge	$0
Total	$12,124,000

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.

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

Morehouse Parish (Unincorporated)	Estimated Total Losses from 100-Year Flood Event
Agricultural	$106,000
Commercial	$1,214,000
Government	$0
Industrial	$377,000
Religious / Non-Profit	$24,000
Residential	$9,969,000
Schools	$53,000
Total	$11,743,000

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

Bastrop	Estimated Total Losses from 100-Year Flood Event
Agricultural	$0
Commercial	$98,000
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$242,000
Schools	$0
Total	$340,000

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

Bonita	Estimated Total Losses from 100-Year Flood Event
Agricultural	$0
Commercial	$7,000
Government	$0
Industrial	$0
Religious / Non-Profit	$0
Residential	$33,000
Schools	$1,000
Total	$41,000

Threat to People

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

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

Number of People Exposed to Flood Hazards			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Morehouse Parish (Unincorporated)	**15,271**	**2,889**	**18.9%**
Bastrop	**11,365**	**96**	**0.8%**
Bonita	**284**	**41**	**14.4%**
Collinston	**287**	**0**	**0%**
Mer Rouge	**628**	**0**	**0%**
Oak Ridge	**144**	**0**	**0%**
Total	**27,979**	**3,026**	**10.8%**

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

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

Morehouse Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	2,889	18.9%
Persons Under 5 Years	200	6.9%
Persons Under 18 Years	515	17.8%
Persons 65 Years and Over	445	15.4%
White	1,481	51.3%
Minority	1,408	48.7%

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

Bastrop		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	96	0.8%
Persons Under 5 Years	8	8.7%
Persons Under 18 Years	19	20.0%
Persons 65 Years and Over	12	12.9%
White	25	25.7%
Minority	71	74.3%

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

Bonita		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	41	14.4%
Persons Under 5 Years	2	4.9%
Persons Under 18 Years	10	23.9%
Persons 65 Years and Over	6	15.1%
White	14	34.9%
Minority	27	65.1%

Vulnerability

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

Thunderstorms

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

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

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

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

- *Severe Thunderstorm Watch*: Issued to alert people to the possibility of a severe thunderstorm developing in the area. Expected time frame for these storms is three to six hours.

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

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

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

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

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

Hazard Description

Hailstorms

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

Table 2-29: TORRO Hailstorm Intensity Scale

Intensity Category		Hail Diameter (mm)	Probable Kinetic Energy	Typical Damage Impacts
H0	Hard Hail	5	0 - 20	No damage
H1	Potentially Damaging	5 - 15	>20	Slight general damage to plant, crops
H2	Significant	10 - 20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20 - 30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25 - 40	>500	Widespread glass damage, vehicle body work
H5	Destructive	30 - 50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40 - 60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50 - 75		Severe roof damage, risk of serious injuries
H8	Destructive	60 - 90		Severe damage to aircraft bodywork
H9	Super Hailstorms	75 - 100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Table 2-30: Spectrum of Hailstone Diameters and their Everyday Description (Source: National Weather Service)

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

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

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

High Winds

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

Table 2-31: High Winds Categorized by Source, Frequency, and Duration
(Source: Making Critical Facilities Safe from High Wind, FEMA)

High Winds Categories			
High Wind Type	**Description**	**Relative Frequency in Louisiana**	**Relative Maximum Duration in Louisiana**
Straight-line Winds	Wind blowing in straight line; usually associated with intense low-pressure area	High	Few minutes – 1 day
Downslope Winds	Wind blowing down the slope of a mountain; associated with temperature and pressure gradients	N/A	N/A
Thunderstorm Winds	Wind blowing due to thunderstorms, and thus associated with temperature and pressure gradients	High (especially in the spring and summer	Few minutes – several hours
Downbursts	Sudden wind blowing down due to downdraft in a thunderstorm; spreads out horizontally at the ground, possibly forming horizontal vortex rings around the downdraft	Medium-to-High (~5% of all thunderstorms)	~15 – 20 minutes
Northeaster (nor'easter) Winds	Wind blowing due to cyclonic storm off the east coast of North America; associated with temperature and pressure gradients between the Atlantic and land	N/A	N/A
Hurricane Winds	Wind blowing in spirals, converging with increasing speed toward eye; associated with temperature and pressure gradients between the Atlantic and Gulf and land	Low-to-Medium	Several days
Tornado Winds	Violently rotating column of air from base of a thunderstorm to the ground with rapidly decreasing winds at greater distances from center; associated with extreme temperature gradient	Low-to-Medium	Few minutes – few hours

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

The following table presents the Beaufort Wind Scale, first developed in 1805 by Sir Francis Beaufort, which aids in determining relative force and wind speed based on the appearance of wind effects.

Table 2-32: Beaufort Wind Scale
(Source: NOAA's SPC)

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

Major damage directly caused by thunderstorm winds is relatively rare, while minor damage is common and pervasive, and most noticeable when it contributes to power outages. These power outages can have major negative impacts such as increased tendency for traffic accidents, loss of revenue for businesses, increased vulnerability to fire, food spoilage, and other losses that might be sustained by a loss of power. Power outages may pose a health risk for those requiring electric medical equipment and/or air conditioning.

Lightning

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

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

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

Table 2-33: Lightning Activity Level (LAL) Grids

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

Hazard Profile

Hailstorms

Location

Because hailstorms are a climatological based hazard, the entire planning area for Morehouse Parish is equally at risk for hailstorms.

Previous Occurrences / Extents

The SHELDUS database reports 35 significant hailstorm events occurring within the boundaries of Morehouse Parish between the years of 1990 - 2015. According to the National Climatic Data Center, hailstorm diameters experienced in Morehouse Parish have ranged from 0.75 inches to 2.75 inches since 1990. The most frequently recorded hail size has been 1 inch diameters. *Figure 2-18* displays the density of hailstorms in Morehouse Parish and adjacent parishes. Based on the National Climatic Data Center dataset, *Table 2-34* provides an overview of hailstorms that have impacted the Morehouse Parish planning area since 2010. Morehouse Parish can expect to experience hail up to 2.75 inches in diameter for future events.

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

Date	Recorded Hail Size (inches)	Location
April 24, 2010	1.5	NAFF
May 16, 2010	1	BEEKMAN
May 19, 2010	1.5	MARCARCO
May 19, 2010	1	STEVENSON
October 12, 2010	1	COLLINSTON
October 12, 2010	1	OAK RIDGE
March 29, 2011	1.75	WINDSOR
April 4, 2011	1.75	BASTROP MEML ARPT
June 7, 2011	1	BONITA
March 2, 2012	1	JONES
March 2, 2012	1	LOG CABIN
April 5, 2012	1	UPLAND
April 5, 2012	1	USEARCO
August 9, 2012	1	BRODENAX
March 18, 2013	2.75	JONES
March 23, 2013	1	BEEKMAN
March 23, 2013	1	GALLION
June 8, 2014	1.75	DEWDROP
April 19, 2015	1.75	OAK RIDGE

Since 2010, there have been no significant hailstorm events in the incorporated areas of Bastrop and Mer Rouge.

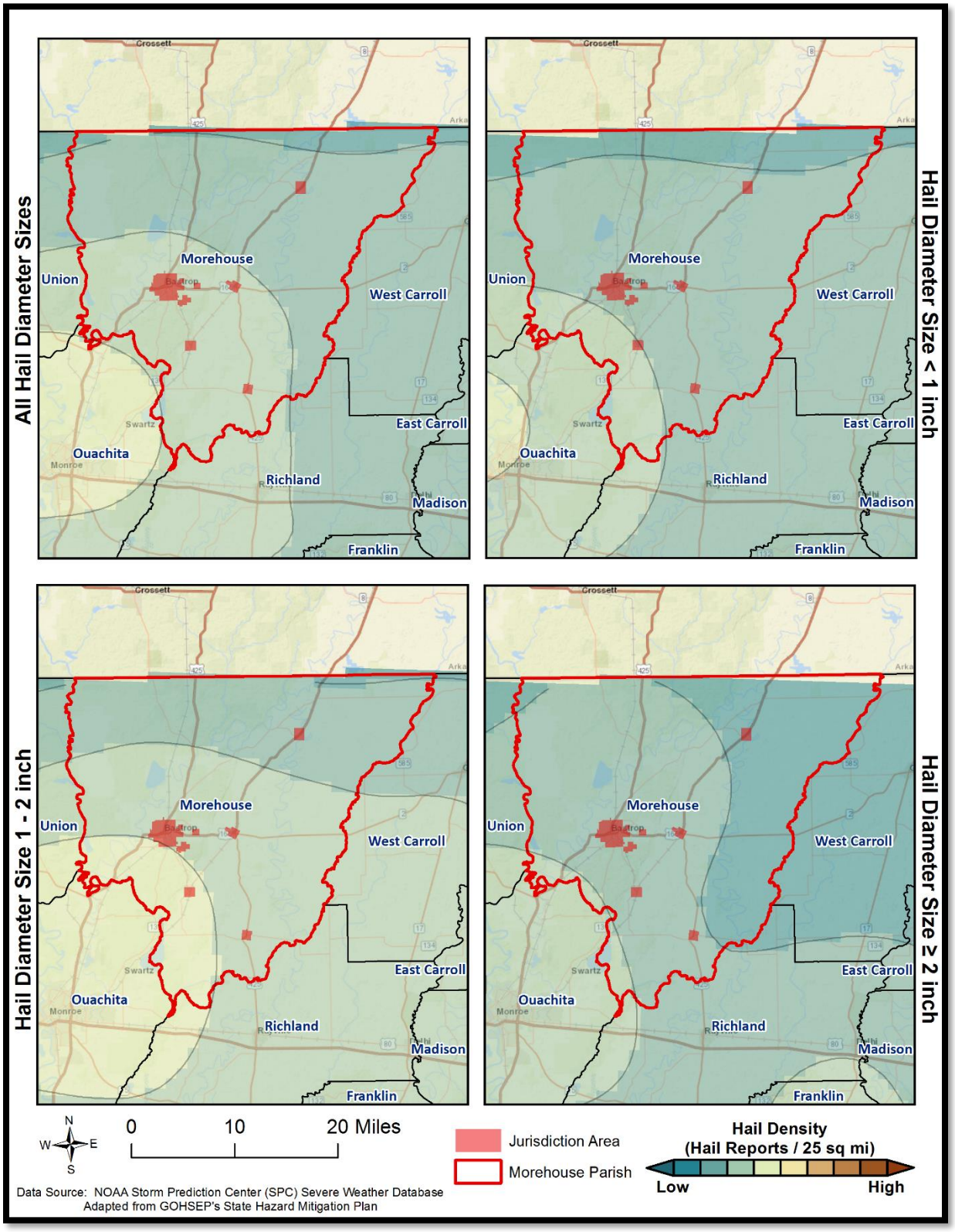

Figure 2-18: Density of Hailstorms by Diameter from 1950-2012
(Source: State of Louisiana Hazard Mitigation Plan 2014)

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 Morehouse Parish has had 35 recorded events.

Estimated Potential Losses

According to the SHELDUS database, property damage due to hailstorms in Morehouse Parish have totaled approximately $910,294 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 $36,412. *Table 2-35* provides an estimate of potential property losses for Morehouse Parish.

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

Estimated Annual Potential Losses from Hailstorms for Morehouse Parish					
Unincorporated Morehouse Parish (54.6% of Population)	Bastrop (40.6% of Population)	Bonita (1.0% of Population)	Collinston (1.0% of Population)	Mer Rouge (2.2% of Population)	Oak Ridge (0.5% of Population)
$19,874	$14,790	$370	$374	$817	$187

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

Previous Occurrences / Extents

The SHELDUS database reports a total of 107 thunderstorm wind events occurring within the boundaries of Morehouse Parish between the years of 1990 to 2015. The significant thunderstorm wind events experienced in Morehouse Parish have ranged in wind speed from 50 mph to 100 mph. Morehouse Parish can expect to receive thunderstorm winds up to 100 mph for future high wind events. The following table provides an overview of significant high wind events over the last five years:

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

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
BEEKMAN	May 16, 2010	60	$0	$0
BASTROP	May 19, 2010	57	$1,087	$0
USEARCO	June 9, 2010	66	$8,696	$0
WARDVILLE	August 3, 2010	57	$3,261	$0

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
BASTROP	August 19, 2010	57	$5,435	$0
WARDVILLE	February 24, 2011	57	$1,054	$0
WARDVILLE	February 24, 2011	63	$12,644	$0
WARDVILLE	April 4, 2011	57	$3,161	$0
BONITA	April 4, 2011	69	$3,161	$0
LOG CABIN	April 15, 2011	69	$5,268	$0
SPYKER	April 26, 2011	69	$63,222	$0
OAK RIDGE	April 26, 2011	57	$1,054	$0
NEWBLOCK	May 25, 2011	57	$0	$0
BEEKMAN	July 4, 2011	57	$26,343	$0
TWIN OAKS	July 4, 2011	57	$4,215	$0
BASTROP	July 12, 2011	57	$10,537	$0
SPYKER	July 13, 2011	57	$2,107	$0
OAK RIDGE	August 21, 2011	57	$3,161	$0
BASTROP MEML ARPT	March 11, 2012	75	$77,425	$0
MER ROUGE BACON ARPT	March 11, 2012	77	$0	$0
COLLINSTON	April 2, 2012	57	$2,065	$0
OAK RIDGE	May 21, 2012	57	$5,162	$0
MER ROUGE BACON ARPT	June 12, 2012	57	$4,129	$0
MER ROUGE	October 9, 2012	50	$103	$0
BRODENAX	October 9, 2012	57	$10,323	$0
OAK RIDGE	October 9, 2012	57	$0	$0
SPYKER	December 9, 2012	57	$1,032	$0
BASTROP	December 20, 2012	57	$6,194	$0
OAK RIDGE	January 29, 2013	57	$2,035	$0
COLLINSTON	January 29, 2013	57	$3,052	$0
BASTROP	January 29, 2013	57	$10,174	$0
BEEKMAN	March 23, 2013	63	$25,436	$0
BASTROP	March 31, 2013	57	$15,261	$0
WARDVILLE	April 18, 2013	57	$0	$0
BASTROP	May 21, 2013	57	$20,349	$0
COLLINSTON	June 1, 2013	63	$0	$0
NAFF	June 28, 2013	57	$1,017	$0
MER ROUGE	June 28, 2013	69	$30,523	$0
NAFF	December 21, 2013	57	$1,017	$0
STAMPLEY	March 28, 2014	72	$20,024	$0
USEARCO	June 9, 2014	63	$70,083	$0
BASTROP	June 28, 2014	66	$4,005	$0
SPYKER	October 13, 2014	69	$5,006	$0

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
MER ROUGE	October 13, 2014	57	$5,006	$0
OAK RIDGE	October 13, 2014	70	$1,001	$0
MER ROUGE BACON ARPT	October 13, 2014	63	$1,001	$0
MER ROUGE BACON ARPT	October 13, 2014	64	$1,001	$0
OAK RIDGE	February 1, 2015	60	$4,000	$0
MER ROUGE BACON ARPT	April 19, 2015	57	$2,000	$0
MARCARCO	April 22, 2015	85	$300,000	$0
COLLINSTON	April 22, 2015	81	$400,000	$0
BASTROP	April 24, 2015	57	$5,000	$0
COLLINSTON	April 24, 2015	57	$3,000	$0
MER ROUGE	April 24, 2015	63	$30,000	$0
BASTROP	May 17, 2015	57	$5,000	$0
BASTROP	May 24, 2015	50	$4,000	$0
BASTROP	May 25, 2015	57	$8,000	$0
MER ROUGE	May 25, 2015	57	$10,000	$0
BASTROP	May 29, 2015	57	$10,000	$0
BASTROP	December 28, 2015	57	$4,000	$0

Frequency

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

Estimated Potential Losses

Since 1990, there have been 107 significant wind events that have resulted in property damages according to the SHELDUS database. The total property damages associated with those storms have totaled $2,494,944. 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 $99,798. The table on the next page provides an estimate of potential property losses for Morehouse Parish.

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

Estimated Annual Potential Losses from Thunderstorm Winds for Morehouse Parish					
Unincorporated Morehouse Parish (54.4% of Population)	Bastrop (40.5% of Population)	Bonita (1.0% of Population)	Collinston (1.0% of Population)	Mer Rouge (2.2% of Population)	Oak Ridge (0.5% of Population)
$54,470	$40,538	$1,013	$1,024	$2,240	$514

There have been two reported injuries and no 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 Morehouse Parish.

Previous Occurrences / Extents

There have been no significant lightning events occurring within the boundaries of Morehouse Parish between the years of 1990 - 2015. The SHELDUS and NCDC databases only record 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 Morehouse 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.

Since 2010, there have been no lightning events that have caused property damage or loss of life in Morehouse Parish Planning area.

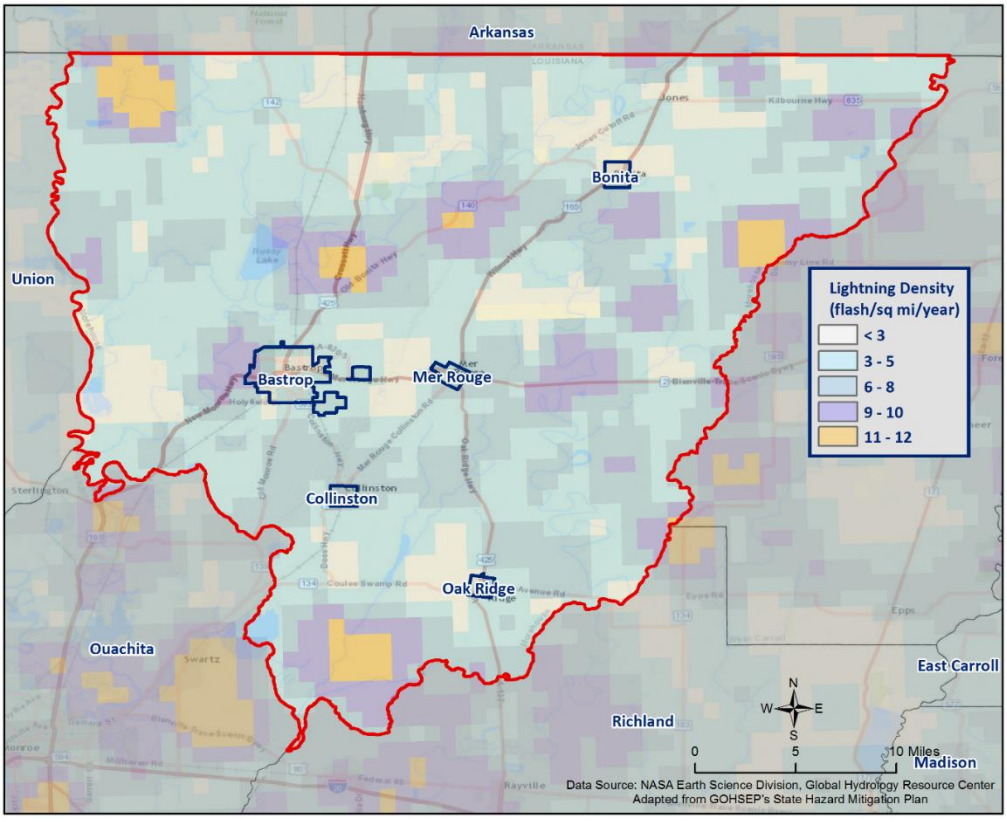

Figure 2-19: Lightning Density Reports for Morehouse Parish

Frequency

Lightning can strike anywhere and is produced by every thunderstorm, so the chance of lightning occurring in Morehouse 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 and NCDC, there have been no lightning events that have caused property damages or injuries over the last 25 years, establishing an annual probability of less than 1%.

Estimated Potential Losses

Since 1990, there have been no significant lightning events that have resulted in property damage. Because there were no significant lightning events, the total property damages associated with lightning events totaled $0. 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 $0.

There have been no reported injuries or fatalities in Morehouse 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 2-38* 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 2-38: 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 2-39: 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 Morehouse Parish with actual locations, tornadoes in general are a climatological based hazard and have the same approximate probability of occurring in Morehouse Parish as all of its jurisdictions. Because a tornado has a similar probability of striking anywhere within the planning area for Morehouse Parish, all jurisdictions are equally at risk for tornadoes.

