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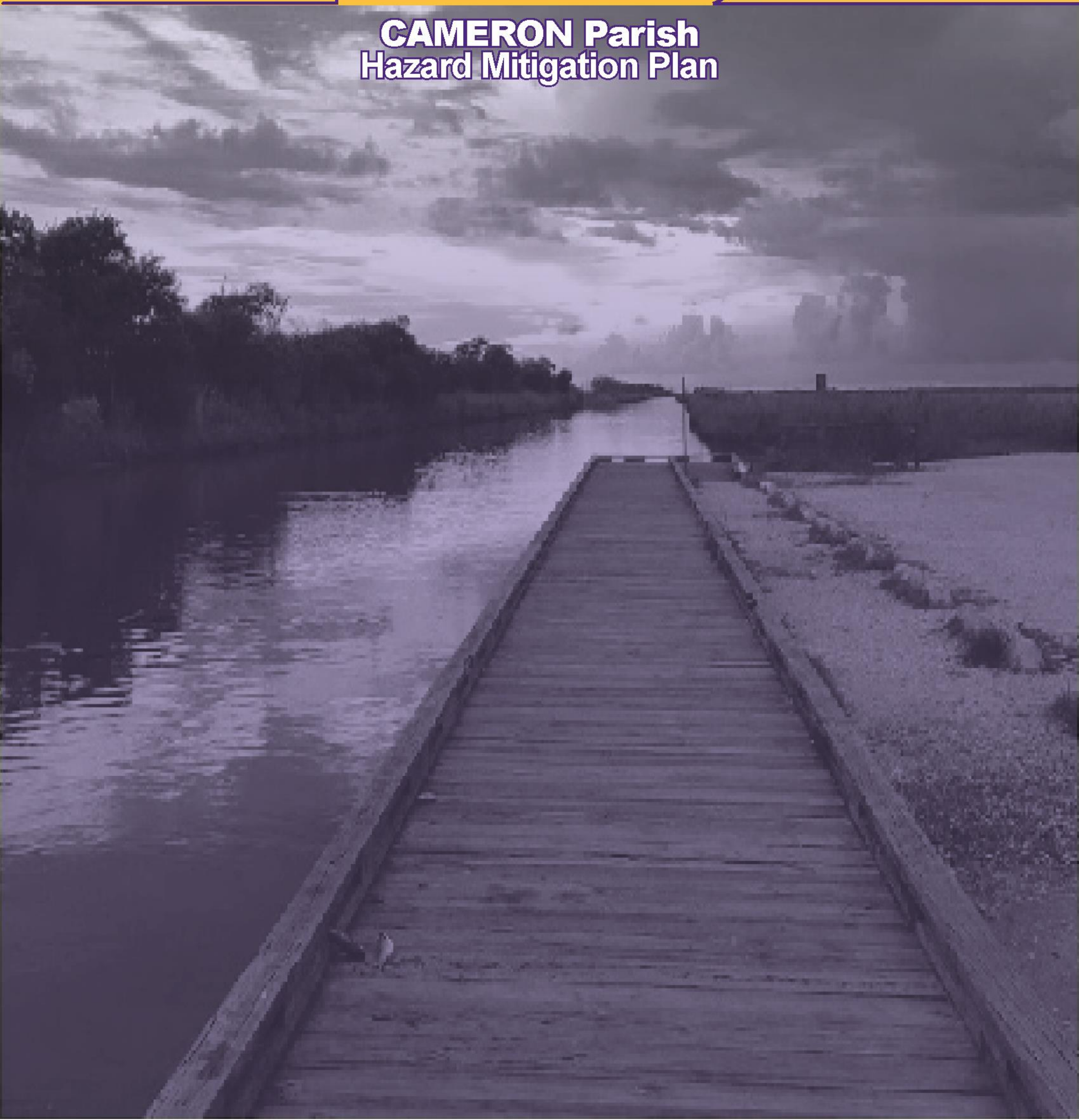
Cameron Parish OHSEP

2020

CAMERON Parish Hazard Mitigation Plan



CAMERON PARISH

HAZARD MITIGATION PLAN UPDATE

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Cameron Parish

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ACKNOWLEDGMENTS

This 2020 Cameron Parish Hazard Mitigation Plan Update was coordinated by the Cameron Parish Hazard Mitigation Plan Update Steering Committee, in collaboration with community stakeholders and the general public.

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

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The 2020 Cameron Parish Hazard Mitigation Plan Update was written by the Stephenson Disaster Management Institute, Louisiana State University. Further comments should be directed to the Cameron Parish Office of Emergency Preparedness: P.O. Box 374 Cameron, LA 70631.

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 Cameron Parish Hazard Mitigation Plan Update (HMPU) process; (b) identifies natural hazards and risks within the parish; and (c) identifies the parish's hazard mitigation strategy to make Cameron Parish less vulnerable and more disaster resilient. It also includes mitigation project scoping to further identify scopes of work, funding sources, and implementation timing requirements of proposed selected mitigation projects. Information in the plan will be used to help guide and coordinate mitigation and local policy decisions affecting future land use.

The Cameron Parish Hazard Mitigation Plan is a single jurisdictional plan that covers the unincorporated communities of Cameron, Creole, Grand Chenier, Grand Lake, Hackberry, Holly Beach, and Johnson Bayou. Multi-Jurisdictional requirements are not required nor addressed in this plan update.

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 Cameron 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.

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 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.

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 (CRS), a program that reduces flood insurance premiums in participating communities. This program is further described in Section Three: Capability Assessment.

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 CRS credit, and provides Cameron Parish and its communities with a blueprint for reducing the impacts of these natural hazards on people and property.

Geography, Population and Economy

Geography

Cameron Parish, originally called Leesburg, is a land of abundance, unique in formation, with miles of beautiful beaches, abundant wildlife and fisheries, and a vast unspoiled wilderness just waiting to be enjoyed. Located in the southwest corner of Louisiana, Cameron Parish has a land area of about 1,313 square miles representing 840,343 acres and a water area of approximately 619 square miles representing 395,986 acres with an average elevation of 5 feet above sea level. Cameron Parish, Louisiana's largest parish is almost entirely gulf marshland with approximately 32% of the parish covered by water. The coastal town of Cameron has been the nation's leading commercial fishing port. The unincorporated communities of Creole, Grand Chenier, Grand Lake, Hackberry, Holly Beach, Johnson Bayou, and Sweet Lake comprise the rest of the parish.

Figure 1-1: Location of Cameron Parish

Cameron Parish is bound by Calcasieu Parish to the north, the Gulf of Mexico to the south, Jefferson Davis and Vermilion Parishes to the east, and the Sabine River/Newton and Orange County, Texas to the west. Cameron Parish lives up to the term of "Sportsman's Paradise" with its 26 miles of easily accessible public beaches, many miles of waterways, four wildlife refuges comprising of approximately 284,000 acres of both fresh and saltwater marshes and a bird sanctuary. Activities such as fishing, hunting, crabbing, swimming, shelling, photography, and bird watching are beyond compare.

NATIONAL WILDLIFE REFUGES

Three National Wildlife Refuges – Sabine, Cameron Prairie, and Lacassine; and one State Refuge – Rockefeller – are located in Cameron Parish. The National Wildlife Refuges (NWRs) are managed by the U.S. Fish and Wildlife Service and the state refuge is owned by the state and managed by the L.A. Department of Wildlife and Fisheries.

The Sabine National Wildlife Refuge was established in 1937 and consists of 124,511 acres, 39,844 acres of open water, and 84,667 acres of grassland/herbaceous/marsh. The refuge is located eight miles south of Hackberry on State Highway 27, the Creole Nature Trail All- American Road, in Cameron Parish, LA. The refuge occupies the marshes between Calcasieu and Sabine lakes in southwest Louisiana, containing large concentrations of ducks, geese, alligators, muskrats, nutrias, raptors, wading birds, shorebirds, blue crabs, and shrimp in addition to olivaceous cormorant, snowy egret, and common egret rookeries being present.

The objectives of the refuge are to provide a habitat for migratory waterfowl and other birds, preserve and enhance coastal marshes for fish and wildlife, and provide outdoor recreation and environmental education for the public. Refuge visitors contribute to the local economy through the purchase of gasoline, food items, and fishing/hunting license sales. Gas and oil exploration activities generate financial returns to the local economy during oil well drilling and seismic exploration activities, and in the form of federally mandated excise tax revenues to local governments from oil extraction active.

The Cameron Prairie NWR was established in 1988 and consists of 9,621 acres. The refuge is located in Cameron Parish, 25 miles southeast of Lake Charles, Louisiana on the LA Highway 27, the Creole Nature Trail All-American Road. Abundant migratory birds and fresh marsh are the dominant features of the area. Old rice fields have been converted to moist soil management areas, utilizing existing levees and pump system. Over 45,000 ducks and 10,000 geese are present in peak populations during the winter months. The refuge provides excellent habitat for native wildlife including alligators, furbearers, white-tailed deer, as well as numerous migratory birds throughout the year. The refuge is crucial to meeting goals set by the North American Waterfowl Management Plan, an international agreement to restore lost wetland habitats.

The Lacassine NWR was established on December 30, 1937 and consists of 34,886 acres in Cameron and Evangeline Parishes. The refuge is located at 209 Nature Road, at the end of Highway 3056, eleven miles southwest of Lake Arthur, Louisiana off Hwy. 14. The Lacassine NWR is responsible for managing a 3,345 acre wilderness area and an 8,000 acre private lands mini-refuge program for migrating waterfowl in six parishes. Wintering populations of ducks and geese are among the largest in the National Wildlife Refuge System. The refuge management is responsible for negotiating with oil and gas industries for mineral exploration/extraction, establishing prairie restoration programs, exotic Chinese tallow tree control programs, and wetland easements in Jefferson Davis Parish.

Rockefeller Wildlife Refuge, located in eastern Cameron and western Vermilion Parishes, is owned and maintained by the State of Louisiana. When deeded to the state this refuge encompassed approximately 86,000 acres, but beach erosion has taken a heavy toll and the most recent surveys indicate only 76,042 acres remaining. This area borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier ridge, a stranded beach ridge, and six miles from the Gulf. The Rockefeller Refuge is a flat, treeless area with highly organic soils which are capable of producing immense quantities of waterfowl foods in the form of annual emergent and submerged aquatics. Since 1954, Rockefeller Refuge has been a test site for various marsh management strategies, including levees, weirs, and several types of water control structures utilized to enhance marsh health and waterfowl food production. Rockefeller Wildlife Refuge is one of the most biologically diverse wildlife areas in the nation. Located at the terminus of the vast Mississippi Flyway, south Louisiana winters about four million waterfowl annually. Historically, Rockefeller wintered as many as 400,000-plus waterfowl annually, but severe declines in the continental duck population due to drought and poor habitat quality on the breeding grounds have altered Louisiana's wintering population. More recent surveys indicate a wintering waterfowl population on Rockefeller Wildlife Refuge reaching 160,000. In addition to ducks, geese, and coots, numerous shorebirds and wading birds either migrate through or over winter in Louisiana's coastal marshes. Neo-tropical migrant passerines also use the shrubs and trees on levees and other "upland" areas of the refuge as a rest stop on their trans-Gulf journeys to and from Central and South America. Although Canada geese no longer migrate to the refuge from breeding areas in the north as they once did, a resident flock of giant Canada geese was established in the early 1960s. Recreational shrimping, crabbing, fishing, and bird-watching are common on the refuge accounting for an annual visitation rate of nearly 80,000 people.

The Steering Committee, in communication with parish civic and government leaders, does not expect any significant changes in land use for the next five years. Timber and Agribusiness will continue to play a significant role in the allocation and use of the parish's land. There are no significant commercial and/or residential developments in the update.

This plan will discuss hazards affecting Cameron 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.