Previous Occurrences / Extents

SHELDUS reports a total of 11 tornadoes or waterspouts occurring within the boundaries of Morehouse Parish between the years of 1990 - 2015. The tornadoes experienced in Morehouse Parish have from ranged EF0 to EF1 on the EF scale, and ranged from F0 to F2 on the F scale. The worst case scenario Morehouse Parish can expect in the future is an EF2 tornado.

The tornado that caused the most damage to property occurred on November 24, 2001. The F1 tornado touched down two miles northeast of Bastrop and traveled northeast for a distance of 17 miles. The maximum path width of the storm was 200 yards. The tornado caused extensive damage to a sweet potato plant at the Kinnaird Farms on Old Bonita Road. The tornado also caused extensive damage to farm buildings, equipment (including an overturned trailer rig), and house on another farm on Claud Mann Road. Numerous trees and power lines were blown down.

Table 2-40: Historical Tornadoes in Morehouse Parish with Locations from 1990 - 2015

Date	Impacts	Property Damage	Location	Magnitude
February 2, 1990	1.0 mile path with a width of 30 yards. Two mobile homes received damage.	$45,336	WARDVILLE	F1
August 26, 1992	2.0 mile path with a width of 50 yards. Destroyed a mobile home, did major damage to another home, and minor damage to 6 homes. Three people were injured when a mobile home was destroyed.	$422,339	BEEKMAN	F1
April 20, 1995	2.0 mile path with a width of 100 yards. Three houses were destroyed. Three people were taken to the hospital for superficial injuries. Several roads were closed due to downed trees and power lines.	$155,523	BASTROP	F2
January 8, 1999	1.5 mile path with a width of 50 yards. One trailer was overturned. A house was moved four feet off of its foundation. A roof was blown off of a café.	$14,227	BASTROP	F1
January 8, 1999	1.0 mile path with a width of 50 yards. A mobile home was rolled.	$14,227	BASTROP	F0
January 21, 1999	7.0 mile path with a width of 200 yards. Roofing was torn off of a house. Numerous trees and power lines were blown down.	$28,453	BONITA	F1

Date	Impacts	Property Damage	Location	Magnitude
November 24, 2001	17.0 mile path with a width of 200 yards. Damaged a sweet potato plant, farm buildings, equipment, and a house.	$334,770	BASTROP	F1
May 3, 2007	2.0 mile path with a width of 75 yards. Damaged one home were most of its roof was blown off. Numerous trees were uprooted and snapped.	$137,175	BEEKMAN	EF1
May 3, 2007	0.5 mile path with a width of 50 yards. Significantly damaged one home by shifting it from its foundation and damaging the roof.	$91,450	BASTROP	EF1
April 26, 2011	2.46 mile path with a width of 75 yards. Mostly downed large limbs along with a few snapped or uprooted trees. Some minor roof damage was also noted.	$21,074	PT PLEASANT	EF0
April 26, 2011	7.84 mile path with a width of 440 yards. Damaged a mobile home, roofs, and trees. Maximum winds were around 110 mph.	$63,222	STEVENSON	EF1
April 24, 2015	4.26 mile path with a width of 100 yards. Several large hardwood trees were snapped and uprooted.	$10,000	WARDVILLE	EF1

The incorporated areas of Bastrop, Bonita, Collinston, Mer Rouge, and Oak Ridge 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, Morehouse Parish has had one tornado touchdown in the unincorporated areas of the parish. The following is a brief synopsis of this event:

April 24, 2015 – EF1 Tornado in Wardville

This tornado caused a path of tree damage in the area three to four miles south of Beekman. The most significant damage was along State Highway 593 where several large hardwood trees were snapped and uprooted. Maximum winds were estimated at 90 mph.

Frequency / Probability

Tornadoes are a sporadic occurrence within Morehouse Parish, with an annual chance of occurrence calculated at 44% based on the records for the past 25 years (1990 - 2015). The figure on the next page displays the density of tornado touch downs in Morehouse Parish and neighboring parishes.

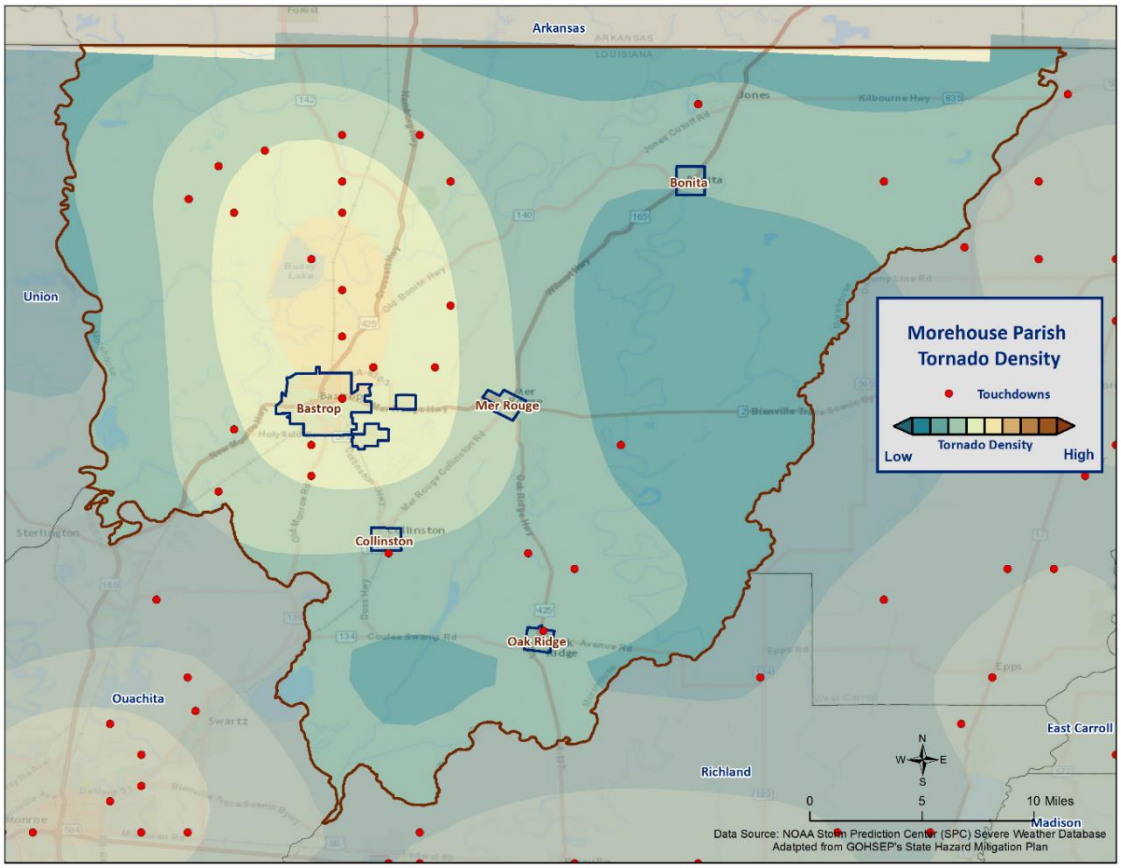

Figure 2-20: Location and Density of Tornadoes to Touch Down in Morehouse Parish (Source: NOAA/SPC Severe Weather Database)

Estimated Potential Losses

According to the SHELDUS database, there have been 11 tornadoes that have caused some level of property damage. The total damage from the actual claims for property is $952,335, with an average cost of $86,576 per tornado strike. When annualizing the total cost over the 25-year record, total annual loses based on tornadoes are estimated to be $38,093. 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 Morehouse Parish.

Table 2-41: Estimated Annual Losses from Tornadoes in Morehouse Parish

Estimated Annual Potential Losses from Tornadoes in Morehouse Parish					
Unincorporated Morehouse Parish (54.6% of Population)	Bastrop (40.6% of Population)	Bonita (1.0% of Population)	Collinston (1.0% of Population)	Mer Rouge (2.2% of Population)	Oak Ridge (0.5% of Population)
$20,791	$15,473	$387	$391	$855	$196

Table 2-42 presents an analysis of building exposure that is susceptible to tornadoes by general occupancy type for Morehouse Parish, along with the percentage of building stock that are mobile homes.

Table 2-42: Building Exposure by General Occupancy Type for Tornadoes in Morehouse 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 (%)
2,881,812	502,558	115,738	40,660	174,614	44,675	40,738	18.6

The parish has suffered through a total of three days in which tornadoes or waterspouts have accounted for seven injuries and no fatalities during this 25-year period (*Table 2-43*). The average number of injuries per event for Morehouse Parish is 0.63 per tornado, with an average of 0.28 per year for the 25-year period.

Table 2-43: Tornadoes in Morehouse Parish by Magnitude that Caused Injuries or Deaths

Date	Magnitude	Deaths	Injuries
August 26, 1992	F1	0	3
April 20, 1995	F2	0	3
April 26, 2011	EF1	0	1

In assessing the overall risk to population, the most vulnerable population throughout the parish are those residing in manufacturing housing. Approximately 18.6% of all housing in Morehouse Parish consists of manufactured housing. Based on location data collected in a previous hazard mitigation project, there are nine known locations where manufactured housing is concentrated. Each of those nine locations have an overall number of manufactured houses ranging from one to 25. 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 Morehouse Parish (*Table 2-44*). 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 2-44: Manufactured Home Distribution throughout Morehouse Parish

Location	Number of Manufactured Home Parks	% of Manufactured Home Parks
Unincorporated Area	6	66.7%
Bastrop	3	33.3%
Bonita	0	0%
Collinston	0	0%
Mer Rouge	0	0%
Oak Ridge	0	0%

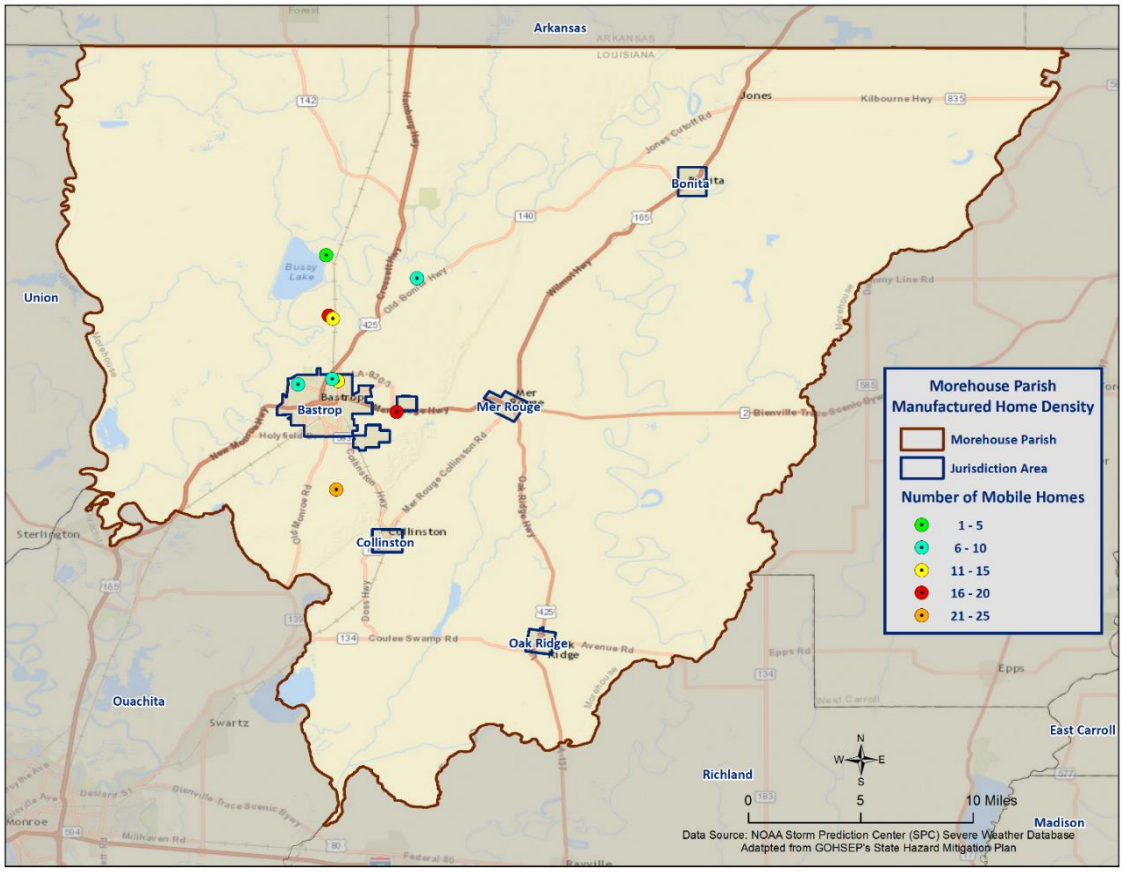

Figure 2-21: Location and Approximate Number of Units in Manufactured Housing Locations throughout Morehouse Parish

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 2-45: 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 Morehouse 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 five tropical cyclone events occurring within the boundaries of Morehouse Parish between the years 2002 and 2014 (*Table 2-46*). The tropical cyclone events experienced in Morehouse Parish include depressions, storms, and hurricanes. As a worst case scenario, Morehouse Parish can expect to experience hurricanes at the Category 1 level in the future.

Table 2-46: Historical Tropical Cyclone Events in Morehouse Parish from 2002 - 2015 (Source: SHELDUS)

Date	Name	Storm Type At Time of Impact
October 3, 2002	Lili	Hurricane –Category 1
August 29, 2005	Katrina	Hurricane – Category 1
September 24, 2005	Rita	Hurricane – Category 1
September 1, 2008	Gustav	Tropical Storm
August 29, 2012	Isaac	Tropical Storm

Hurricane Lili (2002)

Hurricane Lili made landfall on the Louisiana coast on October 3, 2002, with an estimated intensity of 80 knots. Although Lili weakened considerably before making landfall on the central Louisiana coast, it caused significant wind and flood damage in the area. Strong winds toppled trees onto houses and into roadways, stripped shingles from roofs, and blew out windows. The wind and driving rain flattened sugarcane fields throughout southern Louisiana. A combination of storm surge and rain caused levees to fail in Montegut and Franklin, Louisiana. Lili also temporarily curtailed oil production in the Gulf of Mexico.

In Morehouse Parish, saturated ground conditions from the combined rainfall of Lili and Isidore (which moved over the same area a week earlier) allowed winds to push down numerous trees. One such tree in Morehouse Parish fell upon a house, causing considerable damage. Rainfall amounts from this event were over three inches in many areas although no major instances of flooding occurred.

Hurricane Katrina (2005)

Hurricane Katrina was one of the strongest and most destructive hurricanes on record to impact the coast of the United States. The National Hurricane Center ranked Katrina as the costliest storm (both before and after adjusting for inflation) and the third deadliest in the U.S. since 1851. The hurricane initially made landfall in Plaquemines Parish on August 29, 2005, as a Category 3 storm and continued on a north-northeast track, with a second landfall occurring near the Louisiana-Mississippi border. Hurricane Katrina caused widespread devastation along the central Gulf Coast states. Following the passage of Katrina, the flooding of New Orleans was catastrophic, resulting in the displacement of more than 250,000 people.

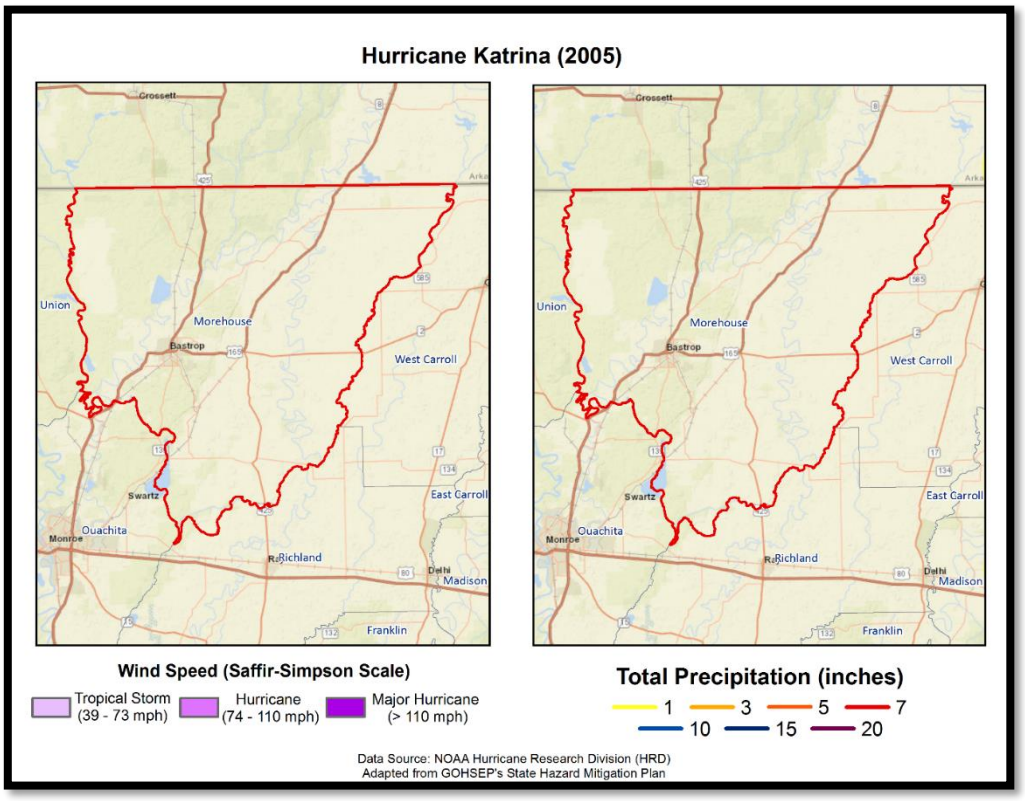

Figure 2-22: Wind Speed and Precipitation Totals in Morehouse Parish for Hurricane Katrina

Hurricane Katrina brought considerable wind, rain, and damage to Morehouse Parish. Wind gusts up to tropical storm force were felt while rainfall totals around two inches inundated the area. Hundreds of residents filed loss claims with FEMA as a result of Hurricane Katrina.

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.

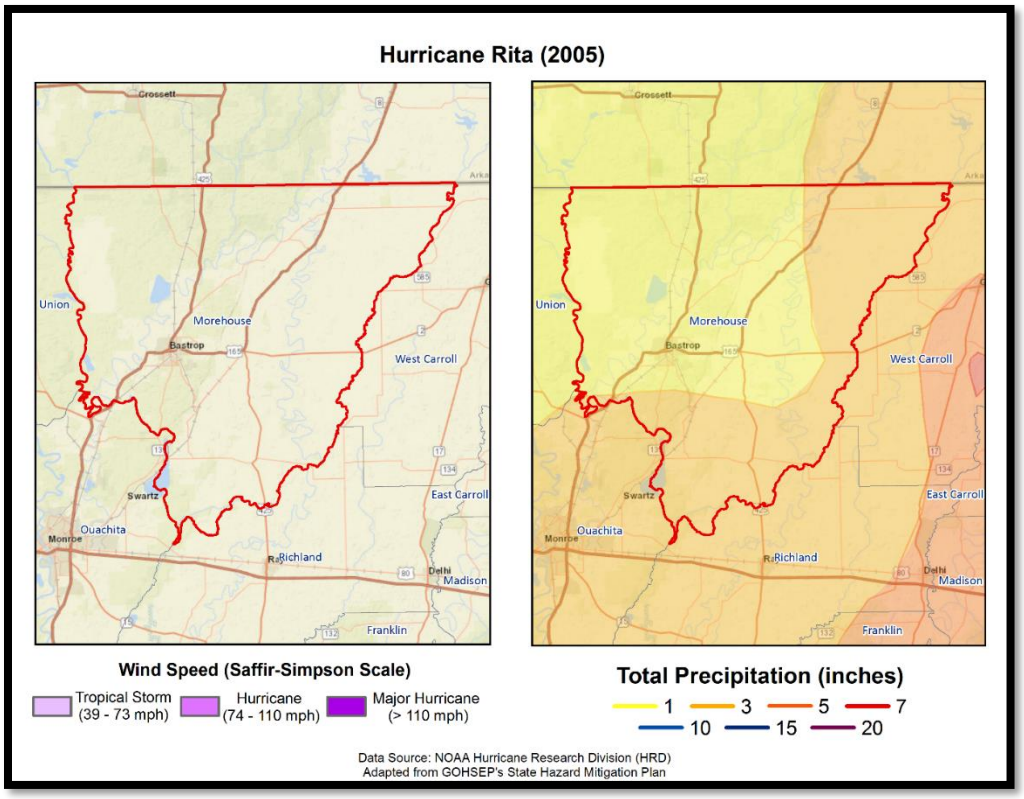

Figure 2-23: Wind Speed and Precipitation Totals in Morehouse Parish for Hurricane Rita

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.