Population and Economy

The population of Cameron Parish is estimated at 6,868 (2019 estimate) with a population percent change from April 1, 2010 – July 1, 2019 of 1.96%.

Table 1-1: Cameron Parish Population
(Source: US Census)

	2010 Census	2019 Estimates	Percent Change 2010 -2019
Total Population	6,839	6,973	1.5%
Population Density (Pop/Sq. Mi.)	5.3		-------
Total Households	3,822	2,718	-28.89%
Persons Per Household	-------	2.52	-------

Table 1-2: Cameron Parish Business Patterns
(Source: US Census, CBP)

Business Description	Number of Establishments	Number of Employees	Annual Payroll ($1,000)
Retail Trade	18	139	2,772
Mining, Quarrying, Oil and Gas Extraction	9	52	4,075
Transportation and Warehousing	23	161	11,227
Construction	16	98	4,659
Administration/Support and Waste Management/Remediation Services	3	100-249	___
Real Estate and Rental and Leasing	6	124	4,868
Wholesale Trade	8	47	3,040
Other Services (except Public Administration)	12	35	575
Accommodation and Food Services	6	24	356
Financial and Insurance	4	18	731
Professional, Scientific, and Technical Services	18	206	53,435
Arts, Entertainment, and Recreation	5	73	1,821
Utilities	4	33	3,908

Hazard Mitigation

To fully understand hazard mitigation efforts in Cameron 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 in advance of a disaster event.

- **Disaster Response**—includes actions taken to provide emergency assistance, save lives, minimize property damage, and speed recovery immediately following a disaster.

- **Disaster Recovery**—includes actions taken to return to a normal or improved operating condition following a disaster.

Figure 1-2 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 1-2* 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 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.

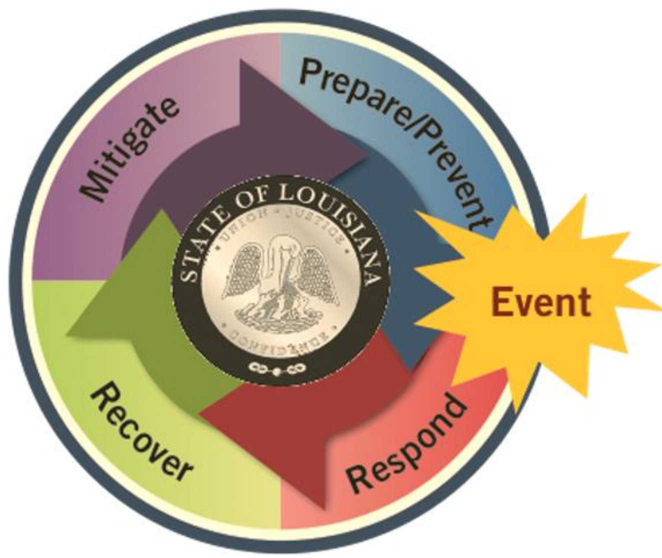


Figure 1-2: The Four Phases of Emergency Management and their Relation to Future Hazard Mitigation (Source: Louisiana State Hazard Mitigation Plan 2014)

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 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 the Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) encourages the parishes and the local communities 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 2020 Cameron Parish Hazard Mitigation Plan (HMP) maintains much of the information from the 2015 plan version, but it now reflects the order and methodologies of the 2019 Louisiana State Hazard Mitigation Plan.

The sections in the 2015 Cameron HMP were as follows:

- Section 1 Introduction
- Section 2 Hazard Identification and Risk Assessment
- Section 3 Capability Assessment
- Section 4 Mitigation Strategy
- Appendix A Planning Process
- Appendix B Plan Maintenance
- Appendix C Essential Facilities
- Appendix D Plan Adoption
- Appendix E State Required Worksheets

This plan update 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 Cameron 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.

2020 Plan Update

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

1. Reduce the loss of life or property
2. Protect critical public facilities and thoroughfares
3. Ensure post-disaster operability of strategic facilities and thoroughfares
4. Develop incentive and community outreach/education programs that assist homeowners in protecting residential properties
5. Provide a long term mitigation solution in locations which experience repetitive hazard damage
6. Provide a cooperative, inter-jurisdictional / inter-agency solution to a problem
7. Show development and implementation of comprehensive programs, standards, and regulations that reduce future hazard damage
8. Avoid inappropriate future development in areas that are vulnerable to hazard damage
9. Reduce the level of hazard vulnerability in existing structures and developed property
10. Restore or protect natural resources, recreational areas, open space, or other environmental values

This plan update makes a number of textual changes throughout, but the most obvious changes are data related and structural edits. First, the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information's (NCEI) Storm Events Database was used in the analysis, which provides historical hazard data from 1950 to 2019. Furthermore, all of the sections were updated to reflect the most current information and the most current vision of the plan update. The most significant changes are the newly developed hazard profiles and risk assessments, as well as the removal of much repetition between sections from the previous plan updates.

The 2020 plan update is organized in the exact same format as the 2015 update as you can see below:

Table 1-3: 2020 Plan Update Crosswalk

Plan Update Crosswalk	
Section 1: Introduction	Section 1: Introduction
Section 2: Hazard Identification and Risk Assessment	Section 2: Hazard Identification and Risk Assessment
Section 3: Capability Assessment	Section 3: Capability Assessment
Section 4: Mitigation Strategy	Section 4: Mitigation Strategy
Appendix A: Planning Process	Appendix A: Planning Process
Appendix B: Plan Maintenance	Appendix B: Plan Maintenance
Appendix C: Essential Facilities	Appendix C: Essential Facilities
Appendix D: Plan Adoptions	Appendix D: Plan Adoptions
Appendix E: State Required Worksheets	Appendix E: State Required Worksheets

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 Cameron Parish and its communities. The extent of this risk is dictated primarily by its geographic location. Most significantly, Cameron Parish remains at high risk of water inundation from various sources, including flooding and tropical cyclone activity. The entire 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 communities, 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. While Cameron is a single jurisdiction plan, they do have multiple communities that are partners in mitigation strategy efforts. 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 Cameron 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 Cameron Parish Hazard Mitigation Plan published in 2015, as well as the hazards that were identified in the state's 2019 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 2020 Update
Coastal Hazards	X		X
Drought	X		X
Excessive Heat	X		X
Flooding	X	X	X
Sinkholes	X		X
Thunderstorms (Hail, Lightning, & Wind)	X	X	X
Tornadoes	X	X	X
Tropical Cyclones	X	X	X
Wildfires	X		X

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 thunderstorms.