Morehouse Parish received wind gusts up to tropical storm force level as a result of Hurricane Rita. Rainfall totals of several inches accompanied these gusts. Trees and power lines were blown down across the parish.

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.

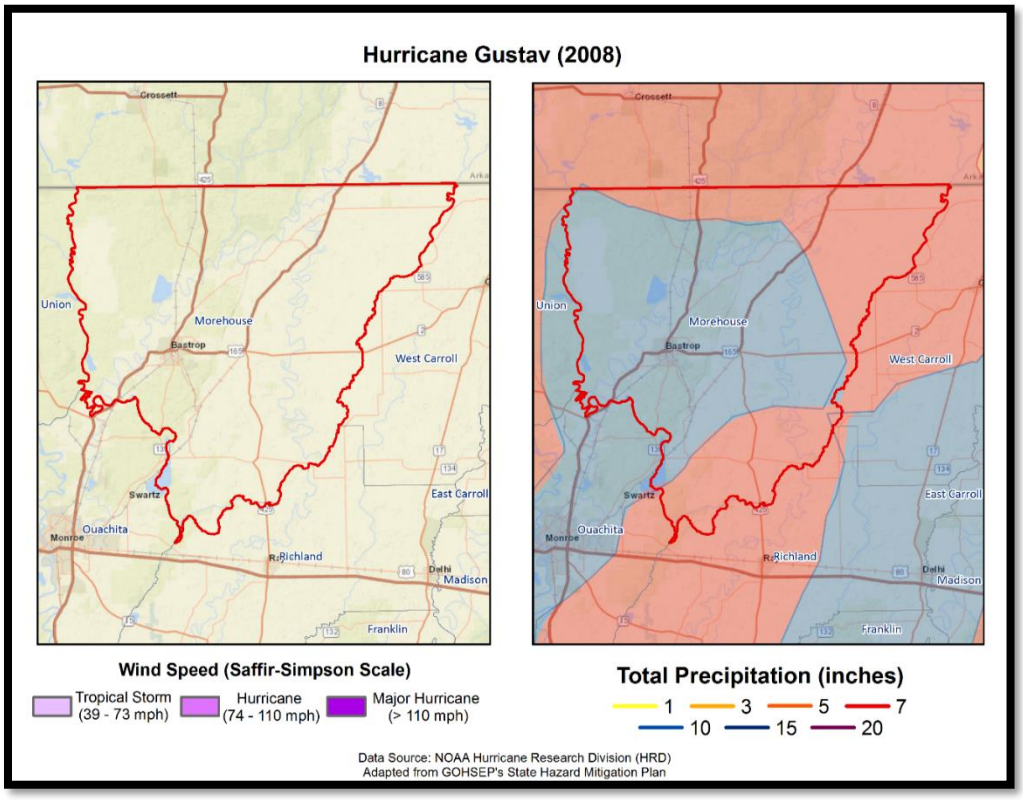

Figure 2-24: Wind Speed and Precipitation Totals in Morehouse Parish for Hurricane Gustav

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

Gustav produced widespread wind damage across southeast Louisiana, especially in the area from Houma and Thibodaux through the greater Baton Rouge area. Hurricane force wind gusts occurred also across the inland areas, including the Baton Rouge area and surrounding parishes. A peak wind gust of 91 mph was recorded at the Baton Rouge (Ryan Field) Airport at 1:12 PM CST. This was only one mph less than the highest wind gust recorded during Hurricane Betsy in 1965. After the storm, the electric utility serving most of southeast Louisiana reported 75 to 100 percent of utility customers were without power, in areas ranging from Lafourche and Terrebonne Parishes northwest through the Baton Rouge area to central Louisiana and southwest Mississippi. Considerable damage occurred to many houses and structures as large tree limbs and trees were toppled by the hurricane force winds. Preliminary estimates from the American Red Cross indicated that around 13,000 single family dwellings were damaged by the hurricane in southeast Louisiana, and several thousand more apartments and mobile homes were also damaged. Early estimates from Louisiana Economic Development indicated that Gustav caused at least $4.5 billion in property damage in Louisiana, including insured and uninsured losses.

Tropical storm force winds occurred across Morehouse Parish as the outer edges of Hurricane Gustav moved across central Louisiana. Numerous trees and several power lines were blown down and blocked area roads. Wind gusts peaked between 40 and 50 mph.

Hurricane Isaac (2012)

Tropical Depression Nine formed in the Atlantic, east of the Lesser Antilles, on the morning of August 21, 2012. Twelve hours later, Tropical Depression Nine had strengthened into Tropical Storm Isaac. Isaac continued to track through the eastern Caribbean Sea and Florida Straits while maintaining high end tropical storm strength. Just before noon central time on the 28th, Isaac was located about 75 miles south-southeast of the mouth of the Mississippi River (or about 160 miles southeast of New Orleans) and was found to have reached hurricane strength with winds of 75 mph. An outer rain band from Isaac brought some showers to portions of the ArkLaMiss during the afternoon of the 28th, while the center of Isaac was still churning in the Gulf of Mexico. At 6:45pm on August 28th, Hurricane Isaac made a brief landfall along the coast of Southeast Louisiana in Plaquemines Parish. Maximum sustained winds were 80mph at this landfall. Isaac did not remain over land for long as he was back over water again by 9:00pm that same evening. Isaac made his second landfall along the coast of southeast Louisiana, just to the west of Port Fourchon, around 2:15am August 29th, again with maximum sustained winds of 80 mph.

Isaac moved very slowly to the north and northwest over the course of August 29th, which made for prolonged impacts. Forward motion of about 5 mph lead to tremendous flooding issues for both Louisiana and portions of Mississippi south of I-20. Around noon on August 29th, Isaac was downgraded to a Tropical Storm, but this was not much relief to the many residents who were being inundated with rain and wind. Storm total rainfall across portions of Marion County indicated at least 10 to 15 inches fell. Numerous homes and buildings were flooded and some water rescues occurred in Lamar, Marion and Clarke counties. Further to the north, flooding issues were not quite as bad with about 5 to 7 inches of rain falling from the I-20 corridor and north. Tropical storm force wind gusts were noted as far north as Bolivar County, with the Golden Triangle region not seeing winds reach more than tropical depression strength. The worst of the wind was felt generally along and south of an axis from Marion County to Adams County. Numerous trees were down in Adams County, leaving many without power for several days. Eighty percent of the roads were blocked in Franklin County due to downed trees.

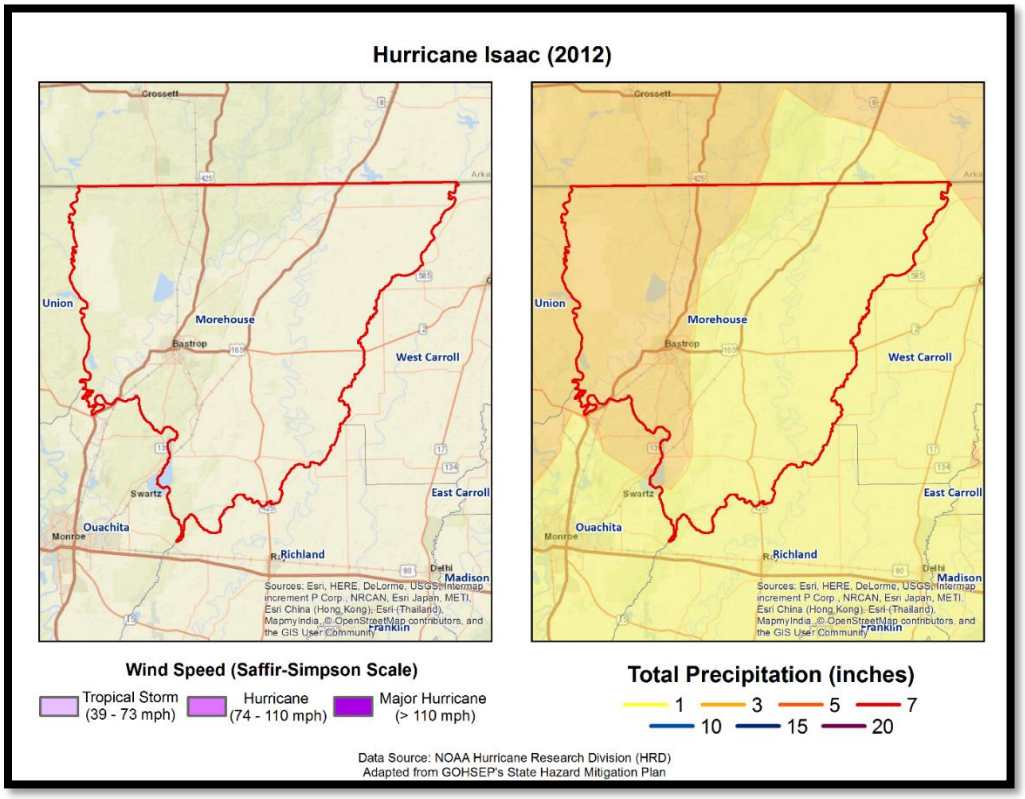

Figure 2-25: Wind Speed and Precipitation Totals in Morehouse Parish for Hurricane Isaac

With all of the rain that fell, some of the area's rivers filled quickly. Minor flooding was recorded on the lower Pearl River at Rockport and Monticello, as well as on Bouie Creek at Hattiesburg and Tallahala Creek at Laurel. The biggest river impact in the Jackson Hydrologic Service Area was on Black Creek at Brooklyn. Black Creek entered moderate flooding and finally crested at 26.71 feet on August 31st at 5pm. This will go down as the second highest crest in history for this particular river and forecast point. This river flooding caused damage to 15 homes both upstream and downstream of the river gage.

The winds and flooding were not all Isaac brought as a couple of tornadoes touched down in eastern Mississippi. Two tornadoes, one in Clarke County and one in Lauderdale County, occurred during the morning of August 30th. Both were rated EF-1 with winds around 100 mph. The tornado in Clarke County, near Crandall, resulted in 3 injuries to residents of a mobile home. One death attributed to Isaac occurred in Holmes County when a 64 year old woman was killed by a tree falling on her car. Isaac finally moved out of the region by the afternoon of the 30th, and was downgraded to a tropical depression by late afternoon on the 30th as it continued to track to the northwest into Missouri and the Ohio Valley.

Strong winds downed multiple trees all across Morehouse Parish between the afternoon of the 29th and midday on the 30th.

The figure on the next page displays the wind zones that affect Morehouse Parish in relation to critical facilities throughout the parish.

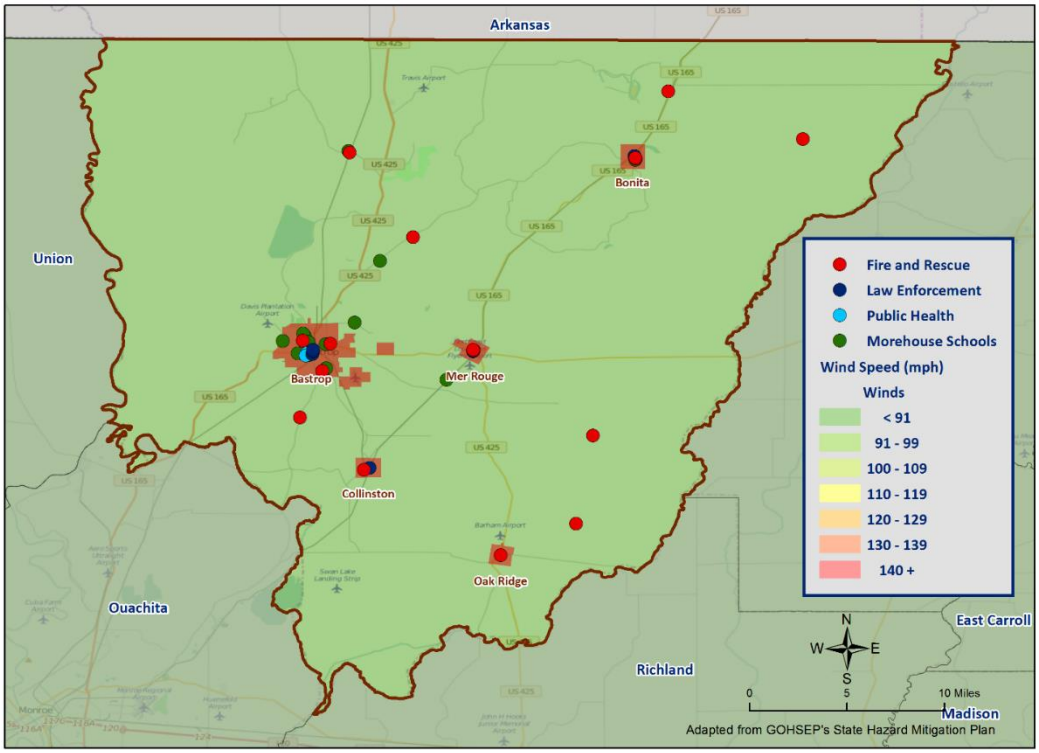

Figure 2-26: Winds Zones for Morehouse Parish in Relation to Critical Facilities

Frequency / Probability

Tropical cyclones are large natural hazard events that regularly impact Morehouse Parish. The annual chance of occurrence for a tropical cyclone is estimated at 20% for Morehouse Parish and its municipalities, with five 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. Based on geographical location alone, Morehouse Parish is highly vulnerable to tropical cyclones. This area has experienced several tropical cyclone events in the past and can expect more in the future.

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 below shows the total economic losses that would result from this occurrence.

Table 2-47: Total Estimated Losses for a 100-Year Hurricane Event (Source: Hazus 2.2)

Jurisdiction	Estimated Total Losses from 100-Year Hurricane Event
Morehouse Parish (Unincorporated)	$871,697
Bastrop	$648,736
Bonita	$16,211
Collinston	$16,382
Mer Rouge	$35,847
Oak Ridge	$8,220
Total	$1,597,094

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 2-48: Ratio of Total Losses to Total Estimated Value of Assets for each Jurisdiction in Morehouse 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	$871,697	$1,914,285,000	0.0%
Bastrop	$648,736	$1,672,824,000	0.0%
Bonita	$16,211	$42,960,000	0.0%
Collinston	$16,382	$34,735,000	0.0%
Mer Rouge	$35,487	$101,576,000	0.0%
Oak Ridge	$8,220	$34,415,000	0.0%

Based on the Hazus 2.2 Hurricane Model, estimated total losses account for less than 0.1% of the total estimated value of all assets for the entirety of Morehouse Parish.

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 following tables.

Table 2-49: Estimated Losses in Unincorporated Morehouse Parish for a 100-Year Hurricane Event
(Source: Hazus 2.2)

Morehouse Parish (Unincorporated)	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$583
Commercial	$8,762
Government	$844
Industrial	$2,252
Religious / Non-Profit	$3,209
Residential	$855,219
Schools	$827
Total	$871,697

Table 2-50: Estimated Losses in Bastrop for a 100-Year Hurricane Event (Source: Hazus 2.2)

Bastrop	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$434
Commercial	$6,521
Government	$628
Industrial	$1,676
Religious / Non-Profit	$2,388
Residential	$636,472
Schools	$615
Total	$648,736

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

Bonita	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$11
Commercial	$163
Government	$16
Industrial	$42
Religious / Non-Profit	$60
Residential	$15,905
Schools	$15
Total	$16,211

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

Collinston	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$11
Commercial	$165
Government	$16
Industrial	$42
Religious / Non-Profit	$60
Residential	$16,073
Schools	$16
Total	$16,382

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

Mer Rouge	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$24
Commercial	$360
Government	$35
Industrial	$93
Religious / Non-Profit	$132
Residential	$35,170
Schools	$34
Total	$35,847

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

Oak Ridge	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$5
Commercial	$83
Government	$8
Industrial	$21
Religious / Non-Profit	$30
Residential	$8,064
Schools	$8
Total	$8,220

Threat to People

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

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

Number of People Exposed to Hurricane Hazards			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Parish (Unincorporated)	**15,271**	**15,271**	**100.0%**
Bastrop	**11,365**	**11,365**	**100.0%**
Bonita	**284**	**284**	**100.0%**
Collinston	**287**	**287**	**100.0%**
Mer Rouge	**628**	**628**	**100.0%**
Oak Ridge	**144**	**144**	**100.0%**
Total	**27,979**	**27,979**	**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 2-56: Vulnerable Populations in Unincorporated Morehouse Parish for a 100-Year Hurricane Event (Source: Hazus 2.2)

Morehouse Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	15,271	100.0%
Persons Under 5 Years	1,057	6.9%
Persons Under 18 Years	2,720	17.8%
Persons 65 Years and Over	2,352	15.4%
White	7,829	51.3%
Minority	7,442	48.7%

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

Bastrop		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	11,365	100.0%
Persons Under 5 Years	986	8.7%
Persons Under 18 Years	2,268	20.0%
Persons 65 Years and Over	1,466	12.9%
White	2,922	25.7%
Minority	8,443	74.3%

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

Bonita		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	284	100.0%
Persons Under 5 Years	14	4.9%
Persons Under 18 Years	68	23.9%
Persons 65 Years and Over	43	15.1%
White	99	34.9%
Minority	185	65.1%

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

Collinston		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	287	100.0%
Persons Under 5 Years	24	8.4%
Persons Under 18 Years	45	15.7%
Persons 65 Years and Over	52	15.7%
White	158	55.1%
Minority	129	45.0%

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

Mer Rouge		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	628	100.0%
Persons Under 5 Years	42	6.7%
Persons Under 18 Years	97	15.5%
Persons 65 Years and Over	158	25.2%
White	407	64.8%
Minority	221	35.2%

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

Oak Ridge		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	144	100.0%
Persons Under 5 Years	14	9.7%
Persons Under 18 Years	11	7.6%
Persons 65 Years and Over	35	24.3%
White	130	90.3%
Minority	14	9.7%

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 2-27* displays the areas of wildland-urban interaction in Morehouse 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 2-62: 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 Morehouse Parish and its jurisdictions.