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

a) Coastal Hazards/Subsidence
b) Drought
c) Excessive Heat
d) Flooding
e) Sinkholes
f) Thunderstorms (Hail, Lightning, & Wind)
g) Tornadoes
h) Tropical Cyclones
i) Wildfires

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

- Flooding from rivers and waterways, rainstorms, 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)
    e) Coastal
- High wind damage most commonly resulting from hurricanes, thunderstorms, and tornadoes
- Property damage resulting from all profiled natural hazards

The potential destructive power of tropical cyclones was determined to be the most prevalent hazards to the parish. Thirteen of the nineteen declarations Cameron Parish has received resulted from tropical cyclones, which validates this as the most significant hazard. Therefore, the issue of hurricanes will serve as the main focus during the mitigation planning process. Hurricanes present risks from the potential 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 assess 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 Cameron Parish is included in the hurricane risk assessment.

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

Table 2-2: Cameron Parish Major Disaster Declarations.

Disaster Number	Year	Declaration
374	4/27/1973	Severe Storm, Flood
675	1/11/1983	Severe Storm, Flood
752	11/1/1985	Tropical Cyclone – Hurricane Juan
902	5/3/1991	Severe Storm, Flood
956	8/26/1992	Tropical Cyclone – Hurricane Andrew
1169	3/18/1997	Winter Storm, Ice
1246	9/23/1998	Tropical Cyclone – TS Frances and Hurricane Georges

Disaster Number	Year	Declaration
1380	6/11/2001	Tropical Cyclone – Tropical Storm Allison
1435	9/27/2002	Tropical Cyclone – Tropical Storm Isidore
1437	10/3/2002	Tropical Cyclone – Hurricane Lili
1603	8/29/2005	Tropical Cyclone – Hurricane Katrina
1607	9/24/2005	Tropical Cyclone – Hurricane Rita
1786	9/2/2008	Tropical Cyclone – Hurricane Gustav
1792	9/13/2008	Tropical Cyclone – Hurricane Ike
3347	8/27/2012	Tropical Cyclone – Tropical Storm Isaac
4277	8/14/2016	Severe Storms and Flooding
4345	10/16/2017	Tropical Cyclone – Tropical Storm Harvey
4458	8/27/2019	Tropical Cyclone – Hurricane Barry
4484	3/24/2020	COVID-19 Pandemic

Probability of Future Hazard Events

The probability of a hazard event occurring in Cameron 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 National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information's (NCEI) Storm Events Database, which provides historical hazard data from 1950 to 2019. In staying consistent with the state plan, the Storm Events Database was evaluated for the last twenty-five years (1994 – 2019) in order to determine future probability of a hazard occurring. While the 30-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 70-year record was used when Hazus 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.

The following table shows the annual probability for each hazard occurring across the parish:

Table 2-3: Probability of Future Hazard Reoccurrence.

Hazard	Probability
	Cameron Parish
Coastal Hazards	100%
Drought	7%
Excessive Heat	< 1%
Flooding	30%
Sinkholes	< 1%
Thunderstorms (Hail)	100%
Thunderstorms (High Wind)	100%
Thunderstorms (Lightning)	30%
Tornadoes	100%
Tropical Cyclones	53%
Wildfires	3%

As shown in *Table 2-3*, coastal hazards, thunderstorms (hail), thunderstorms (high wind), and tornadoes have the highest chance of occurrence in the parish (100%). These hazards are followed by tropical cyclones (53%), thunderstorms (lightning) and flooding (30%), drought (7%), and wildfires (3%). Sinkholes and excessive heat have an annual chance of occurrence in the parish of less than 1%.

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.