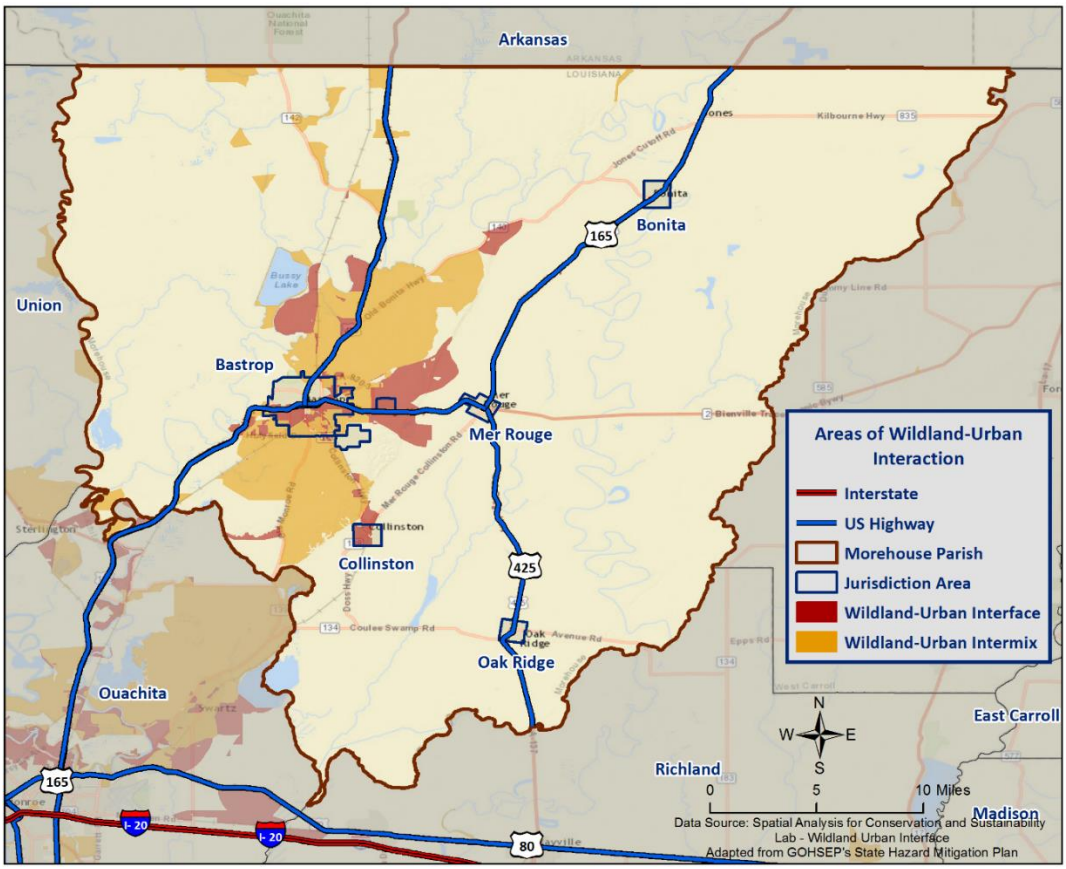

Figure 2-27: Wildland-Urban Interaction in Morehouse Parish

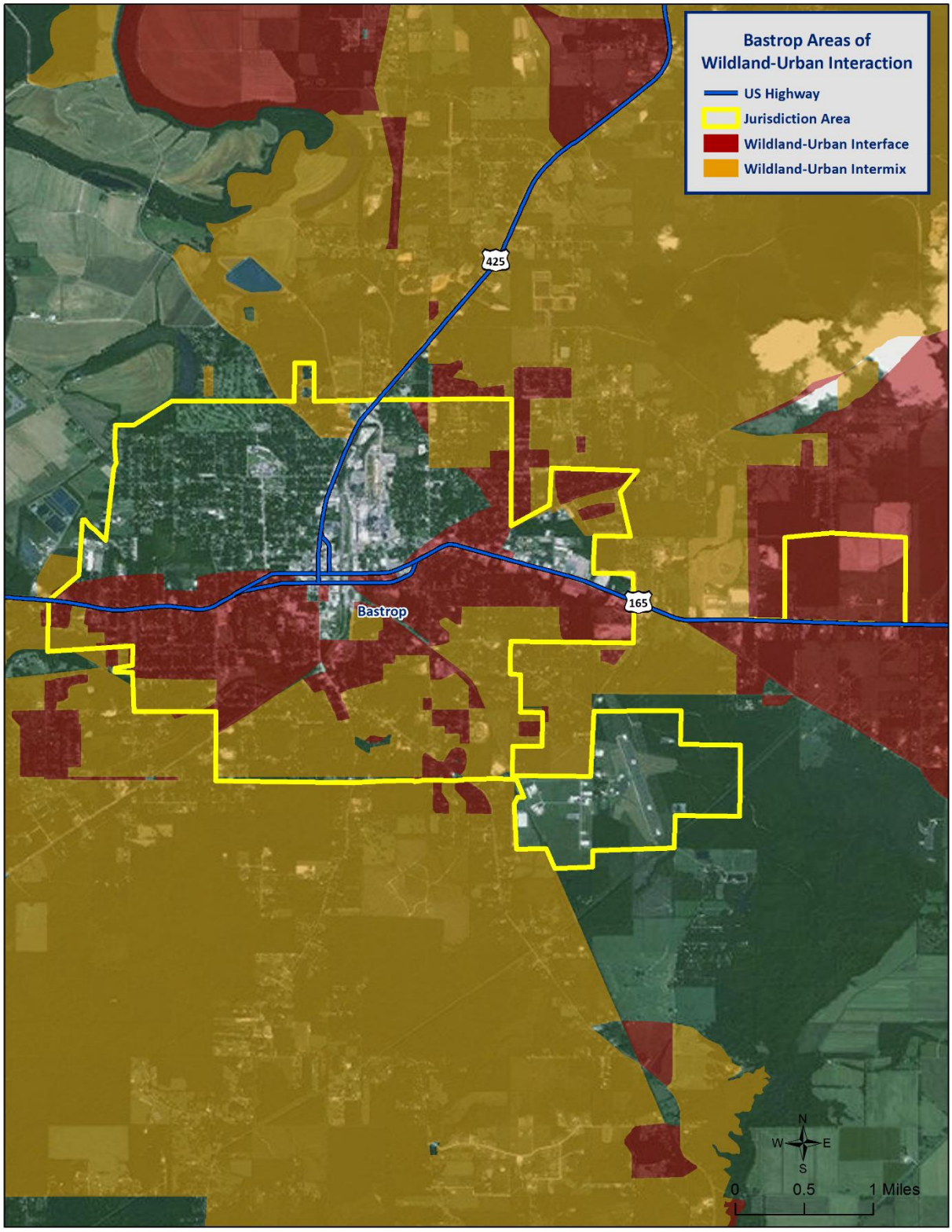

Figure 2-28: Wildland-Urban Interaction in Bastrop

Figure 2-29: Wildland-Urban Interaction in Bonita

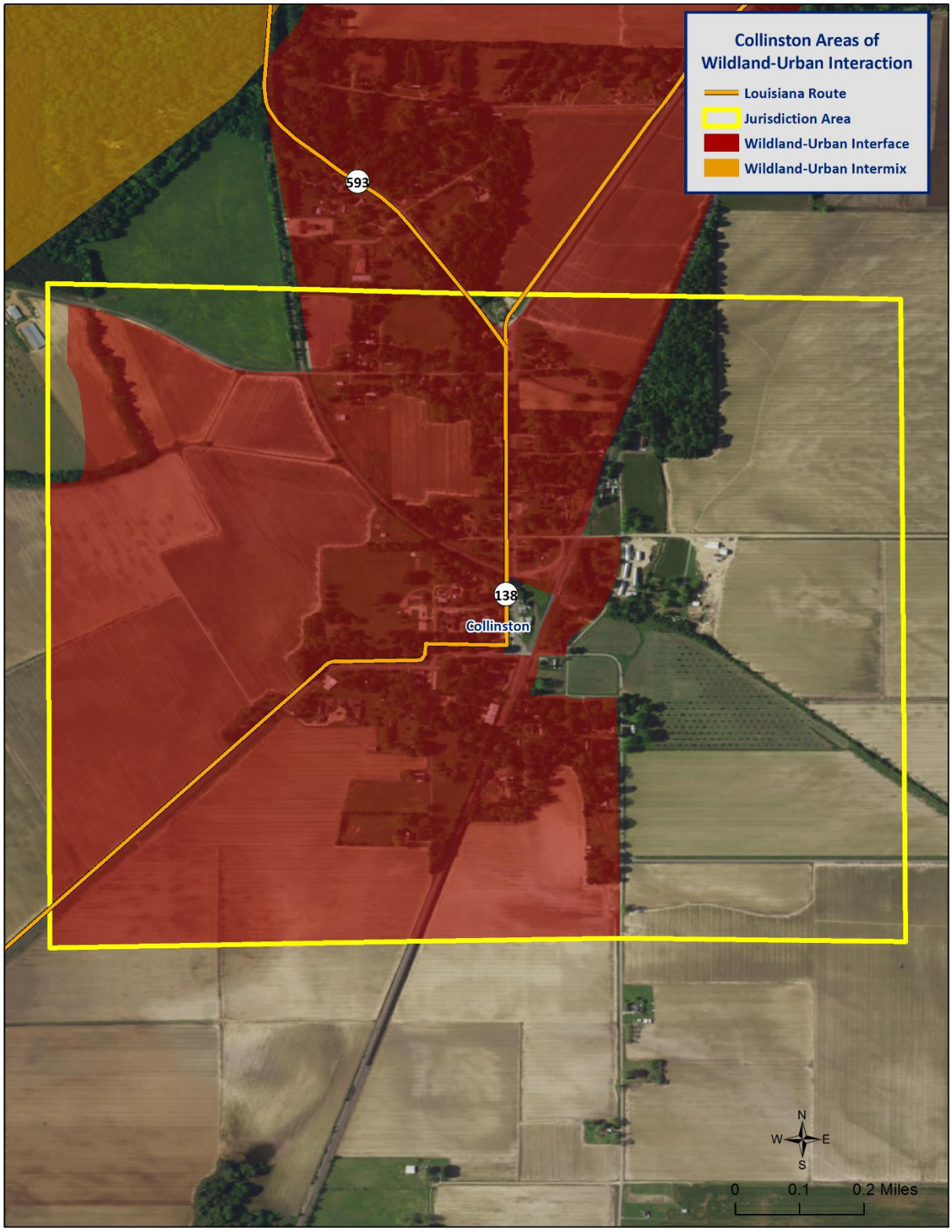

Figure 2-30: Wildland-Urban Interaction in Collinston

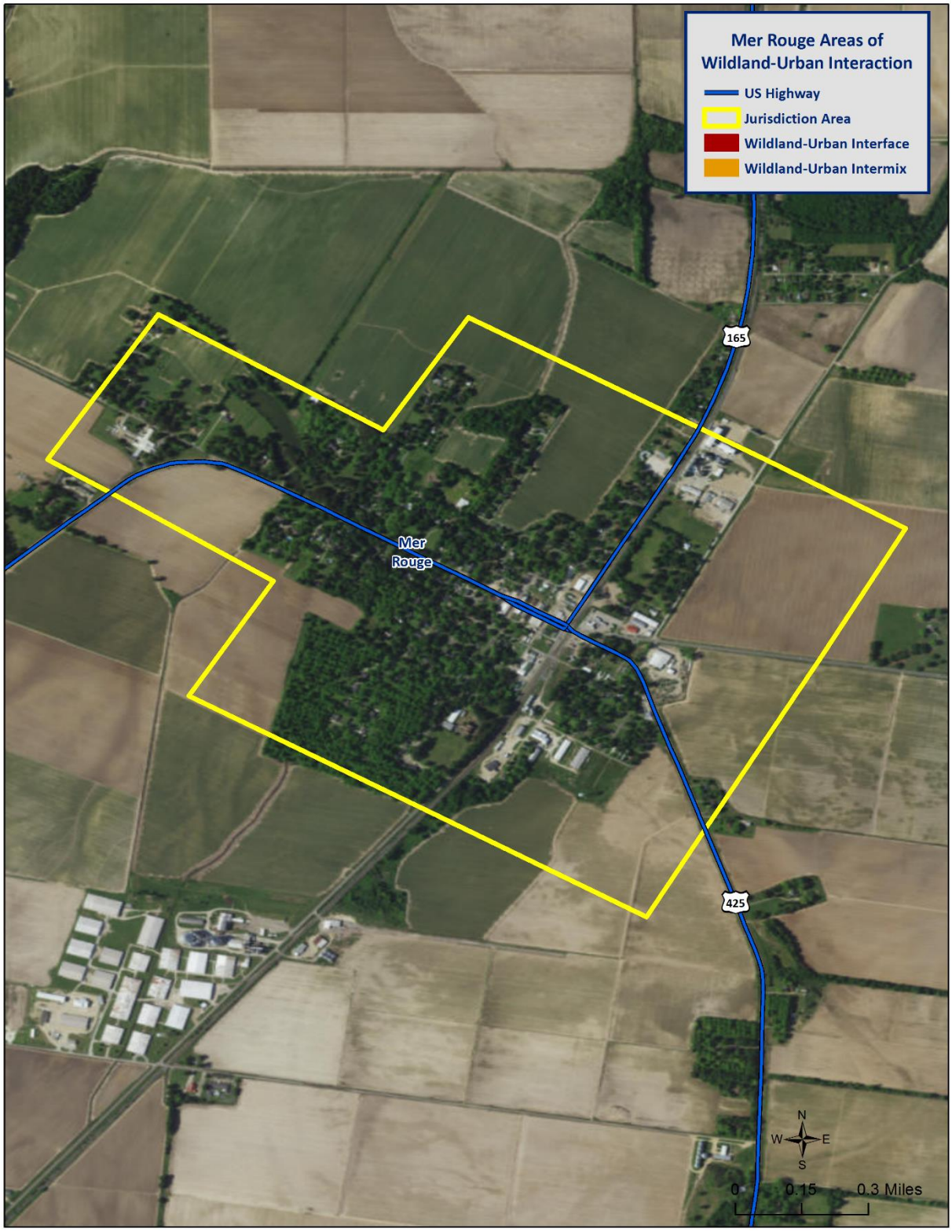

Figure 2-31: Wildland-Urban Interaction in Mer Rouge

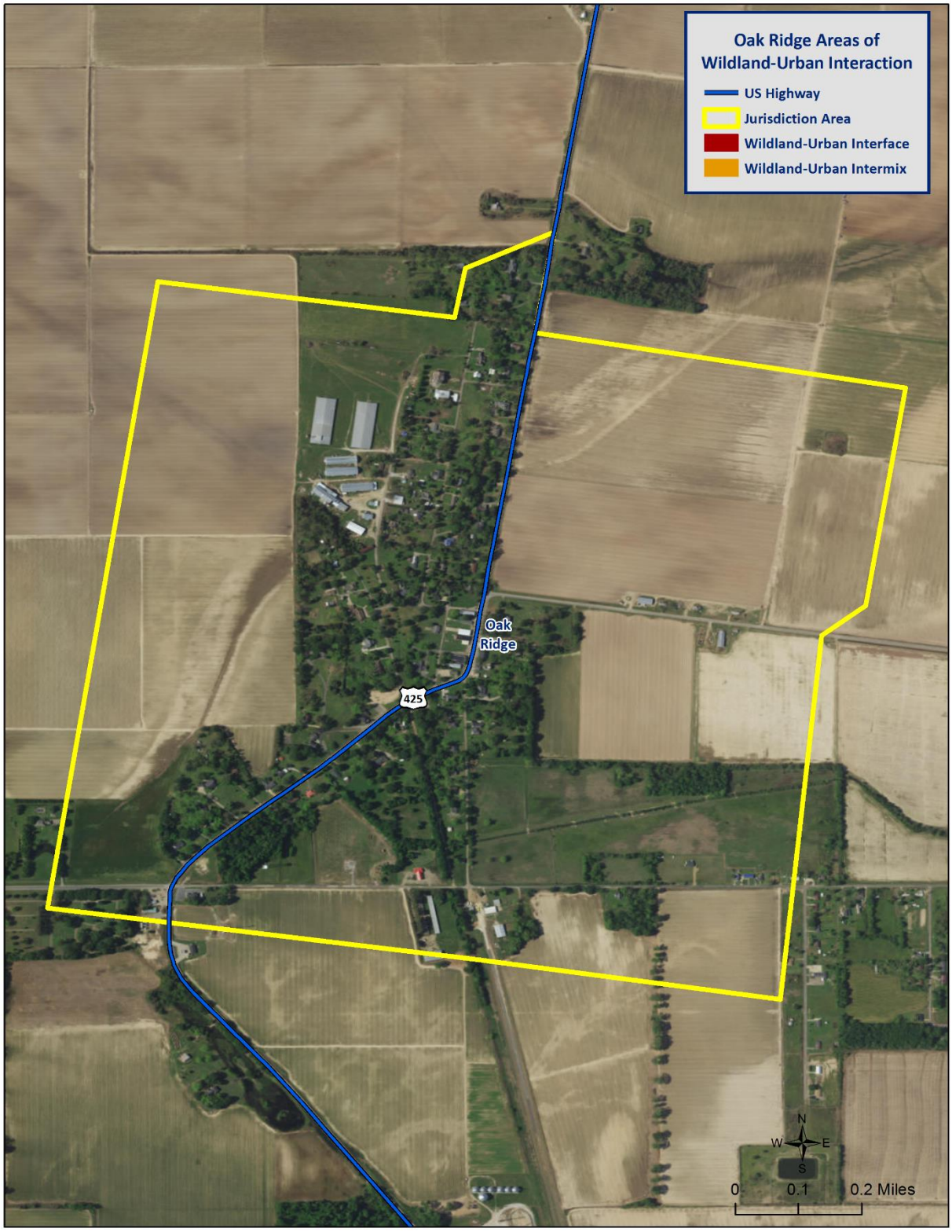

Figure 2-32: Wildland-Urban Interaction in Oak Ridge

Previous Occurrences / Extents

There have been no reported wildfire events that have occurred within the boundaries of Morehouse Parish between the years of 1990 and 2015.

Since 2010, there have been no reported wildfire events in the incorporated areas of Bastrop, Bonita, Collinston, Mer Rouge, and Oak Ridge.

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

Table 2-63: Potential Wildfire Intensity Levels for Morehouse Parish
(Source: Southern Wildfire Assessment Portal)

Potential Wildfire Intensity	
Morehouse Parish (Unincorporated)	Highest Intensity Level 5
Bastrop	Highest Intensity Level 5
Bonita	Moderate to High Intensity Level 3.5
Collinston	Moderate to High Intensity Level 3.5
Mer Rouge	Lowest Intensity Level 1
Oak Ridge	Lowest Intensity Level 1

Frequency / Probability

With no recorded events in 25 years, wildfire events within the boundaries of Morehouse 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 Morehouse 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 2-27 displays the areas of wildland-urban interaction in Morehouse 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 2-64: Total Building Exposure by Wildland-Urban Interaction Areas
(Source: Hazus 2.2)

Jurisdiction	Estimated Total Building Exposure
Morehouse Parish (Unincorporated)	$1,524,758,000
Bastrop	$1,161,064,000
Bonita	$18,767,000
Collinston	$34,735,000
Mer Rouge	$0
Oak Ridge	$0
Total	$2,739,324,000

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:

Table 2-65: Estimated Exposure for Unincorporated Morehouse Parish by Sector (Source: Hazus 2.2)

Morehouse Parish (Unincorporated)	Estimated Total Building Exposure by Sector
Agricultural	$8,306,000
Commercial	$124,505,000
Government	$13,768,000
Industrial	$38,496,000
Religious / Non-Profit	$68,706,000
Residential	$1,263,511,000
Schools	$7,466,000
Total	$1,524,758,000

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

Bastrop	Estimated Total Building Exposure by Sector
Agricultural	$1,702,000
Commercial	$221,129,000
Government	$16,726,000
Industrial	$24,273,000
Religious / Non-Profit	$50,766,000
Residential	$827,130,000
Schools	$19,338,000
Total	$1,161,064,000

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

Bonita	Estimated Total Building Exposure by Sector
Agricultural	$0
Commercial	$2,760,000
Government	$0
Industrial	$0
Religious / Non-Profit	$848,000
Residential	$14,777,000
Schools	$382,000
Total	$18,767,000

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

Collinston	Estimated Total Building Exposure by Sector
Agricultural	$504,000
Commercial	$4,838,000
Government	$720,000
Industrial	$124,000
Religious / Non-Profit	$0
Residential	$25,963,000
Schools	$2,586,000
Total	$34,735,000

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

Number of People Located in Wildland-Urban Interaction Areas.			
Location	**# in Community**	**# in Area**	**% in Area**
Morehouse (Unincorporated)	**15,271**	**3,274**	**21.4%**
Bastrop	**11,365**	**3,836**	**33.8%**
Bonita	**284**	**6**	**2.1%**
Collinston	**287**	**279**	**97.2%**
Mer Rouge	**628**	**0**	**0.0%**
Oak Ridge	**144**	**0**	**0.0%**
Total	**27,979**	**7,395**	**2.4%**

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 tables on the following pages.

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

Morehouse Parish (Unincorporated)		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	3,274	21.4%
Persons Under 5 Years	227	6.9%
Persons Under 18 Years	583	17.8%
Persons 65 Years and Over	504	15.4%
White	1,679	51.3%
Minority	1,595	48.7%

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

Bastrop		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	3,836	33.8%
Persons Under 5 Years	333	8.7%
Persons Under 18 Years	766	20.0%
Persons 65 Years and Over	495	12.9%
White	986	25.7%
Minority	2,850	74.3%

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

Bonita		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	6	2.1%
Persons Under 5 Years	0	4.9%
Persons Under 18 Years	1	23.9%
Persons 65 Years and Over	1	15.1%
White	2	34.9%
Minority	4	65.1%

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

Collinston		
Category	**Total Numbers**	**Percentage of People in Wildland-Urban Interaction Area**
Number in Hazard Area	279	97.2%
Persons Under 5 Years	23	8.4%
Persons Under 18 Years	44	15.7%
Persons 65 Years and Over	51	18.1%
White	154	55.1%
Minority	125	45.0%

Vulnerability

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

Winter Storms

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

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

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

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

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

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

Table 2-74: 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 Morehouse Parish as all of the adjacent parishes, the entire planning area for Morehouse Parish is equally at risk for winter storms.

Previous Occurrences / Extents

According to SHELDUS, there have been 15 reported winter storm events that have occurred within the boundaries of Morehouse Parish between the years of 1990 and 2015. The table on the next page provides a brief synopsis of each event since 2010. Based on historic data, Morehouse Parish can expect an ice damage index of 2 on the Sperry-Piltz Ice Accumulation Index.

Table 2-75: Previous Occurrences for Winter Storm Events

Date	Synopsis	Property Damage	Crop Damage
January 1, 2010	A widespread, damaging freeze occurred. Temperatures fell into the upper teens across the northern parishes and into the 20s elsewhere. Water lines were reported frozen and broken throughout the parish.	$162,849	$0
February 11, 2010	Up to three inches of snow fell in Morehouse Parish. The heavy wet nature of the snow caused large branches and power lines to fall throughout the parish.	$81,425	$0
January 9, 2011	Sleet and freezing rain began falling across the parish during the early morning hours. By early evening, approximately 0.1 inches of ice had accumulated on bridges and vegetation.	$0	$0

Date	Synopsis	Property Damage	Crop Damage
February 3, 2011	A quarter inch to four tenths of ice and sleet accumulated across the parish. Bridges and overpasses were iced over and roadways were slick.	$211,924	$0
February 9, 2011	Two to three inches of snow fell across the parish with the heaviest across the northern portions. Roads were slick and several accidents were reported.	$206,233	$0
January 14, 2013	Between one quarter and a half inch of ice accumulated on trees and power lines causing a few power outages in the northern portion of the parish.	$45,729	$0
February 11, 2014	Between one quarter and one half inch of ice fell cross the parish.	$0	$0
February 25, 2015	Approximately 3 and a half inches of snow fell throughout the parish.	$0	$0

Based on previous winter storm events, the worst-case scenario for the unincorporated area of Morehouse 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 Morehouse Parish have an annual chance of occurrence calculated at 60% 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 $138,583. 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 table on the next page provides an estimate of potential property losses for Morehouse Parish based on the 2010 Census data.

Table 2-76: Estimated Annual Losses for Winter Weather Events in Morehouse Parish

Estimated Annual Potential Losses from Winter Weather for Morehouse Parish					
Unincorporated Morehouse Parish (54.6% of Population)	Bastrop (40.6% of Population)	Bonita (1.0% of Population)	Collinston (1.0% of Population)	Mer Rouge (2.2% of Population)	Oak Ridge (0.5% of Population)
$75,639	$56,292	$1,407	$1,422	$3,111	$713

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

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

Previous Occurrences / Extents

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

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

Previous Occurrences / Extents

There have been no reported levee failures in Morehouse 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. Morehouse 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 Morehouse Parish planning area. Morehouse 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 Morehouse 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, Morehouse 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

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

Table 3-1: Morehouse Parish Planning and Regulatory Capabilities

Planning and Regulatory							
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.							
	Morehouse Parish	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge	Comments
Plans	Yes / No						
Comprehensive / Master Plan	NO	NO	NO	NO	NO	NO	
Capital Improvements Plan	NO	NO	NO	NO	NO	NO	
Economic Development Plan	YES	YES	YES	YES	YES	YES	economic development board
Local Emergency Operations Plan	YES	YES	YES	YES	YES	YES	
Continuity of Operations Plan	YES	YES	YES	YES	YES	YES	
Transportation Plan	NO	NO	NO	NO	NO	NO	
Stormwater Management Plan	NO	NO	NO	NO	NO	NO	
Community Wildfire Protection Plan	NO	NO	NO	NO	NO	NO	
Other plans (redevelopment, recovery, coastal zone management)	NO	NO	NO	NO	NO	NO	
Building Code, Permitting and Inspections	Yes / No						
Building Code	YES	YES	YES	YES	YES	YES	
Building Code Effectiveness Grading Schedule (BCEGS) Score	NO	NO	NO	NO	NO	NO	
Fire Department ISO/PIAL rating	YES	YES	YES	YES	YES	YES	5 parish, 4 inside city
Site plan review requirements	YES	YES	YES	YES	YES	YES	
Land Use Planning and Ordinances	Yes / No						
Zoning Ordinance	NO	NO	NO	NO	NO	NO	
Subdivision Ordinance	NO	NO	NO	NO	NO	NO	
Floodplain Ordinance	YES	YES	YES	YES	YES	YES	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	NO	NO	NO	NO	NO	NO	
Flood Insurance Rate Maps	YES	YES	YES	YES	YES	YES	
Acquisition of land for open space and public recreation uses	NO	NO	NO	NO	NO	NO	
Other	NO	NO	NO	NO	NO	NO	

Building Codes, Permitting, Land Use Planning and Ordinances

The Morehouse Parish Police Jury provides oversight for building permits and codes, as well as floodplain ordinances for the jurisdictions and the incorporated areas.

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

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

Table 3-2: Morehouse Parish Administrative and Technical Capabilities

Administration and Technical	Morehouse Parish	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge	Comments
Administration	Yes / No						
Planning Commission	YES	YES	YES	YES	YES	YES	
Mitigation Planning Committee	YES	YES	YES	YES	YES	YES	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	NO	NO	NO	NO	NO	NO	
Mutual Aid Agreements							
Staff	Yes / No; FT/PT; % Hazard Mitigation						
Chief Building Official	YES	YES	YES	YES	YES	YES	
Floodplain Administrator	YES	YES	YES	YES	YES	YES	
Emergency Manager	YES	YES	YES	YES	YES	YES	
Community Planner	NO	NO	NO	NO	NO	NO	
Civil Engineer	YES	YES	YES	YES	YES	YES	On contract
GIS Coordinator	NO	NO	NO	NO	NO	NO	
Grant Writer	NO	NO	NO	NO	NO	NO	
Other	NO	NO	NO	NO	NO	NO	
Technical	Yes / No						
Warning Systems / Service (Reverse 911, outdoor warning signals)	YES	YES	YES	YES	YES	YES	
Hazard Data & Information	NO	NO	NO	NO	NO	NO	
Grant Writing	YES	YES	YES	YES	YES	YES	
Hazus Analysis	NO	NO	NO	NO	NO	NO	
Other	NO	NO	NO	NO	NO	NO	

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

Table 3-3: Morehouse Parish Financial Capabilities

Financial							
Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.							
	Morehouse Parish	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge	Comments
Funding Resource	Yes / No						
Capital Improvements project funding	NO	NO	NO	NO	NO	NO	
Authority to levy taxes for specific purposes	YES	YES	YES	YES	YES	YES	
Fees for water, sewer, gas, or electric services	NO	NO	NO	NO	NO	NO	
Impact fees for new development	NO	NO	NO	NO	NO	NO	
Stormwater Utility Fee	NO	NO	NO	NO	NO	NO	
Community Development Block Grant (CDBG)	YES	YES	YES	YES	YES	YES	
Other Funding Programs	NO	NO	NO	NO	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.

Morehouse 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: Morehouse Parish Education and Outreach Capabilities

Education and Outreach							
Identify education and outreach programs and methods, already in place that could be used to implement mitigation activities and communicate hazard-related information.							
	Morehouse Parish	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge	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	NO	NO	NO	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	YES	YES	YES	YES	YES	
Natural Disaster or safety related school program	YES	YES	YES	YES	YES	YES	
Storm Ready certification	NO	NO	NO	NO	NO	NO	
Firewise Communities certification	YES	YES	YES	YES	YES	YES	
Public/Private partnership initiatives addressing disaster-related issues	NO	NO	NO	NO	NO	NO	
Other	NO	NO	NO	NO	NO	NO	

In some cases, the jurisdictions rely on Morehouse Parish OHSEP and/or Morehouse 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, Morehouse Parish and its jurisdiction remains committed to expanding and improving on the existing capabilities within the parish. All participating jurisdictions will work toward increased participation in funding opportunities and available mitigation programs. Should funding become available, the hiring of additional personnel to dedicate to hazard mitigation initiatives and programs, as well as increasing ordinances within the jurisdictions, will help to enhance and expand risk reduction measures within the parish.

With the sharing of these capabilities, the following municipalities and entities are recognized by the Parish of Morehouse 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:

- City of Bastrop
- Village of Bonita
- Village of Collinston
- Village of Mer Rouge
- Village of Oak Ridge

Flood Insurance and Community Rating System

Morehouse Parish is not a participant in the Community Rating System (CRS), nor are any of its jurisdictions. Obtaining the CRS rating for the parish and participating jurisdictions is recognized as an eventual goal by the Hazard Mitigation Steering Committee. Participation in the CRS strengthens local capabilities by lowering flood insurance premiums for jurisdictions that exceed NFIP minimum requirements.

Under the Federal Emergency Management Agency (FEMA), the National Flood Insurance Program (NFIP) administers the Community Rating System. Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. This program can have a major influence on the design and implementation of flood mitigation activities, so a brief summary is provided here.

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

There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction (see *Figure 3-1*). A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a class 10 community.

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

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

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

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

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

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

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

As of May 2012, 310 communities in the State of Louisiana participate in the Federal Emergency Management Agency's NFIP. Of these communities, 41 (or 13%) participate in the Community Rating System (CRS). Of the top fifty Louisiana communities, in terms of total flood insurance policies held by residents, 27 participate in the CRS. The remaining 23 communities present an outreach opportunity for encouraging participation in the CRS.

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

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

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

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

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

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

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

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

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.

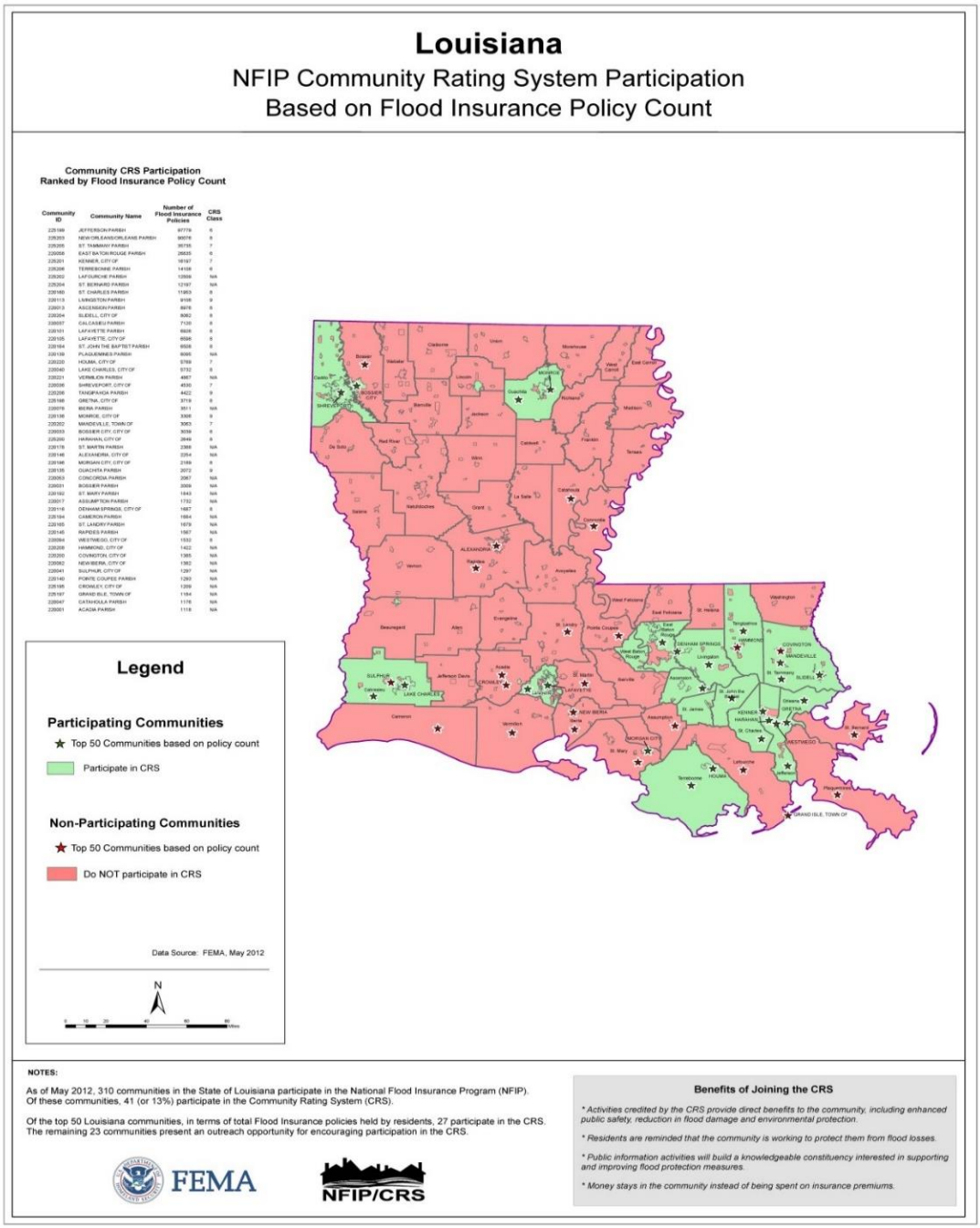

Figure 3-2: Louisiana CRS NFIP Participation
(Source: FEMA[2])

[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

Morehouse 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.

Morehouse 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 Morehouse Parish Hazard Mitigation Plan Steering Committee, under the coordination of the Morehouse 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 January 2016 – September 2016.

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

This activity was created in an effort to confirm that the goals and action items developed by the Morehouse Parish Hazard Mitigation Plan Steering Committee are representative of the outlook of the community at large. However, because there were so few responses to the survey, an accurate depiction of the public's opinion could not be gathered. Therefore, this this public feedback could not be incorporated into the plan. The full Morehouse Parish survey can be found at the following link:

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

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 Morehouse 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, Morehouse 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 Morehouse 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 four goals remain valid.

The goals are as follows:

- Pursue opportunities to mitigate repetitive and severe repetitive loss properties and other appropriate hazard mitigation projects, programs, and activities
- Improve education and outreach efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact
- Improve data collection, us, and sharing to reduce the impact of hazards
- Improve capabilities, coordination, and opportunities at municipal and parish levels to plan and implement hazard mitigation projects, programs, and activities

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

Morehouse 2011 Hazard Mitigation Action Update

Morehouse Parish - Unincorporated			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
M1: Pursuing Elevation, Acquisition, Flood proofing Projects	Pursue elevation / acquisition / flood proofing projects and structural solutions to flooding using available grant funding for the repetitive loss structure.	Flooding	Carried over
M2: Review Repetitive Loss List	Annually review and correct the Repetitive Loss List by submitting correction worksheets to FEMA.	Flooding	Ongoing
M3: Localized Interior Drainage Project	Investigate and implement a localized interior drainage project along US Highways 165, & 425, and the Parish roads, which are repetitive loss areas, and reduce its flood potential.	Flooding	Carried Over
M4: Drainage Way Improvement	Improve drainage ways, along Bayou Galion, Staulkinghead Creek, Tisdale Brake and W-10 Canal, by enlarging any inferior culverts and replacing any substandard bridges along the major drainage laterals.	Flooding	Carried Over
M5: Hardening by Flood proofing and Generators	Harden the Morehouse Parish EOC, Eastside Elementary School and Morehouse Junior High School, by utilizing applicable flood proofing techniques and add backup power supply/generators at these locations. Also include generators at the Bastrop Municipal Center, Morehouse Parish General Hospital, the Parish Courthouse, Beekman Water System, LSU Agriculture Auditorium, and the Beekman School Gym.	Flooding	Carried Over
M6: Hardening EOC	Harden Parish EOC	All Hazards	Carried Over
M7: Alternate EOC Location	Examine alternate EOC location due to the proximity of the current EOC to Railroad.	All Hazards	Deleted
M8: Hail proofing	Hail proof public buildings	All Hazards	Carried Over
M9: Drinking Water System Development	Contingency development of drinking water system connections to other systems	All Hazards	Carried Over

Morehouse Parish - Unincorporated			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
M10: Parish Communications Antennas	Harden parish communications antennas at 5 repeater sites	All Hazards	Carried Over
M11: Irrigation Management	Land use – irrigation management explore redefinition of well head protection zones	All Hazards	Carried Over
M12: Generators	Install generator at Parish Courthouse, Parish EOC, and water wells (portable)	All Hazards	Carried Over
M13:Warning Systems	Implement Parish Wide Warning systems for all hazards	All Hazards	Carried Over
M14: Fee Waiving	Building permit fee waiving for improvements that address hazard mitigation (grant pursuit to help pay for inspectors where fees are waived)	All Hazards	Ongoing
M15: Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP). Benefits: Enables homeowners to financially recover from the devastating effects of flooding as rapidly as possible. Serves to educate area residents that any homeowner, regardless of location, can purchase flood insurance.	Flooding	Ongoing
M16: NFIP Participation	Increasing participation in NFIP, particularly with future of decertification of levees.	Flooding	Ongoing
M17: Public Awareness	Increase public awareness of hazards and hazardous areas. Distribute public awareness information regarding flood hazards, SFHA's, and potential mitigation measures using the local newspaper, utility bill inserts, inserts in the phone book, and parish hazards awareness website, or "how to" classes in retrofitting by local merchants.	All Hazards	Ongoing
M18: Disaster Resistance Education	Integrate "Disaster Resistance Education" into the public school curriculum.	All Hazards	Ongoing
M19: Public Education	Provide public education on importance of maintaining ditches.	All Hazards	Ongoing
M20: Multi-Hazard Awareness Week	Sponsor a "Multi-Hazard Awareness Week", to educate the public on hailstorms and severe storms (sheltering in place, evacuation, emergency preparedness, and structural retrofitting), flooding (evacuation, emergency preparedness, retrofitting, and flood insurance), thunderstorms and lightning (emergency preparedness).	All Hazards	Ongoing
M21: Education Efforts	Continue and expand efforts to educate the public regarding all hazards, including direct mail, technical assistance, and development / implementation of general advertising campaign.	All Hazards	Ongoing
M22: Local Business Involvement	Work with location businesses to identify hazards to their business and mitigation actions that can be taken to protect Parish's economy.	All Hazards	Ongoing

Morehouse Parish - Unincorporated			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
M23: Parish Employee Involvement	Work with parish and municipal employees to identify potential ways to mitigate the impact of hazards upon employees, assets and infrastructure	All Hazards	Ongoing
M24: Emergency Personnel Training	Work to provide training to emergency personnel Parish-wide in NIMS and ICS	All Hazards	Carried Over
M25: Data Improvement	Repetitive loss data improvement	Flooding	Carried Over
M26: Building Code Insurance Partnership	Develop partnerships with insurance companies to promote building codes	All Hazards	Ongoing
M27: Alternate Water Sources	Study to determine alternate water sources	All Hazards	Carried Over
M28: FEMA Partnership	Work with FEMA to update FIRMs	Flooding	Ongoing
M29: Update Mitigation Requirements	Continue to include and update mitigation requirements in floodplain development regulations	Flooding	Ongoing
M30: Flow Study	Develop transportation chemical commodity flow study	Hazardous Materials	Deleted
M31: Wildfire Analysis	Consider wildfire analysis	Wildfire	Carried Over
M32: Vegetation Mitigation	Identify and consider vegetation mitigation programs and methods	All Hazards	Carried Over
M33: Auxiliary Power Sources	Identify and prioritize auxiliary power sources for critical infrastructure	All Hazards	Carried Over
M34: Reservoir Sites	Examine current resources and potential reservoir sites	Drought	Carried Over
M35: Floodplain Development Regulations	Update and implement floodplain development regulations, which limit the opportunity for new homes and businesses to be constructed in the floodplain	Flooding	Carried Over
M36: Master Drainage Plan	Develop a master drainage plan which will evaluate drainage projects at major drainage laterals to determine best method of increasing drainage capacity. Implement recommended projects resulting from drainage plan.	Flooding	Carried Over
M37: Community Rating System	Participate in the "Community Rating system (CRS)" of the NFIP. Inform the public about the CRS program and the fact that it could result in a discount in Flood Insurance Premiums. Review the existing floodplain ordinance and see how it could be augmented to increase CRS potential and further reduce the flood insurance premiums.	Flooding	Carried Over
M38: NFIP Insurance Partnership	Partner with insurance agents to increase awareness and policyholders in the NFIP	Flooding	Ongoing