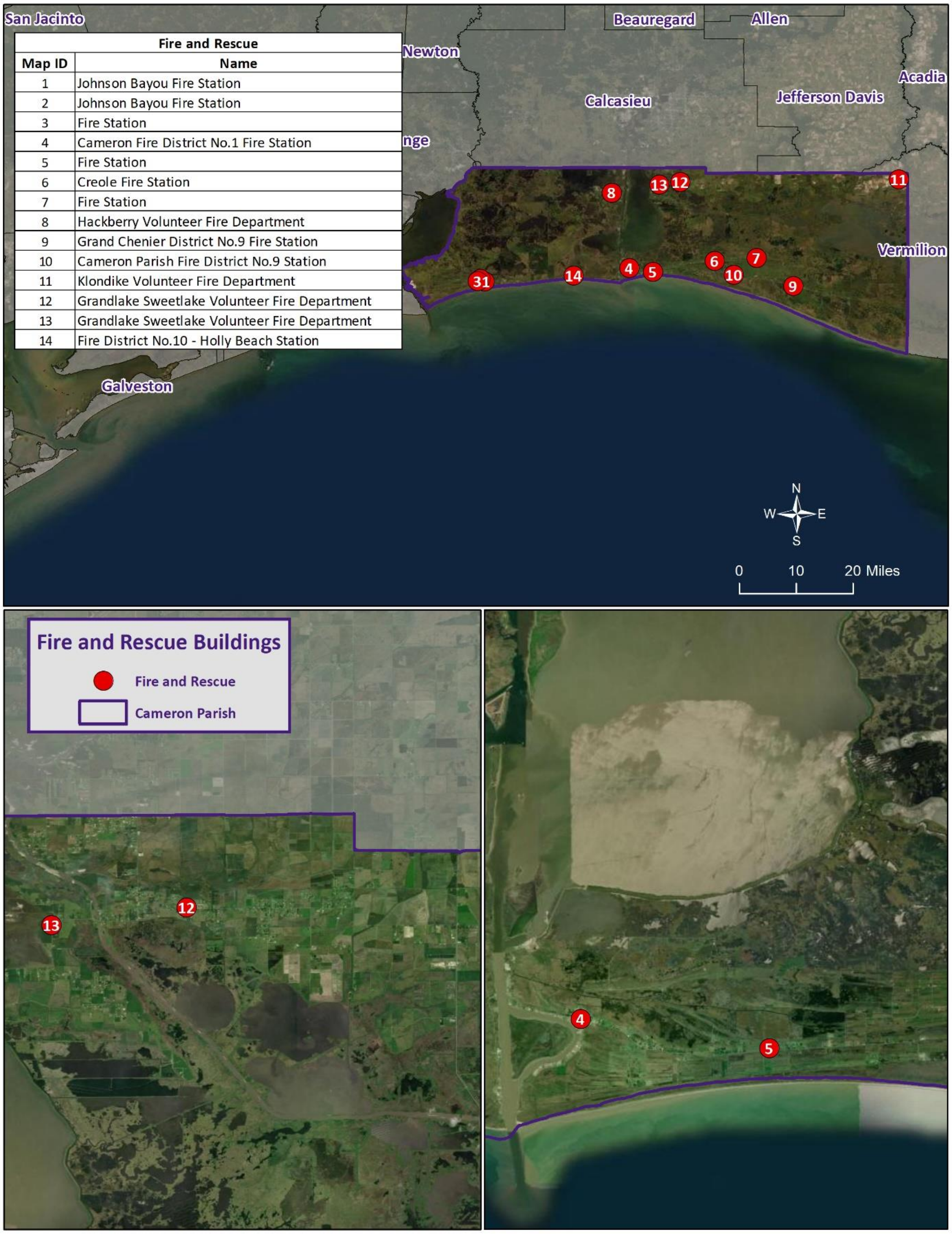
Within the entire planning area, there is an estimated value of $3,681,095,000 in structures throughout the parish. The table below provides the total estimated value for each type of structure by occupancy.

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

Occupancy	Cameron Parish
Agricultural	$2,949,000
Commercial	$117,899,000
Government	$8,404,000
Industrial	$56,247,000
Religion	$21,263,000
Residential	$667,821,000
Education	$4,104,000
Total	**$878,687,000**

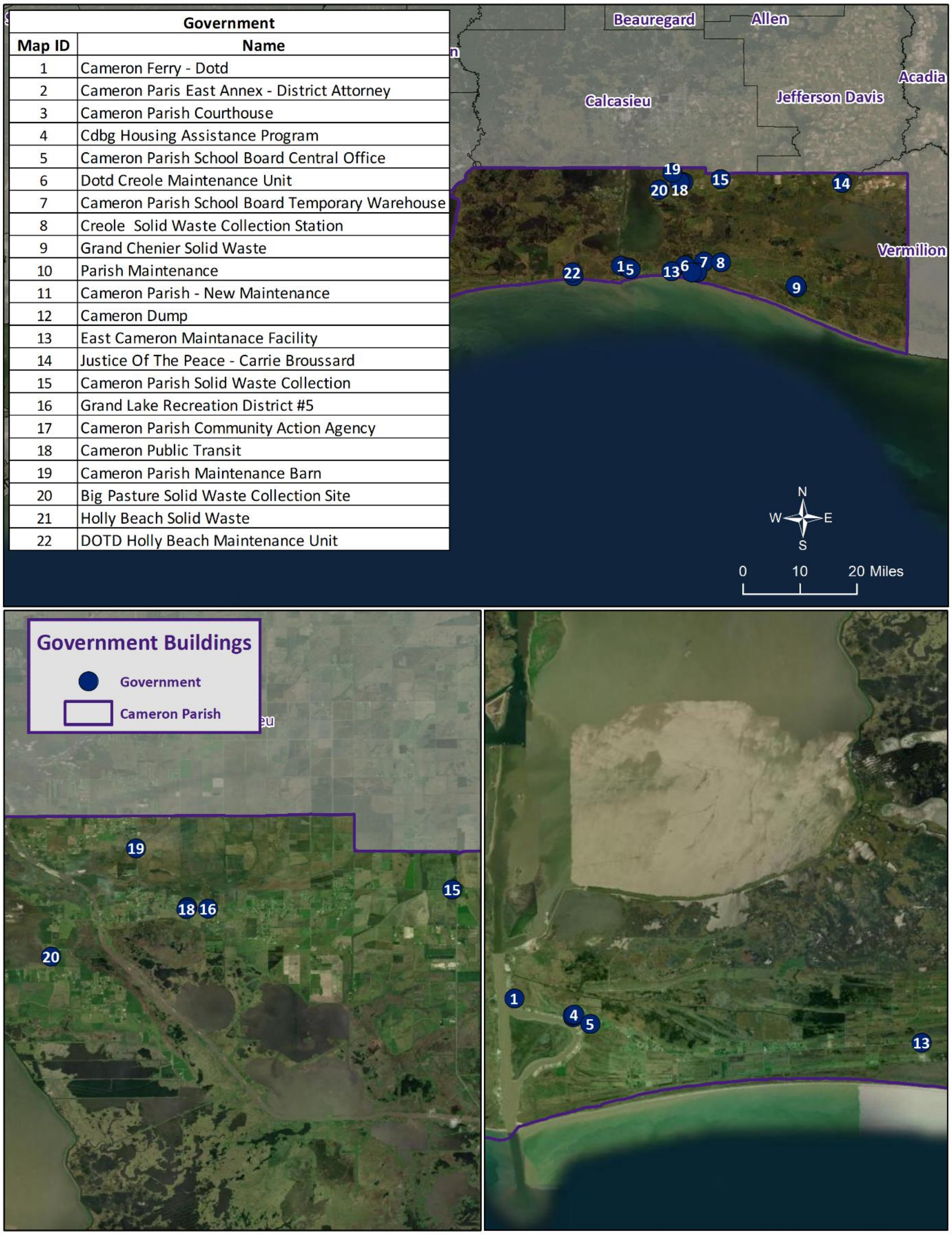
Essential Facilities of the Parish

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



Fire and Rescue	
Map ID	Name
1	Johnson Bayou Fire Station
2	Johnson Bayou Fire Station
3	Fire Station
4	Cameron Fire District No.1 Fire Station
5	Fire Station
6	Creole Fire Station
7	Fire Station
8	Hackberry Volunteer Fire Department
9	Grand Chenier District No.9 Fire Station
10	Cameron Parish Fire District No.9 Station
11	Klondike Volunteer Fire Department
12	Grandlake Sweetlake Volunteer Fire Department
13	Grandlake Sweetlake Volunteer Fire Department
14	Fire District No.10 - Holly Beach Station

Figure 2-1: Fire and Rescue Facilities in Cameron Parish.



Government	
Map ID	Name
1	Cameron Ferry - Dotd
2	Cameron Paris East Annex - District Attorney
3	Cameron Parish Courthouse
4	Cdbg Housing Assistance Program
5	Cameron Parish School Board Central Office
6	Dotd Creole Maintenance Unit
7	Cameron Parish School Board Temporary Warehouse
8	Creole Solid Waste Collection Station
9	Grand Chenier Solid Waste
10	Parish Maintenance
11	Cameron Parish - New Maintenance
12	Cameron Dump
13	East Cameron Maintanace Facility
14	Justice Of The Peace - Carrie Broussard
15	Cameron Parish Solid Waste Collection
16	Grand Lake Recreation District #5
17	Cameron Parish Community Action Agency
18	Cameron Public Transit
19	Cameron Parish Maintenance Barn
20	Big Pasture Solid Waste Collection Site
21	Holly Beach Solid Waste
22	DOTD Holly Beach Maintenance Unit

Figure 2-2: Government Buildings in Cameron Parish.

Figure 2-3: Law Enforcement and Correction Facilities in Cameron Parish.

Public Health	
Map ID	Name
1	South Cameron Hospital
2	South Cameron Memorial Hospital System Rural

Figure 2-4: Emergency Medical Services in Cameron Parish.

Education	
Map ID	Name
1	Johnson Bayou School
2	Hackberry High School
3	South Cameron School Sports Complex
4	South Cameron High School
5	Grand Lake School

Figure 2-5: School Facilities in Cameron Parish.

Future Development Trends

Cameron Parish experienced a decline in population and housing between the years of 2000 and 2010, decreasing from a population of 9,991 with 5,336 housing units in 2000 to a population of 6,839 with 3,593 housing units in 2010 after an extremely destructive hurricane event. Both population and housing units have started to rebound this past decade rising in population to 6,973 with 4,277 housing units in 2019. 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 2019:

Table 2-5: Population Growth Rate for Cameron Parish.

Total Population	Cameron Parish
1-Apr-00	9,991
1-Apr-10	6,839
1-Jul-19	6,973
Population Growth between 2000 – 2010	-31.5%
Average Annual Growth Rate between 2000 – 2010	-3.2%
Population Growth between 2010 – 2019	2.0%
Average Annual Growth Rate between 2010 – 2019	0.22%

Table 2-6: Housing Growth Rate for Cameron Parish.

Total Housing Units	Cameron Parish
1-Apr-00	5,336
1-Apr-10	3,593
1-Jul-19	4,277
Housing Growth between 2000 – 2010	-32.7%
Average Annual Growth Rate between 2000 – 2010	-3.3%
Housing Growth between 2010 – 2019	19.0%
Average Annual Growth Rate between 2010 – 2019	2.1%

Future Hazard Impacts

Hazard impacts were estimated for five years and ten years in the future (2025 and 2030). Yearly population and housing growth rates were applied to parish inventory assets for composite flood and tropical cyclones. Based on a review of available information, it is assumed that population and housing units will continue to grow within Cameron Parish from the present until 2028. 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%.

Table 2-7: Estimated Future Impacts, 2018-2030.
(Source: Hazus, US Census Bureau)

Hazard / Impact	Total in Parish (2018)	Hazard Area (2018)	Hazard Area (2025)	Hazard Area (2030)
Flood Damage				
Structures	4,277	3,824	3,850	3,870
Value of Structures	$878,687,000	$785,537,698.20	$849,292,176.34	$897,975,177
# of People	6,990	6,234	6,341	6,419
Tropical Cyclone				
Structures	4,277	4,277	4,307	4,329
Value of Structures	$878,687,000	$878,687,000	$950,001,503.76	$1,004,457,350
# of People	6,973	6,973	7,080	7,157

Population and housing numbers have continued to increase steadily since the last update to the Cameron Parish Hazard Mitigation Plan. However, initiatives such as active floodplain management have restricted the development of flood prone areas, particularly coastal flood zones, to continue supporting and encouraging safer communities within Cameron Parish. Strict enforcement of building codes for all new development is an additional step taken by the parish in its effort to decrease its vulnerability and increase the resiliency of the parish against natural hazards.

Land Use

The Cameron Parish Land Use table is provided on the below. Residential, commercial, and industrial areas account for only 1% of the parish's land use. Wetland areas is the largest category accounting for 656,089 acres (53%) of parish land. At 476,107 acres, water areas account for 39% of parish lands, while 82,329 acres of agricultural areas account for 7% of parish lands. The parish also consists of 4,472 acres of forested areas, accounting for less than 1% of all parish lands.