Morehouse Parish - Unincorporated			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
M39: International Building Codes	Adopt the current International Building Codes by ordinance, which would result in additional techniques to harden structures.	Flooding	Ongoing
M40: New Development Regulation	Develop and pass ordinances to help regulate new development in the Parish, such as requiring proper drainage with adequate sloping; stormwater retention ponds; dikes; levees and floodwalls if appropriate, and requiring freeboard above the Base Flood Elevation (BFE) in flood prone areas.	Flooding	Carried Over
M41: New Subdivision Developments	Encourage new subdivision developments to install underground utilities, which would help reduce the chances of power outages.	All hazards	Ongoing
M42: Water-Saving Measures	Adopt ordinance requiring water-saving measures in time of drought.	Drought	Ongoing
M43: Effort Coordination	Coordination of all preparedness and mitigation efforts; hosting disaster response drills; regular attendance at networking and coordination meetings	All Hazards	Ongoing
M44: Monitoring and Communications Systems	Work to enhance monitoring and communications systems to improve ability to predict and prepare for flood events	Flooding	Carried Over

City of Bastrop			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
B1: Procure Equipment	Procure equipment to respond to HazMat and chemical spills	Hazardous Materials	Deleted
B2: Wildfire/Vegetation Analysis	Conduct wildfire/ vegetation analysis	Wildfire	Carried Over
B3: Municipal Center Safe Room	Safe room project for Municipal Center	All Hazards	Carried Over
B4: Dodson Center Safe Room	Safe room project for Dodson Center	All Hazards	Carried Over
B5: Garment Factory Safe Room	Safe room project for old garment factory owned by Bastrop	All Hazards	Carried Over
B6: Alternate Location	Examine alternate location for dispatch center due to proximity to Railroads and highway intersections	All Hazards	Carried Over
B7: Public Education	Public education and outreach program for all hazards	All Hazards	Carried Over
B8: NIMS/ICS Training	Continued NIMS/ICS training for all hazards	All Hazards	Carried Over

Village of Bonita			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
BO1: Water System	Winterize/weatherize water system	All Hazards	Carried Over
BO2: Hardening Fire Station	Harden fire station with wind straps and bay doors	All Hazards	Carried Over
BO3: Wind Retrofitting	Wind retrofit for Town Hall / Police Department	All Hazards	Carried Over
BO4: Fire Department Generator	Generator for fire department	All Hazards	Carried Over
BO5: Town Hall/Police Department Generator	Generator for Town Hall / police department	All Hazards	Carried Over
BO6: Safe Room	Retrofit Town Hall/Police department to serve as safe room	All Hazards	Carried Over

Village of Collinston			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
C1: Drainage Project	Drainage project to address flooding due to canals around village, increase flow capacity to alleviate flooding.	All Hazards	Carried Over
C2: Drainage Ditch	Drainage ditch from East to West toward Ouachita River needs to be enhanced to alleviate flooding issues. Flooding causes loss of function of local sewer system to approximately 375 residents.	All Hazards	Carried Over
C3: Remove Beaver Dams	Examine methods of removing beaver dams around town to alleviate flooding issues.	Flooding	Carried Over
C4: Culvert Project	Culvert project on Dowd Rd at the railroad right of way to reduce flooding.	Flooding	Carried Over
C5: Hardening Town Hall	Harden Town Hall with straps and shutters	All Hazards	Carried Over
C6: Surge Protection	Surge protection needed for water system to avoid power outages	All Hazards	Carried Over
C7: Public Education	Implement Public education and outreach program for all hazards approach	All Hazards	Carried Over
C8: Winterize Water System	Winterize water system to avoid pipe freeze.	Winter Storms	Carried Over
C9: Waste Water Examination	Examine waste water treatment/storage facility due to water backing up into facility due to flooding causing loss of function to entire town for 1-2 days.	Flooding	Carried Over
C10: Hardening Fire Station	Hardening project for fire station with wind straps and bay doors.	All Hazards	Carried Over

Village of Mer Rouge			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
M1: Hardening Fire Station	Harden fire station with wind straps and bay doors	All Hazards	Carried Over
M2: Town Hall Hardening/Retrofitting	Wind retrofit/hardening project for town hall	All Hazards	Carried Over
M3: Town Hall Safe Room	Retrofit Town Hall to serve as safe room	All Hazards	Carried Over
M4: Water System	Winterize/weatherize water system	Winter Storms	Carried Over
M5: Hazmat Equipment	Procure hazmat equipment for fire department	Hazardous Materials	Deleted

Village of Oak Ridge			
Jurisdiction-Specific Action	**Action Description**	**Hazard**	**Status**
O1: Water System Generator	Backup generator for water system	All Hazards	Carried Over
O2: Portable Generator	Portable generator for sewer lift stations	All Hazards	Carried Over
O3: Town Hall Generator	Backup generator for Town Hall/Police department	All Hazards	Carried Over
O4: Fire Department Generator	Generator for fire department	All Hazards	Carried Over
O5: Hardening Fire Station	Harden fire station with wind straps and bay doors	All Hazards	Carried Over
O6: Retrofitting/Hardening Town Hall	Retrofit / harden town hall / police station and roof retrofit	All Hazards	Carried Over

Unincorporated Morehouse New Mitigation Actions

Morehouse Unincorporated - New Mitigation Actions							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
M1: Building Retrofits	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds, and helps assure that the public buildings can be used, occupied and operable during or after storms.	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	High Wind, Tropical Cyclones, Tornadoes, Hail	1,3,4	New
M2: Drainage Improvement	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Flooding, Tropical Cyclones	1,3,4	New
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties.	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	1,2,3,4	New

Morehouse Unincorporated - New Mitigation Actions							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
M4: Safe Room Projects	Construction of a safe room for first responders located in Morehouse Parish. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones	1,3,4	New
M5: 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, Wildfires, Thunderstorms (lightning, high wind, hail), Drought, Extreme Heat, Dam Failure, Levee Failure and Winter Storm hazards as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the parish and its communities.	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Wildfires, Thunderstorms (lightning, high wind, hail), Winter Storms, Dam Failure, Levee Failure, Drought, Extreme Heat	1,2,3,4	New
M6: Generators for continuity of operations and government	Procurement and Installation of generators at identified critical facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Extreme Heat	1,4	New
M7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Lightning	1,4	New

Morehouse Unincorporated - New Mitigation Actions							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
M8: Warning Systems	Update/upgrade public warning system components throughout Morehouse Parish as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Winter Storms, Wildfires, Tornadoes, Tropical Cyclones	1,4	New
M9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	1,4	New
M10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	1,2,4	New
M11: Wildfires Ordinance	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 Years	Morehouse Parish OHSEP	Wildfires	1,4	New
M12: Dam and Levee Failure 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	Morehouse Parish OHSEP	Dam Failure, Levee Failure, Flooding	1,2,3,4	New
M13: Water Conservation Measures	Adopt ordinances requiring water-saving measures in time of Drought	FEMA HMGP, Local	1-5 years	Morehouse Parish OHSEP	Drought	1,4	New

City of Bastrop - New Mitigation Actions

City of Bastrop							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**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 Bastrop/Morehouse Parish OHSEP	High Wind, Tropical Cyclones, Tornadoes, Hail	1,3,4	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 Bastrop/Morehouse Parish OHSEP	Flooding, Tropical Cyclones	1,3,4	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 Bastrop/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	1,2,3,4	New

City of Bastrop							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
B4: Safe Room Projects	Construction of a safe room for first responders located in Bastrop. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	City of Bastrop/Morehouse Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones, Wildfires	1,3,4	New
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, Wildfires, Thunderstorms (lightning, high wind, hail), Drought, Extreme Heat, Dam Failure, Levee Failure and Winter Storm hazards as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the parish and its communities.	FEMA HMGP, Local	1-5 years	City of Bastrop/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Wildfires, Thunderstorms (lightning, high wind, hail), Winter Storms, Dam Failure, Levee Failure, Drought, Extreme Heat	1,2,3,4	New
B6: Generators for continuity of operations and government	Procurement and Installation of generators at identified critical facilities to ensure continued operations during and after events	FEMA HMGP, Local	1-5 years	City of Bastrop/Morehouse Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Extreme Heat	1,4	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 Bastrop/Morehouse Parish OHSEP	Lightning	1,4	New

City of Bastrop							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
B8: Warning Systems	Update/upgrade public warning system components throughout Bastrop as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	City of Bastrop/Morehouse Parish OHSEP	Winter Storms, Wildfires, Tornadoes, Tropical Cyclones	1,4	New
B9: 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 Bastrop/Morehouse Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	1,4	New
B10: 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 Bastrop/Morehouse Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	1,2,4	New
B11: Wildfires Ordinance	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 Years	City of Bastrop/Morehouse Parish OHSEP	Wildfires	1,4	New
B12: Dam and Levee Failure 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 Bastrop/Morehouse Parish OHSEP	Dam Failure, Levee Failure, Flooding	1,2,3,4	New
B13: Water Conservation Measures	Adopt ordinances requiring water-saving measures in time of Drought	FEMA HMGP, Local	1-5 years	City of Bastrop/Morehouse Parish OHSEP	Drought	1,4	New

Village of Bonita - New Mitigation Actions

Village of Bonita							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**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	Village of Bonita/Morehouse Parish OHSEP	High Wind, Tropical Cyclones, Tornadoes, Hail	1,3,4	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	Village of Bonita/Morehouse Parish OHSEP	Flooding, Tropical Cyclones	1,3,4	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	Village of Bonita/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	1,2,3,4	New

Village of Bonita							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
B4: Safe Room Projects	Construction of a safe room for first responders located in Bonita. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Village of Bonita/Morehouse Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones, Wildfires	1,3,4	New
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, Wildfires, Thunderstorms (lightning, high wind, hail), Drought, Extreme Heat, Dam Failure, Levee Failure and Winter Storm hazards as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the parish and its communities.	FEMA HMGP, Local	1-5 years	Village of Bonita/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Wildfires, Thunderstorms (lightning, high wind, hail), Winter Storms, Dam Failure, Levee Failure, Drought, Extreme Heat	1,2,3,4	New
B6: Generators for continuity of operations and government	Procurement and Installation of generators at identified critical facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Village of Bonita/Morehouse Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Extreme Heat	1,4	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	Village of Bonita/Morehouse Parish OHSEP	Lightning	1,4	New

Village of Bonita							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
B8: Warning Systems	Update/upgrade public warning system components throughout Bonita as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Village of Bonita/Morehouse Parish OHSEP	Winter Storms, Wildfires, Tornadoes, Tropical Cyclones	1,4	New
B9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Village of Bonita/Morehouse Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	1,4	New
B10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Village of Bonita/Morehouse Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	1,2,4	New
B11: Wildfires Ordinance	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 Years	Village of Bonita/Morehouse Parish OHSEP	Wildfires	1,4	New
B12: Dam and Levee Failure 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	Village of Bonita/Morehouse Parish OHSEP	Dam Failure, Levee Failure, Flooding	1,2,3,4	New
B13: Water Conservation Measures	Adopt ordinances requiring water-saving measures in time of Drought	FEMA HMGP, Local	1-5 years	Village of Bonita/Morehouse Parish OHSEP	Drought	1,4	New

Village of Collinston - New Mitigation Actions

Village of Collinston							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
C1: Building Retrofits	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds, and helps assure that the public buildings can be used, occupied and operable during or after storms.	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	High Wind, Tropical Cyclones, Tornadoes, Hail	1,3,4	New
C2: Drainage Improvement	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Flooding, Tropical Cyclones	1,3,4	New
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties.	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	1,2,3,4	New

Village of Collinston							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
C4: Safe Room Projects	Construction of a safe room for first responders located in Collinston. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones, Wildfires	1,3,4	New
C5: 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, Wildfires, Thunderstorms (lightning, high wind, hail), Drought, Extreme Heat, Dam Failure, Levee Failure and Winter Storm hazards as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the parish and its communities.	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Wildfires, Thunderstorms (lightning, high wind, hail), Winter Storms, Dam Failure, Levee Failure, Drought, Extreme Heat	1,2,3,4	New
C6: Generators for continuity of operations and government	Procurement and Installation of generators at identified critical facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Extreme Heat	1,4	New
C7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Lightning	1,4	New

Village of Collinston							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
C8: Warning Systems	Update/upgrade public warning system components throughout Collinston as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Winter Storms, Wildfires, Tornadoes, Tropical Cyclones	1,4	New
C9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	1,4	New
C10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	1,2,4	New
C11: Wildfires Ordinance	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 Years	Village of Collinston/Morehouse Parish OHSEP	Wildfires	1,4	New
C12: Dam and Levee Failure 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	Village of Collinston/Morehouse Parish OHSEP	Dam Failure, Levee Failure, Flooding	1,2,3,4	New
C13: Water Conservation Measures	Adopt ordinances requiring water-saving measures in time of Drought	FEMA HMGP, Local	1-5 years	Village of Collinston/Morehouse Parish OHSEP	Drought	1,4	New

Village of Mer Rouge - New Mitigation Actions

Village of Mer Rouge							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
M1: Building Retrofits	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds, and helps assure that the public buildings can be used, occupied and operable during or after storms.	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	High Wind, Tropical Cyclones, Tornadoes, Hail	1,3,4	New
M2: Drainage Improvement	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Flooding, Tropical Cyclones	1,3,4	New
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties.	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	1,2,3,4	New

Village of Mer Rouge							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
M4: Safe Room Projects	Construction of a safe room for first responders located in Mer Rouge. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones, Wildfires	1,3,4	New
M5: 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, Wildfires, Thunderstorms (lightning, high wind, hail), Drought, Extreme Heat, Dam Failure, Levee Failure and Winter Storm hazards as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the parish and its communities.	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Wildfires, Thunderstorms (lightning, high wind, hail), Winter Storms, Dam Failure, Levee Failure, Drought, Extreme Heat	1,2,3,4	New
M6: Generators for continuity of operations and government	Procurement and Installation of generators at identified critical facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Extreme Heat	1,4	New
M7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Lightning	1,4	New

Village of Mer Rouge							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
M8: Warning Systems	Update/upgrade public warning system components throughout Mer Rouge as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Winter storm, Wildfires, Tornadoes, Tropical Cyclones	1,4	New
M9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	1,4	New
M10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	1,2,4	New
M11: Wildfires Ordinance	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 Years	Village of Mer Rouge/Morehouse Parish OHSEP	Wildfires	1,4	New
M12: Dam and Levee Failure 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	Village of Mer Rouge/Morehouse Parish OHSEP	Dam Failure, Levee Failure, Flooding	1,2,3,4	New
M13: Water Conservation Measures	Adopt ordinances requiring water-saving measures in time of Drought	FEMA HMGP, Local	1-5 years	Village of Mer Rouge/Morehouse Parish OHSEP	Drought	1,4	New

Village of Oak Ridge - New Mitigation Actions

Village of Oak Ridge							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
O1: Building Retrofits	Retrofit public buildings exterior shell to maintain use during and after storm events. Benefits: Reduces damage from high winds, and helps assure that the public buildings can be used, occupied and operable during or after storms.	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	High Wind, Tropical Cyclones, Tornadoes, Hail	1,3,4	New
O2: Drainage Improvement	Will relieve flooding problems, reduce flood damage and costs of damage, overtopping of roads with drain water, while also keeping open roadways during periods of high precipitation. Benefits: Relieves Parish or local government and property owners of the continual flooding problems, with closed roadways (loss of function). Saves public funds for road repairs, drainage ditch repairs, sandbagging and blocking of roadways during storm periods.	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Flooding, Tropical Cyclones	1,3,4	New
O3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	Elevation, acquisition-demolition, acquisition-relocations, and reconstruction of repetitive loss or flooding or other hazard prone properties.	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Dam Failure, Levee Failure	1,2,3,4	New
O4: Safe Room Projects	Construction of a safe room for first responders located in Oak Ridge. Other locations will be identified based on funding availability.	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Tornadoes, High Wind, Tropical Cyclones, Wildfires	1,3,4	New

Village of Oak Ridge							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
O5: 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, Wildfires, Thunderstorms (lightning, high wind, hail), Drought, Extreme Heat, Dam Failure, Levee Failure and Winter Storm hazards as well as providing information on high risk areas. Informing communities, business and citizens on proper mitigation efforts and activities will create resiliency within the parish and its communities.	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Flooding, Tropical Cyclones, Tornadoes, Wildfires, Thunderstorms (lightning, high wind, hail), Winter Storms, Dam Failure, Levee Failure, Drought, Extreme Heat	1,2,3,4	New
O6: Generators for continuity of operations and government	Procurement and Installation of generators at identified critical facilities to ensure continued operations during and after events.	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Tornadoes, Winter Storms, Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Extreme Heat	1,4	New
O7: Lightning Mitigation	Procurement and Installation of Lightning rods and surge protectors for public buildings to preserve life and property	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Lightning	1,4	New
O8: Warning Systems	Update/upgrade public warning system components throughout Oak Ridge as necessary. Install audible and/or reverse 911 warning system(s)	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Winter Storms, Wildfires, Tornadoes, Tropical Cyclones	1,4	New

Village of Oak Ridge							
Jurisdiction-Specific Action	**Action Description**	**Funding Source**	**Target Completion Date**	**Responsible Party, Agency, or Department**	**Hazard**	**Goal**	**Status**
O9: Potable Water	Create redundancy of potable water supply to critical facilities, especially hospitals in Parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations.	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Tropical Cyclones, Thunderstorms (lightning, high wind, hail), Tornadoes	1,4	New
O10: Promote Flood Insurance	Promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the National Flood Insurance Program (NFIP).	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Tropical Cyclones, Flooding, Dam Failure, Levee Failure	1,2,4	New
O11: Wildfires Ordinance	Strengthen penalties and improve enforcement capabilities of burn ban ordinances	FEMA HMGP, Local	1-5 Years	Village of Oak Ridge/Morehouse Parish OHSEP	Wildfires	1,4	New
O12: Dam and Levee Failure 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	Village of Oak Ridge/Morehouse Parish OHSEP	Dam Failure, Levee Failure, Flooding	1,2,3,4	New
O13: Water Conservation Measures	Adopt ordinances requiring water-saving measures in time of Drought	FEMA HMGP, Local	1-5 years	Village of Oak Ridge/Morehouse Parish OHSEP	Drought	1,4	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 Morehouse 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, or political priorities within the past 5 years, with the methodology and prioritization process remaining the same.

Morehouse 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.

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Appendix A: Planning Process

Purpose

The Hazard Mitigation Plan Update process prompts local jurisdictions to keep their hazard mitigation plan current and moving toward a more resilient community. The plan update builds on the research and planning efforts of previous plans while reviewing recent trends. The steering committee followed FEMA's hazard mitigation planning process per the FEMA Local Mitigation Planning Handbook. This planning process assured public involvement and the participation of interested agencies and private organizations. Documentation of the planning process for the updated plan is addressed in this section.

The Morehouse Parish Hazard Mitigation Plan Update

The Morehouse 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.