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

Land Use	Acres	Percentage
Agricultural Land, Cropland, and Pasture	82,329	7%
Wetlands	656,089	53%
Forest Land (Not including forested wetlands)	4,472	< 1%
Urban/Development	16,723	1%
Water	476,107	39%

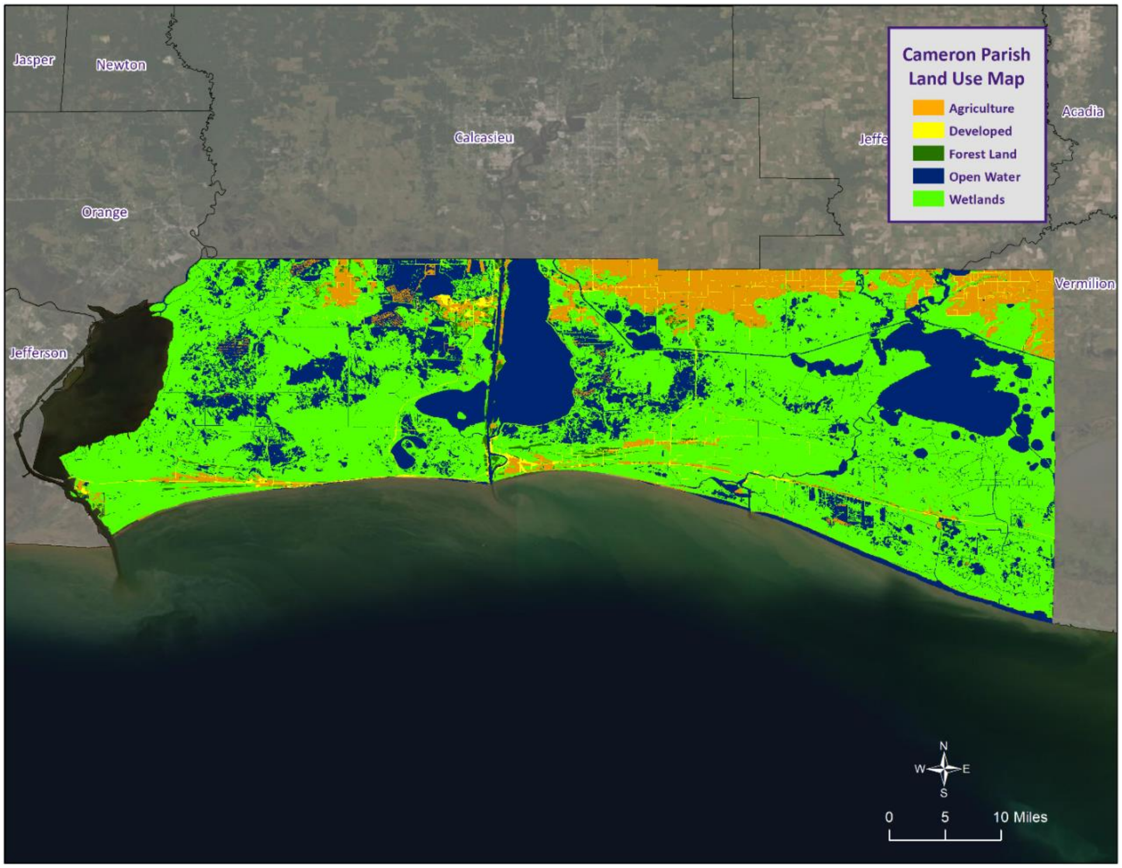


Figure 2-6: Cameron Parish Land Use Map.
(Source: USGS Land Use Map)

Assessing Vulnerability Overview

The purpose of assessing vulnerability is to quantify and/or qualify exposure and determine how various threats and hazards impact life, property, the environment, and critical operations in Cameron Parish. Vulnerability can be defined as the manifestation of the inherent states of the system (e.g., physical, technical, organizational, cultural) that can be exploited to adversely affect (cause harm or damage to) that system. For example, identifying areas in the parish that suffer disproportional damages from flooding compared with other areas, or overall exposure of an entire town to flooding. Identifying and understanding vulnerability to each threat and hazard provides a strong foundation for developing and pursuing mitigation actions.

The Vulnerability Assessment section for each hazard builds upon the information provided in the Risk Assessment by assessing the potential impact and amount of damage that each hazard has on the parish and each jurisdiction location. To complete the assessment, best available data were collected from a variety of sources, including local, state, and federal agencies, and multiple analyses were performed qualitatively and quantitatively. The estimates provided in the Vulnerability Assessment should be used to understand relative risk from each hazard and the potential losses that may be incurred; however, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning specific hazards and their effects on the built environment, as well as incomplete datasets from approximations and simplifications that are necessary to provide a meaningful and complete analysis. Further, most datasets used in this assessment contain relatively short periods of records, which increases the uncertainty of any statistically-based analysis.

Quantitative Methodology

The quantitative methodology consists of utilizing a detailed GIS-based approach informed through the development of comprehensive hazard and infrastructure databases. This data-centric approach forms the foundation for our quantitative vulnerability assessment. GIS technology allowed for the identification and analysis of potentially at-risk community assets such as people and infrastructure. This analysis was completed for hazards that can be spatially defined in a meaningful manner (i.e., hazards with an official and scientifically determined geographic extent) and
for which GIS data were readily available.

Qualitative Methodology

The qualitative assessment relies less on technology, but more on historical and anecdotal data regarding expected hazard impacts. The qualitative assessment completed for Cameron Parish is based on the Priority Risk Index (PRI). The purpose of the PRI is to prioritize all potential hazards, and then group them into three categories of high, moderate, or low risk to identify and prioritize mitigation opportunities. The PRI is a good practice to use when prioritizing hazards because it provides a standardized numerical value for hazards to be compared. PRI scores were calculated using five categories:

- Probability
- Impact
- Spatial Extent
- Warning Time
- Duration

Each degree of risk is assigned a value (1-4) and a weighting factor. To calculate the Risk Factor for a given hazard, the assigned risk value for each category is multiplied by the weighted factor, and the sum of all six categories is totaled together to determine the final Risk Factor. The highest possible Risk Factor is 4.0.

Risk Factor = [(Probability * 0.25) + (Impact * 0.25) + (Spatial Extent * 0.20) + (Warning Time *0.15) + (Duration * 0.15)]

Priority Risk Index and Hazard Risk

Hazard risk is determined by calculating the Risk Factor for each hazard impacting Cameron Parish. A summary of the PRI is found in the following table. The conclusions drawn from the qualitative and quantitative assessments are fitted into three categories based on High, Moderate, or Low designations. Hazards identified as high risk have risk factors of 2.5 or greater. Risk Factors ranging from 2.0 to 2.4 are deemed moderate risk hazards. Hazards with Risk Factors less than 2.0 are considered low risk.