Morehouse Parish includes five incorporated municipalities that participated in the plan update process – the City of Bastrop, Village of Bonita, Village of Collinston, Village of Mer Rouge, and Village of Oak Ridge. Morehouse 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
1/21/2016	Initial Coordination	Telephone/ Email	No	Discuss with Parish HM coordinator and any Steering Committee members expectations and requirements of the project.
2/3/2016	Kick-Off Meeting	Bastrop, LA	No	Discuss with the plan steering committee expectations and requirements of the project. Assign plan worksheets to jurisdictions.
8/24/2016	Risk Assessment Overview	Bastrop, LA	No	Discuss and review the risk assessment with the steering committee discuss and review expectations for public meeting.
8/24/2016	Public Meeting	Bastrop, 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 Morehouse 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 Morehouse 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/MorehouseParish
2 Week Period	Public Plan Review (Digital)		Yes	Parish Website and Morehouse 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								
Plan Adoption								
Plan Approval								

Coordination

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

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

- Morehouse Parish Government
- Morehouse Office of Homeland Security and Emergency Preparedness
- City of Bastrop
- Village of Bonita
- Village of Collinston
- Village of Bonita

The Parish of West Carroll was invited by the Morehouse Parish OHSEP 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 8 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/Email
Gene Montgomery	Parish Superintendent	MHSE Police Jury	125 E. Madison Ave Bastrop, LA	318-281-4132
Arthur Jones	Mayor of Bastrop	City of Bastrop	202 E. Jefferson Avenue Bastrop, LA	318-283-0250
Johnny McAdams	Mayor of Mer Rouge	Village of Mer Rouge	P.O. Box 146 Mer Rouge, LA 71261	318-647-3622
Kathy Moses	Mayor of Bonita	Village of Bonita	P.O. Box 278 Bonita, LA 71223	318-823-2128
Frank Miller	Mayor of Collinston	Village of Collinston	P.O. Box 148 Collinston, LA 71229	318-874-2631
Andy Barham	Mayor of Oak Ridge	Village of Oak Ridge	P.O. Box 58 Oak Ridge, LA 71264	318-244-5033
James Mardis	OHSEP Director	Morehouse OHSEP	Police Jury, Madison Ave, Bastrop, LA	jmardis@mpso.net
Joe Stewart	Regional Coordinator	GOHSEP	7667 Independence Blvd Baton Rouge, LA	joe.stewart@la.gov
Peggy Robinson	OHSEP Director	West Carroll Parish	107 South Briggs Street Oak Grove, LA	wcpoep@bellsouth.net

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 Morehouse 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 Morehouse Parish Hazard Mitigation Steering Committee will remain charged with ensuring that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Hazard Mitigation Plan, and will not contribute to increased hazard vulnerability in the parish. Existing plans, studies, and technical information were incorporated in the planning process. Examples include flood data from FEMA, the U.S. Army Corps of Engineers (USACE or Corps), and the U.S. Geological Survey. Much of this data was incorporated into the risk assessment component of the plan relative to plotting historical events and the magnitude of damages that occurred. The parish's 2005 Hazard Mitigation Plan was also used in the planning process. Other existing parish and jurisdiction data and plans reviewed and/or incorporated into the planning process include those listed below:

- Emergency Operations Plan (Parish and Jurisdictions)
- State of Louisiana 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 Morehouse Parish.

Meeting #1: Coordination Discussion

Date: January 21, 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: Morehouse Parish OHSEP, SDMI Staff

Meeting #2: Hazard Mitigation Plan Update Kick-Off

Date: February 3, 2016

Location: Bastrop, Louisiana

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
Gene Montgomery	Parish Superintendent	MHSE Police Jury
Arthur Jones	Mayor of Bastrop	City of Bastrop
Johnny McAdams	Mayor of Mer Rouge	Village of Mer Rouge
Kathy Moses	Mayor of Bonita	Village of Bonita
Frank Miller	Mayor of Collinston	Village of Collinston
Andy Barham	Mayor of Oak Ridge	Village of Oak Ridge
James Mardis	OHSEP Director	Morehouse OHSEP
Joe Stewart	Regional Coordinator	GOHSEP
Peggy Robinson	OHSEP Director	West Carroll Parish

Meeting #3: Risk Assessment Overview

Date: August 24, 2016

Location: Bastrop, 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
Gene Montgomery	Parish Superintendent	MHSE Police Jury
Arthur Jones	Mayor of Bastrop	City of Bastrop
Johnny McAdams	Mayor of Mer Rouge	Village of Mer Rouge
Kathy Moses	Mayor of Bonita	Village of Bonita
Frank Miller	Mayor of Collinston	Village of Collinston
Andy Barham	Mayor of Oak Ridge	Village of Oak Ridge
James Mardis	OHSEP Director	Morehouse OHSEP
Joe Stewart	Regional Coordinator	GOHSEP
Peggy Robinson	OHSEP Director	West Carroll Parish

Meeting #4: Public Meeting

Date: August 24, 2016

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

Public Initiation: Yes

Invitees Included:

Name	Title	Agency
Gene Montgomery	Parish Superintendent	MHSE Police Jury
Arthur Jones	Mayor of Bastrop	City of Bastrop
Johnny McAdams	Mayor of Mer Rouge	Village of Mer Rouge
Kathy Moses	Mayor of Bonita	Village of Bonita
Frank Miller	Mayor of Collinston	Village of Collinston
Andy Barham	Mayor of Oak Ridge	Village of Oak Ridge
James Mardis	OHSEP Director	Morehouse OHSEP
Joe Stewart	Regional Coordinator	GOHSEP
Peggy Robinson	OHSEP Director	West Carroll Parish

****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

MOREHOUSE PARISH OFFICE OF HOMELAND SECURITY & EMERGENCY PREPAREDNESS

MEETING NOTICE – Wednesday, August 24

Morehouse Parish to hold Public Meetings for Hazard Mitigation Plan Update

Bastrop, LA – Morehouse Parish Office of Homeland Security & Emergency Preparedness is in the process of updating the Morehouse Parish Hazard Mitigation Plan and are required to hold public meetings on the plan update. The Public meeting will be held on August 24th, in the Police Jury Meeting Room located on Madison Avenue, Bastrop, LA, from 2:30PM to 3:30PM.

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 grants. Hazard mitigation plans must be: (a) implemented on an ongoing basis, and (b) updated every five years to ensure that they remain applicable representations of local risk and locally-preferred risk reduction strategies.

Morehouse Parish is in the stages of updating its hazard mitigation plan. Public meeting will be held on August 24th for all citizens interested in learning about and participating in discussions concerning the Morehouse Parish Hazard Mitigation Plan.

Residents of Morehouse 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/MorehouseParish

For more information, please contact: Morehouse 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 Morehouse Parish Hazard Mitigation Draft Plan was placed on the Morehouse Parish website to collect comments and feedback from the public. This outreach provided the public an opportunity to comment on the plan during the drafting stage and prior to plan approval. No feedback or public comment was received during this time.

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Appendix B: Plan Maintenance

Purpose

The section of the Code of Federal Regulations (CFR) pertaining to Local Mitigation Plans lists five required components for each plan: a description of the planning process; risk assessments; mitigation strategies; a method and system for plan maintenance; and documentation of plan adoption. This section details the method and system for plan maintenance, following the CFR's guidelines that the Plan Update must include (1) "a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle," (2) "a process by which local governments incorporated the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans", and (3) "discussion on how the community will continue public participation in the plan maintenance process."

Monitoring, Evaluating, and Updating the Plan

The Morehouse 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

Morehouse 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

Morehouse 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 Morehouse Parish OHSEP Director will be responsible for conducting the annual planning committee meetings.

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

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

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

2) What were the results of the implemented action

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

4) Did the results achieve the stated goals and objectives

5) Was the action cost-effective

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

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

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

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

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

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

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

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

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

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

- Ordinances, Resolutions, Regulations
- Floodplain Ordinances (Parish and Jurisdictions)
- Emergency Operations Plan (Parish and Jurisdictions)
- Economic Development Plan (Parish and Jurisdictions)
- Continuity of Operations Plan

Opportunities to integrate the requirements of this plan into other local planning mechanisms will continue to be identified through future meetings of the Morehouse 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 Morehouse 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 Morehouse Parish, as well as the City of Bastrop, Village of Bonita, Village of Collinston, Village of Mer Rouge, and Village of Oak Ridge, Morehouse 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 Morehouse Parish
Economic Development Plan/Updated as needed/Morehouse Parish Police Jury
Local Emergency Operations Plan/Updated as needed/Morehouse Parish OHSEP
Continuity of Operations Plan/Update as needed/Morehouse Parish OHSEP

City of Bastrop
Economic Development Plan/Update as needed/ Morehouse Parish Police Jury and Mayor of Bastrop
Local Emergency Operations Plan/Updated as needed/Morehouse Parish OHSEP
Continuity of Operations Plan/Updated as needed/Morehouse Parish OHSEP

Village of Bonita
Economic Development Plan/Update as needed/ Morehouse Parish Police Jury and Mayor of Bonita
Local Emergency Operations Plan/Updated as needed/Morehouse Parish OHSEP
Continuity of Operations Plan/Updated as needed/Morehouse Parish OHSEP

Village of Collinston
Economic Development Plan/Update as needed/ Morehouse Parish Police Jury and Mayor of Collinston
Local Emergency Operations Plan/Updated as needed/Morehouse Parish OHSEP
Continuity of Operations Plan/Updated as needed/Morehouse Parish OHSEP

Village of Mer Rouge
Economic Development Plan/Update as needed/ Morehouse Parish Police Jury and Mayor of Mer Rouge
Local Emergency Operations Plan/Updated as needed/Morehouse Parish OHSEP
Continuity of Operations Plan/Updated as needed/Morehouse Parish OHSEP

Village of Oak Ridge
Economic Development Plan/Update as needed/ Morehouse Parish Police Jury and Mayor of Oak Ridge
Local Emergency Operations Plan/Updated as needed/Morehouse Parish OHSEP
Continuity of Operations Plan/Updated as needed/Morehouse Parish OHSEP

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

Morehouse Parish Essential Facilities – All Jurisdictions

Morehouse Unincorporated Essential Facilities													
Type	**Name**	**Drought***	**Extreme Heat***	**Flooding**	**Hail**	**Lightning**	**Wind**	**Tornado**	**Tropical Cyclone**	**Wildfire**	**Winter Storms***	**Dam Failure***	**Levee Failure***
Fire and Rescue	6th Ward Fire Protection District #1 Station #2				X	X	X	X	X				
	District 2 Fire Station 4				X	X	X	X	X	X			
	District 2 Fire Station 5				X	X	X	X	X	X			
	Fire Station				X	X	X	X	X				
	Holly Ridge Station				X	X	X	X	X				
	Jones Fire Station				X	X	X	X	X				
	Ward 2 Fire District 1				X	X	X	X	X				
Government	Bastrop DOTD				X	X	X	X	X	X			
	Morehouse Highway Department				X	X	X	X	X	X			
	Morehouse Parish School Board			X	X	X	X	X	X	X			
	USDA Service Center				X	X	X	X	X	X			
Corrections	Morehouse Parish Jail				X	X	X	X	X				
Schools	Beekman Junior High				X	X	X	X	X				
	Cherry Ridge Elementary				X	X	X	X	X	X			
	Delta Junior High				X	X	X	X	X				
	Pine Grove Elementary				X	X	X	X	X				

Bastrop Essential Facilities													
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornado	Tropical Cyclone	Wildfire	Winter Storms*	Dam Failure+	Levee Failure+
Fire and Rescue	Bastrop Fire Station				X	X	X	X	X	X			
	Central Fire Station				X	X	X	X	X				
	Fire Station				X	X	X	X	X	X			
Government	Bastrop City Hall				X	X	X	X	X				
	Bastrop Municipal Center				X	X	X	X	X				
	City of Bastrop Maintenance Yard				X	X	X	X	X				
	LA Workforce Commission				X	X	X	X	X				
	Morehouse Parish Assessor				X	X	X	X	X	X			
	Morehouse Parish Chamber of Commerce				X	X	X	X	X				
	Morehouse Parish Courthouse				X	X	X	X	X				
	Morehouse Parish Department of Social Services				X	X	X	X	X	X			
	Morehouse Parish Police Jury				X	X	X	X	X				
	Morehouse Parish Resource Center				X	X	X	X	X	X			
	Morehouse Parish Tax Assessor's Office				X	X	X	X	X	X			
	Office of Workforce Development				X	X	X	X	X				
Law Enforcement	Bastrop Police Department				X	X	X	X	X				
	Morehouse Parish Sheriff's Office				X	X	X	X	X				

	Morehouse Parish Sheriff's Office - Maintenance				X	X	X	X	X				
Corrections	Morehouse Jail				X	X	X	X	X				
Public Health	Morehouse General Hospital				X	X	X	X	X	X			
	Qayyum Family Medical Center				X	X	X	X	X	X			
Schools	Bastrop High School				X	X	X	X	X				
	Carver Elementary				X	X	X	X	X	X			
	East Side Elementary				X	X	X	X	X				
	Henry V/ Adams Elementary				X	X	X	X	X				
	Morehouse Junior High School				X	X	X	X	X	X			
	Morehouse Magnet School				X	X	X	X	X				
	Oak Hill Elementary				X	X	X	X	X	X			
	School				X	X	X	X	X	X			
	St. Joseph				X	X	X	X	X				

Bonita Essential Facilities													
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornado	Tropical Cyclone	Wildfire	Winter Storms*	Dam Failure+	Levee Failure+
Fire and Rescue	Bonita Fire Station				X	X	X	X	X				
	Bonita Fire Station				X	X	X	X	X				
Government	Bonita Town Hall				X	X	X	X	X				
Law Enforcement	Bonita Police Department				X	X	X	X	X				
Schools	Bonita Elementary School - Vacant				X	X	X	X	X				

Collinston Essential Facilities													
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornado	Tropical Cyclone	Wildfire	Winter Storms*	Dam Failure+	Levee Failure+
Fire and Rescue	Ward 8 Volunteer Fire Department				X	X	X	X	X	X			
Government	Collinston Town Hall				X	X	X	X	X				
Law Enforcement	Collinston Police Department				X	X	X	X	X				

Mer Rouge Essential Facilities													
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornado	Tropical Cyclone	Wildfire	Winter Storms*	Dam Failure+	Levee Failure+
Fire and Rescue	Mer Rouge Fire Station Annex				X	X	X	X	X				
	Mer Rouge Volunteer Fire Department				X	X	X	X	X				
Government	Mer Rouge City Hall				X	X	X	X	X				
Law Enforcement	Mer Rouge Police Station				X	X	X	X	X				

Oak Ridge Essential Facilities													
Type	Name	Drought*	Extreme Heat*	Flooding	Hail	Lightning	Wind	Tornado	Tropical Cyclone	Wildfire	Winter Storms*	Dam Failure+	Levee Failure+
Fire and Rescue	Oak Ridge Volunteer Fire Department				X	X	X	X	X				
Government	Oak Ridge Town Hall				X	X	X	X	X				

*No critical facilities are vulnerable to the hazard

+Unknown due to data deficiency

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Appendix D: Plan Adoption

VILLAGE OF BONITA
RESOLUTION NO. 0516-2

A RESOLUTION APPROVING PARTICIPATION IN THE PARISH MITICATION PLANNING PROCESS AND ADOPTION OF THE PARISH-WIDE HAZARD MITIGATION PLAN

WHEREAS, the Morehouse Parish Police Jury has received grant funds from the Federal Emergency Management Agency through the Louisiana Office of Homeland Security and Emergency Preparedness, for the preparation of a hazard mitigation plan and;

WHEREAS, the Disaster Mitigation Act of 2000, specifically Section 322, addresses local mitigation planning and it requires local governments to develop and submit plans as a condition of receiving Hazard Mitigation Grant Program Funds, and;

WHEREAS, post-disaster mitigation funds are only available to those communities with an approved Hazard Mitigation Plan, and;

WHEREAS, the State Office of Homeland Security and Emergency Preparedness focuses local mitigation planning at the Parish level and they encourage local governments to participate in the Parish mitigation planning process.

NOW THEREFORE, BE IT RESOLVED, that the Village of Bonita approves participation in the parish mitigation planning process in developing a parish-wide hazard mitigation planning process in developing a parish-wide hazard mitigation plan and adoption of the final Federation Emergency Management Agency approved plan.

MOVED FOR ADOPTION by Council Member Rick Polk, seconded by, Council Member Margarita Brown.

WHEREUPON, this Resolution was submitted to a vote that resulted in the following:

YEAS: 3 ABSENT: 0
NAYS: 0 ABSTAIN: 0
PASSED AND ADOPTED this **2th day** of May, 2016.

Kathy [illegible] Mayor

Pamela Wilson, Clerk

VILLAGE OF OAK RIDGE
POST OFFICE BOX 58
OAK RIDGE, LOUISIANA 71264

RESOLUTION

BE IT RESOLVED, that the Village of Oak Ridge Town Council at its regular monthly meeting, reviewed and discussed the Morehouse Parish-Hazard Mitigation Plan:

BE IT FURTHER RESOLVED that the Village of Oak Ridge with a full quorum present, voted to formally adopt the Morehouse Parish Hazard Mitigation Plan.

The foregoing resolution was read in full, the roll was called on the adoption thereof, and the resolution was adopted by the following votes:

YEAS: Gretchen Duff
Earl Baker
Raymond Speights

NAYS: None
ABSTAINED: None
ABSENT: None

CERTIFICATE

I hereby certify that the foregoing is a true and exact copy of the resolution adopted at the regular monthly Town Council meeting held on February 7, 2017, at which meeting a quorum was present and voting.

Oak Ridge, Louisiana, this 7th day of February, 2017.

Malcom Williams, Mayor

The following Resolution was offered by Betty Jones and seconded by Dorothy Bradshaw:

Morehouse Parish
Resolution No. 2016-15

A RESOLUTION ADOPTING THE PARISH-WIDE HAZARD MITIGATION PLAN

WHEREAS, the Village of Collinston has received grant funds from the Federal Emergency Management Agency through the Louisiana Office of Homeland Security and Emergency Preparedness, for the preparation of a hazard mitigation plan and;

WHEREAS, our community has participated in the process to prepare a DMA complaint Hazard Mitigation Plan based on the FEMA guidance available in the How to Guides;

WHEREAS our community wishes to participate in the Hazard Mitigation Plan prepared by the Morehouse Parish government under the oversight of a Steering Committee comprised of Parish-wide representatives;

WHEREAS, Morehouse Parish and local city representatives and governments have participated in the mitigation planning process;

WHEREAS appropriate opportunity for input by public and community officials has been provided through press releases, open meetings and availability of draft documents;

WHEREAS the Plan has been recommended for adoption by the Steering Committee;

WHEREAS adoption of the Plan is required prior to further consideration for FEMA funding under the following programs:

- Pre-Disaster Mitigation
- Hazard Mitigation Grant Program
- Flood Mitigation Assistance Program

Therefore, the Village of Collinston hereby adopts the Morehouse Parish Hazard Mitigation Plan on 13th day of December, 2016.

Frank Miller

Frank Miller
Village of Collinston Mayor

CITY OF BASTROP, LOUISIANA
RESOLUTION 16-1694

A RESOLUTION ADOPTING AN PARISH – WIDE HAZARD MITIGATION PLAN FOR THE CITY OF BASTROP, LOUISIANA

WHEREAS, the Morehouse Parish Police Jury has received funds from the Federal Emergency Management Agency, through the Governor's Office of Homeland Security and Emergency Preparedness, for the update of a Hazard Mitigation Plan, and,

WHEREAS, the City of Bastrop, Louisiana, Morehouse Parish has participated in the process to update a DMA compliant Hazard Mitigation Plan based on the FEMA guidance available in the How to Guides; and,

WHEREAS, the City of Bastrop, Louisiana, Morehouse Parish wishes to participate in the Hazard Mitigation Plan Update prepared by the Morehouse Parish governing authority under the oversight of a Steering Committee comprised of Parish-wide representatives; and,

WHEREAS, Morehouse Parish and the City of Bastrop, Louisiana have participated in the mitigation planning process; and,

WHEREAS, Appropriate opportunity for input by public and community officials has been provided through press releases, open meetings and availability of draft documents; and,

WHEREAS, The updated Plan has been recommended for adoption by the Steering Committee; and,

WHEREAS, Adoption of the updated Plan is required prior to further consideration for FEMA funding under the following programs:

- Pre-Disaster Mitigation
- Hazard Mitigation Grant Program
- Flood Mitigation Grant Program
- Severe Repetitive Loss
- Repetitive Flood Claims

Therefore, Be It Resolved, that City of Bastrop, Louisiana, Morehouse Parish through its governing authority, the City of Bastrop, Louisiana, hereby adopts the Morehouse Parish Hazard Mitigation Plan update on this the 8th day of December, 2016.

YEAS:
Howard Lorde
Roy Armstrong
Robert Shaw
Marion Moore

NAYS:

ABSENT:
Obbie Johnson

Arthur E. Jones, Mayor

Sandra Coleman, City Clerk

The following Resolution was offered by Terry Matthews, seconded by Floyd Tomboli:

MOREHOUSE PARISH
RESOLUTION NO. 2016-15

A RESOLUTION ADOPTING THE
PARISH - WIDE HAZARD MITIGATION PLAN

WHEREAS, the Morehouse Parish Police Jury has received grant funds from the Federal Emergency Management Agency, through the Louisiana Office of Homeland Security and Emergency Preparedness, for the preparation of a hazard mitigation plan and;

WHEREAS our community has participated in the process to prepare a DMA compliant Hazard Mitigation Plan based on the FEMA guidance available in the How to Guides;

WHEREAS our community wishes to participate in the Hazard Mitigation Plan prepared by the Morehouse Parish government under the oversight of a Steering Committee comprised of Parish- wide representatives;

WHEREAS, Morehouse Parish and local city representatives and governments have participated in the mitigation planning process;

WHEREAS appropriate opportunity for input by public and community officials has been provided through press releases, open meetings and availability of draft documents;

WHEREAS the Plan has been recommended for adoption by the Steering Committee;

WHEREAS adoption of the Plan is required prior to further consideration for FEMA funding under the following programs:

- Pre-Disaster Mitigation
- Hazard Mitigation Grant Program
- Flood Mitigation Assistance Program

Therefore, the Morehouse Parish hereby adopts the Morehouse Parish Hazard Mitigation Plan on 12th day of December, 2016.

Mark Sistrunk
Morehouse Parish Police Jury President

Village of Mer Rouge
PO Box 238
Mer Rouge LA 71261
318-647-3622
patti@merrouge.org

RESOLUTION

A RESOLUTION ADOPTING THE PARISH - WIDE HAZARD MITIGATION PLAN

WHEREAS, the Village of Mer Rouge has received grant funds from the Federal Emergency Management Agency, through the Louisiana Office of Homeland Security and Emergency Preparedness, for the preparation of a hazard mitigation plan and;

WHEREAS our community has participated in the process to prepare a DMA compliant Hazard Mitigation Plan based on the FEMA guidance available in the How to Guides;

WHEREAS our community wishes to participate in the Hazard Mitigation Plan prepared by the Morehouse Parish government under the oversight of a Steering Committee comprised of Parish- wide representatives;

WHEREAS, Morehouse Parish and local city representatives and governments have participated in the mitigation planning process;

WHEREAS appropriate opportunity for input by public and community officials has been provided through press releases, open meetings and availability of draft documents;

WHEREAS the Plan has been recommended for adoption by the Steering Committee;

WHEREAS adoption of the Plan is required prior to further consideration for FEMA funding under the following programs:

- Pre-Disaster Mitigation
- Hazard Mitigation Grant Program
- Flood Mitigation Assistance Program

Therefore, the Village of Mer Rouge hereby adopts the Morehouse Parish Hazard Mitigation Plan on 13th day of December, 2016.

John D McAdams, III
Mayor-Village of Mer Rouge

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/Email
Gene Montgomery	Parish Superintendent	MHSE Police Jury	125 E. Madison Ave Bastrop, LA	318-281-4132
Arthur Jones	Mayor of Bastrop	City of Bastrop	202 E. Jefferson Avenue Bastrop, LA	318-283-0250
Johnny McAdams	Mayor of Mer Rouge	Village of Mer Rouge	P.O. Box 146 Mer Rouge, LA 71261	318-647-3622
Kathy Moses	Mayor of Bonita	Village of Bonita	P.O. Box 278 Bonita, LA 71223	318-823-2128
Frank Miller	Mayor of Collinston	Village of Collinston	P.O. Box 148 Collinston, LA 71229	318-874-2631
Andy Barham	Mayor of Oak Ridge	Village of Oak Ridge	P.O. Box 58 Oak Ridge, LA 71264	318-244-5033
James Mardis	OHSEP Director	Morehouse OHSEP	Police Jury, Madison Ave, Bastrop, LA	jmardis@mpso.net
Joe Stewart	Regional Coordinator	GOHSEP	7667 Independence Blvd Baton Rouge, LA	joe.stewart@la.gov
Peggy Robinson	OHSEP Director	West Carroll Parish	107 South Briggs Street Oak Grove, LA	wcpoep@bellsouth.net

Capability Assessment

Morehouse Unincorporated

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
Morehouse Unincorporated		
Plans	Yes/No	Comments
Comprehensive / Master Plan	NO	
Capital Improvements Plan	NO	
Economic Development Plan	YES	economic development board
Local Emergency Operations Plan	YES	
Continuity of Operations Plan	YES	
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	NO	
Fire Department ISO/PIAL rating	YES	5 parish, 4 inside city
Site plan review requirements	YES	
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	
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	
Mitigation Planning Committee	YES	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	NO	
Staff		
Chief Building Official	YES	
Floodplain Administrator	YES	
Emergency Manager	YES	
Community Planner	NO	
Civil Engineer	YES	On contract
GIS Coordinator	NO	
Grant Writer	NO	
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	NO	
Authority to levy taxes for specific purposes	YES	
Fees for water, sewer, gas, or electric services	NO	
Impact fees for new development	NO	
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.	NO	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	YES	
Storm Ready certification	NO	
Firewise Communities certification	YES	
Public/Private partnership initiatives addressing disaster-related issues	NO	
Other	NO	

City of Bastrop

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
Bastrop		
Plans	Yes/No	Comments
Comprehensive / Master Plan	NO	
Capital Improvements Plan	NO	
Economic Development Plan	YES	
Local Emergency Operations Plan	YES	
Continuity of Operations Plan	YES	
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	NO	
Fire Department ISO/PIAL rating	YES	
Site plan review requirements	YES	
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	
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	
Mitigation Planning Committee	YES	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	NO	
Staff		
Chief Building Official	YES	
Floodplain Administrator	YES	
Emergency Manager	YES	
Community Planner	NO	
Civil Engineer	YES	On contract
GIS Coordinator	NO	
Grant Writer	NO	
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	NO	
Authority to levy taxes for specific purposes	YES	
Fees for water, sewer, gas, or electric services	NO	
Impact fees for new development	NO	
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.	NO	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	YES	
Storm Ready certification	NO	
Firewise Communities certification	YES	
Public/Private partnership initiatives addressing disaster-related issues	NO	
Other	NO	

Village of Bonita

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
Bonita		
Plans	Yes/No	Comments
Comprehensive / Master Plan	NO	
Capital Improvements Plan	NO	
Economic Development Plan	YES	
Local Emergency Operations Plan	YES	
Continuity of Operations Plan	YES	
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	NO	
Fire Department ISO/PIAL rating	YES	
Site plan review requirements	YES	
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	
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	
Mitigation Planning Committee	YES	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	NO	
Staff		
Chief Building Official	YES	
Floodplain Administrator	YES	
Emergency Manager	YES	
Community Planner	NO	
Civil Engineer	YES	
GIS Coordinator	NO	
Grant Writer	NO	
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	NO	
Authority to levy taxes for specific purposes	YES	
Fees for water, sewer, gas, or electric services	NO	
Impact fees for new development	NO	
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.	NO	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	YES	
Storm Ready certification	NO	
Firewise Communities certification	YES	
Public/Private partnership initiatives addressing disaster-related issues	NO	
Other	NO	

Village of Collinston

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
Collinston		
Plans	Yes/No	Comments
Comprehensive / Master Plan	NO	
Capital Improvements Plan	NO	
Economic Development Plan	YES	
Local Emergency Operations Plan	YES	
Continuity of Operations Plan	YES	
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	NO	
Fire Department ISO/PIAL rating	YES	
Site plan review requirements	YES	
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	
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	
Mitigation Planning Committee	YES	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	NO	
Staff		
Chief Building Official	YES	
Floodplain Administrator	YES	
Emergency Manager	YES	
Community Planner	NO	
Civil Engineer	YES	
GIS Coordinator	NO	
Grant Writer	NO	
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	NO	
Authority to levy taxes for specific purposes	YES	
Fees for water, sewer, gas, or electric services	NO	
Impact fees for new development	NO	
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.	NO	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	YES	
Storm Ready certification	NO	
Firewise Communities certification	YES	
Public/Private partnership initiatives addressing disaster-related issues	NO	
Other	NO	

Village of Mer Rouge

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
Mer Rouge		
Plans	Yes/No	Comments
Comprehensive / Master Plan	NO	
Capital Improvements Plan	NO	
Economic Development Plan	YES	
Local Emergency Operations Plan	YES	
Continuity of Operations Plan	YES	
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	NO	
Fire Department ISO/PIAL rating	YES	
Site plan review requirements	YES	
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	
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	
Mitigation Planning Committee	YES	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	NO	
Staff		
Chief Building Official	YES	
Floodplain Administrator	YES	
Emergency Manager	YES	
Community Planner	NO	
Civil Engineer	YES	
GIS Coordinator	NO	
Grant Writer	NO	
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	NO	
Authority to levy taxes for specific purposes	YES	
Fees for water, sewer, gas, or electric services	NO	
Impact fees for new development	NO	
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.	NO	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	YES	
Storm Ready certification	NO	
Firewise Communities certification	YES	
Public/Private partnership initiatives addressing disaster-related issues	NO	
Other	NO	

Village of Oak Ridge

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
Oak Ridge		
Plans	Yes/No	Comments
Comprehensive / Master Plan	NO	
Capital Improvements Plan	NO	
Economic Development Plan	YES	
Local Emergency Operations Plan	YES	
Continuity of Operations Plan	YES	
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	NO	
Fire Department ISO/PIAL rating	YES	
Site plan review requirements	YES	
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	
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	
Mitigation Planning Committee	YES	
Maintenance programs to reduce risk (tree trimming, clearing drainage systems)	NO	
Staff		
Chief Building Official	YES	
Floodplain Administrator	YES	
Emergency Manager	YES	
Community Planner	NO	
Civil Engineer	YES	
GIS Coordinator	NO	
Grant Writer	NO	
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	NO	
Authority to levy taxes for specific purposes	YES	
Fees for water, sewer, gas, or electric services	NO	
Impact fees for new development	NO	
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.	NO	
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	YES	
Storm Ready certification	NO	
Firewise Communities certification	YES	
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	Latitude	Longitude	Assessed Value	Date Built	Construction Type
Morehouse Unincorporated									
X	Beekman Jr. High	Education	A.M. Baker Rd.	Beekman	32.92482224	-91.88647799	$2,000,000	1970	Concrete
X	Ward 2 Fire District 1	Fire Search and Rescue	15516 Crossett Hwy	Beekman	32.92378863	-91.88575583	$150,000	1980	Concrete
X	Holly Ridge Station	Fire Search and Rescue	Holly Ridge Rd.	Jones	32.93376307	-91.54843832	$150,000	1980	Concrete
X	Jones Fire Station	Fire Search and Rescue	Hopkins Hill Rd.	Jones	32.9690101	-91.64849792	$100,000	1990	Concrete
X	Bastrop Fire Station	Fire Search and Rescue	7117 North Marable Street	Bastrop	32.76124133	-91.90595722	$2,000,000	1970	concrete
X	District 2 Fire Station 4	Fire Search and Rescue	Nearby: 13390-13758 Old Bonita Road	Bastrop	32.86071746	-91.83842492	$750,000	1990	metal
X	Morehouse Jr. High	Education	1001 West Madison Avenue	Bastrop	32.77426587	-91.92416556	$4,000,000	1950	concrete
X	Henry V. Adams Elementary	Education	Kammel St.	Bastrop	32.78364641	-91.93526438	$1,000,000	1970	concrete
X	Morehouse Magnet School	Education	Larche Ln.	Bastrop	32.78704988	-91.91878871	$1,000,000	1950	concrete
X	Bastrop High School	Education	Highland Ave.	Bastrop	32.78897591	-91.92026946	$10,000,000	1950	concrete
X	Pine Grove Elementary	Education	7261 Pine Grove Loop Road	Bastrop	32.84297617	-91.8630465	$2,000,000	1970	concrete
X	Morehouse Parish Sheriff's Office	Law Enforcement	Nearby: 351 South Franklin Street	Bastrop	32.77571095	-91.9127845	$1,000,000	1999	concrete
X	Morehouse Parish Courthouse	Civil Government	100 East Madison Avenue	Bastrop	32.77776915	-91.91382491	$20,000,000	1914	concrete
X	Morehouse Parish Police Jury	Civil Government	125 E. Madison Ave.	Bastrop	32.77847687	-91.91362729	$750,000	1920	concrete

X	Morehouse Parish Resource Center	Civil Government	6091 Mer Rouge Road	Bastrop	32.77191183	-91.91470027	$25,000	1970	concrete
X	Morehouse Highway Department	Civil Government	3230 New Monroe Road	Bastrop	32.7694456	-91.95237729	$500,000	1970	metal
X	Morehouse Parish Assessor	Civil Government	106 E. Madison Ave.	Bastrop	32.77705256	-91.91390152	$500,000	1970	concrete
X	Morehouse Parish Chamber of Commerce	Civil Government	110 North Franklin Street	Bastrop	32.77861958	-91.91311055	$500,000	1960	concrete
X	Morehouse Parish Courthouse Annex	Civil Government	100 East Madison Avenue	Bastrop	32.7791001	-91.91353832	$750,000	1970	concrete
X	Morehouse General Hospital	Hospital or Medical Center	323 West Walnut Avenue	Bastrop	32.77476816	-91.91722056	$20,000,000	1950	concrete
X	Ward 8 Volunteer Fire Department	Fire Search and Rescue	Nearby: 4476-4532 Main Street	Collinston	32.6877472	-91.87500435	$100,000	1990	metal
X	Delta Junior High	Education	7661 Mer Rouge-Collinston Road	Mer Rouge	32.75465268	-91.81354135	$2,000,000	1980	concrete
X	Mer Rouge Fire Station Annex	Fire Search and Rescue	Nearby: 200-298 West 17th Street	Mer Rouge	32.77677288	-91.79318442	$50,000	1980	metal
X	6th Ward Fire Protection District #1 Station #2	Fire Search and Rescue	Nearby: 12000 Horseshoe Lake Road	Mer Rouge	32.71315941	-91.70466153	$100,000	1980	metal
X	Oak Ridge Volunteer Fire Department	Fire Search and Rescue	Nearby: U.S. 425	Oak Ridge	32.62440421	-91.7732255	$100,000	1950	Concrete
X	Unknown	Fire Search and Rescue	Nearby: 10700-11232 Trails End Road	Oak Ridge	32.6475814	-91.71731693	$100,000	1990	metal
X	Morehouse Parish Jail	Prisons and Correctional Facilities	Nearby: 4273-4781 Eugene Ware Boulevard	Bastrop	32.78135623	-91.93988966	$1,000,000	1970	metal
X	Morehouse Jail	Prisons and Correctional Facilities	Nearby: 250 East Walnut Avenue	Bastrop	32.77505623	-91.91275093	$1,000,000	1999	metal
X	Bonita Fire Station	Fire Search and Rescue	Henry Rd.	Jones	32.91902844	-91.67287024	$100,000	1990	Concrete

Bastrop									
X	Bastrop Police Department	Law Enforcement	Nearby: 200-334 U.S. 425	Bastrop	32.77697314	-91.9127523	$2,000,000	1970	concrete
X	Bastrop Municipal Center	Civil Government	1901 Moeller Drive	Bastrop	32.78248367	-91.89044202	$500,000	1980	metal
X	Bastrop City Hall	Civil Government	Nearby: 201-299 South Franklin Street	Bastrop	32.7769034	-91.91310435	$2,000,000	1970	concrete
X	Bastrop Airport	Airports and Airfields	Nearby: Morehouse Memorial Airport (BQP)	Bastrop	32.75637822	-91.8832532	$5,000,000	1970	concrete
Bonita									
X	Bonita Police Department/Town Hall Annex	Law Enforcement	Nearby: 15416-15448 Bonita Avenue	Bonita	32.92119469	-91.67373707	$150,000	1970	concrete
Collinston									
X	Collinston Police Department/City Hall	Law Enforcement	Nearby: 4598-4628 Main Street	Collinston	32.68917101	-91.87062911	$150,000	1990	concrete
Mer Rouge									
X	Mer Rouge Police Station	Law Enforcement	Nearby: U.S. 425	Mer Rouge	32.77581158	-91.79386418	$100,000	1960	concrete
X	Mer Rouge City Hall	Civil Government	107 North 18th Street	Mer Rouge	32.77686443	-91.79390325	$100,000	1920	concrete
Oak Ridge									
X	Oak Ridge Town Hall	Civil Government	205 North Oak Street	Oak Ridge	32.62358274	-91.77288172	$150,000	1970	Concrete
X	Collinston Town Hall	Civil Government	205 North Oak Street	Oak Ridge	32.68944296	-91.87071558	$100,000	1990	Concrete

Vulnerable Populations

Vulnerable Populations Worksheet

Morehouse Parish

Name	Street	City	Zip Code	Latitude	Longitude
All Hospitals (Private or Public)					
Morehouse General Hospital	323 West Walnut Avenue	Bastrop	71220	32.77476816	-91.91722056
Qayyum Family Medical Center	Nearby: 416-498 Cason Avenue	Bastrop	71220	32.77270377	-91.91831149
Nursing Homes (Private or Public)					
Premier Hospice	Nearby: 1523 Texas Avenue	Bastrop	71220	32.77983181	-91.89760946
Lagniappe Healthcare	Nearby: 1308 Summerlin Lane	Bastrop	71220	32.78881122	-91.89785214
Cherry Ridge Nursing Home	5980 Cherry Ridge Road	Bastrop	71220	32.79607381	-91.89144783
Mobile Home Parks					
Unknown Trailer Park	Huey St.	Bastrop		32.79002049	-91.92914793
Bussey Park	Bussey Park Rd.	Bastrop		32.87327372	-91.91110499
Roseview Mobile Home Park	Nearby: 6187-6235 Van Buron Road	Bastrop	71220	32.77223982	-91.86551772
Lowrey's Mobile Home Park	Nearby: 11955-11999 Scotty Lane	Bastrop	71220	32.83438116	-91.90925871
Mobile Home Park	Nearby: 11610-11906 Shelton Road	Bastrop	71220	32.83232677	-91.90656946
Unknown	Nearby: Mc Creight Street	Bastrop	71220	32.79222977	-91.90340771
East Carter Mobile Home	Nearby: 701-799 Mockingbird Lane	Bastrop	71220	32.79333909	-91.90704503
Spicewood Village RV Park	Nearby: 4559-4566 Dowd Road	Bastrop	71220	32.72229757	-91.90455359
Unknown Mobile Home Park	Nearby: 7220-7298 Bridgett Lane	Mer Rouge	71220	32.85842975	-91.85255082

National Flood Insurance Program (NFIP)

Morehouse Parish

ELEMENT F: STATE REQUIREMENT
National Flood Insurance Program (NFIP)

Jurisdiction: Morehouse Parish

	Morehouse Parish	Bastrop	Bonita	Collinston	Mer Rouge	Oak Ridge
Insurance Summary						
How many NFIP polices are in the community? What is the total premium and coverage?	174, $117,039 Premium, $26,341,700 Coverage	32, $17,208 Premium, $5,595,800 Coverage	4, $2,049 Premium, $424,000 Coverage	None	11, $6,079 Premium, $3,206,300 Coverage	5, $3,956 Premium, $2,180,000 Coverage
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?	88, $1,039,104, Unknown	27, $377,376, Unknown	None	None	2, $15,917, Unknown	None
How many structures are exposed to flood risk with in the community?	88	27	0	0	2	0
Describe any areas of flood risk with limited NFIP policy coverage.	None Known	None Known	None Known	None Known	None Known	None Known
Staff Resources						
Is the Community FPA or NFIP Coordinator certified?	Yes	Yes	Yes	Yes	Yes	Yes
Is flood plain management an auxiliary function?	Yes	Yes	Yes	Yes	Yes	Yes

Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	reviewing permits, inspection services	reviewing permits, inspection services	reviewing permits, inspection services	reviewing permits, inspection services	reviewing permits, inspection services	reviewing permits, inspection services
What are the barriers to running an effective NFIP program in the community, if any?	funding and staffing	funding and staffing	funding and staffing	funding and staffing	funding and staffing	funding and staffing
Compliance History						
Is the community in good standing with the NFIP?	Yes	Yes	Yes	Yes	Yes	Yes
Are there any outstanding compliance issues(i.e., current violations)?	No	No	No	No	No	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact(CAC)?	No	No	No	No	No	No
Is a CAV or CAC scheduled or needed? If so when?	No	No	No	No	No	No
Regulation						
When did the community enter the NFIP?	10/15/1985	12/16/1980	4/1/2007	7/6/2016	6/27/1978	3/27/1997
Are the FIRMs digital or paper?	Both	Both	Both	Both	Both	Both
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Yes, meet State and FEMA requirements	Yes, meet State and FEMA requirements	Yes, meet State and FEMA requirements	Yes, meet State and FEMA requirements	Yes, meet State and FEMA requirements	Yes, meet State and FEMA requirements
Community Rating System (CRS)						
Does the community participate in CRS?	No	No	No	No	No	No
What is the community's CRS Class Ranking?	N/A	N/A	N/A	N/A	N/A	N/A
Does the plan include CRS planning requirements?	N/A	N/A	N/A	N/A	N/A	N/A