Table 2-9: Summary of the Priority Risk Index.

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	25%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	25%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self-explanatory	1	15%
	12 to 24 hours	Self-explanatory	2	
	6 to 12 hours	Self-explanatory	3	
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	15%
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

Table 2-10: Associated Risk Factor with PRI Value Range.

Risk Factor	PRI Range
High Risk	2.5 to 4.0
Moderate Risk	2.0 to 2.4
Low Risk	0 to 1.9

Table 2-11: Risk Assessment for Cameron Parish.

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	Overall Risk
Coastal Hazards	4	2	4	1	3	**2.9**
Drought	2	4	4	1	4	**3.05**
Excessive Heat	1	1	4	1	2	**1.75**
Flooding	3	4	3	4	3	**3.4**
Sinkholes	1	2	2	4	1	**1.9**
Thunderstorms (Hail)	4	2	3	3	1	**2.7**
Thunderstorms (High Winds)	4	2	2	3	1	**2.5**
Thunderstorms (Lightning)	3	2	2	3	1	**2.25**
Tornadoes	4	3	2	4	3	**3.2**
Tropical Cyclones	3	4	4	1	4	**3.3**
Wildfires	1	3	3	4	4	**2.8**

Hazard Identification

Coastal Hazards/Subsidence

Coastal land loss is the loss of land (especially beach, shoreline, or dune material) by natural and/or human influences. Coastal land loss occurs through various means, including erosion, subsidence (the sinking of land over time as a result of natural and/or human-caused actions), saltwater intrusion, coastal storms, littoral drift, changing currents, manmade canals, rates of accretion, and sea level rise. The effects of these processes are difficult to differentiate because of their complexity and because they often occur simultaneously, with one influencing each of the others.

Some of the worst recent contributors to coastal land loss in the state are the tropical cyclones of the past decade. Two storms that stand out in this regard are Hurricanes Katrina and Rita. These powerful cyclones completely covered large tracts of land in a very brief period, permanently altering the landscape. The disastrous legacy of these storms concentrated already ongoing efforts to combat coastal land loss. Consistent with the 2014 State Hazard Mitigation Plan Update, coastal land loss is considered in terms of two of the most dominant factors: sea level rise and subsidence.

Sea level rise and subsidence impact Louisiana in a similar manner—again making it difficult to separate impacts. Together, rising sea level and subsidence—known together as relative sea level rise—can accelerate coastal erosion and wetland loss, exacerbate flooding, and increase the extent and frequency of storm impacts. According to NOAA, global sea level rise refers to the upward trend currently observed in the average global sea level. Local sea level rise is the level that the sea rises relative to a specific location (or, benchmark) at the coastline. The most prominent causes of sea level rise are thermal expansion, tectonic actions (such as sea floor spreading), and the melting of the Earth's glacial ice caps.
The current U.S. Environmental Protection Agency (EPA) estimate of global sea level rise is 10–12 in. per century, while future sea level rise could be within the range of 1–4 ft. by 2100. According to the U.S. Geological Survey (USGS), the Mississippi Delta plain is subject to the highest rate of relative sea level rise of any region in the nation largely due to rapid geologic subsidence.

Subsidence results from a number of factors including:

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

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

Overall, subsidence creates three distinct problems in Louisiana:

- By lowering elevations in coastal Louisiana, subsidence accelerates the effects of saltwater intrusion and other factors that contribute to land loss.
- By lowering elevations, subsidence may make structures more vulnerable to flooding.
- By destabilizing elevations, subsidence undermines the accuracy of surveying benchmarks (including those affecting levee heights, coastal restoration programs, surge modeling, BFEs, and other engineering inputs), which can contribute to additional flooding problems if construction occurs at lower elevations than anticipated or planned.

Saltwater intrusion is one of the major causes of subsidence and marshland loss. Saltwater intrusion refers to the movement of saltwater into freshwater aquifers, or to the encroachment of saline water into freshwater estuaries. This intrusion flows into streams discharging into the Gulf of Mexico as well as the marsh areas, subsequently into freshwater streams. Intrusion of saltwater causes the loss of fresh and intermediate vegetation, which results in rapid erosion of marsh soils and the ultimate conversion of the area to open water.

Location

Historic areas of coastal land loss and gain (*Figure 2-7*) and subsidence rates (*Figure 2-8)* have been quantified for Cameron Parish using data from the U.S. Geologic Survey and Louisiana Coastal Protection and Restoration Authority (CPRA). Since 1932, the average annual land loss in Louisiana is 35 mi^2, while the average annual land gain has been 3 mi^2 for a net loss of 32 mi^2 per year. Land loss is primarily occurring throughout the entire area of Cameron Parish. Portions of the Mississippi River Gulf Outlet Canal area of eastern and western shores of Calcasieu Lake as well as the southeastern portion of the coastline along the Gulf of Mexico in Cameron Parish (*Figure 2-7*). Additionally, subsidence is occurring in the majority of the parish (*Figure 2-8*).

Previous Occurrences / Extent

Coastal land loss is an ongoing process, including discrete (hurricanes) and continuous (subsidence, sea level rise) processes. While historic flood loss data undoubtedly include the effects of coastal land loss, specific previous occurrences have not been identified as a source of direct disaster damage in Louisiana. Rather, the effects of the underlying flood or hurricane storm surge hazard are recorded. Land loss is a significant hazard, however, and assessment of the added flood impacts caused by land loss is quantified in the following sections. The southwestern portion of Cameron Parish can expect to experience subsidence rates of approximately 35 mm annually while the remainder of the parish can expect subsidence rates of approximately 10 mm annually.

Frequency / Probability

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

Table 2-12: Annual Probability of Coastal Land Loss in Cameron Parish.

Coastal Land Loss Probability Cameron Parish
100%

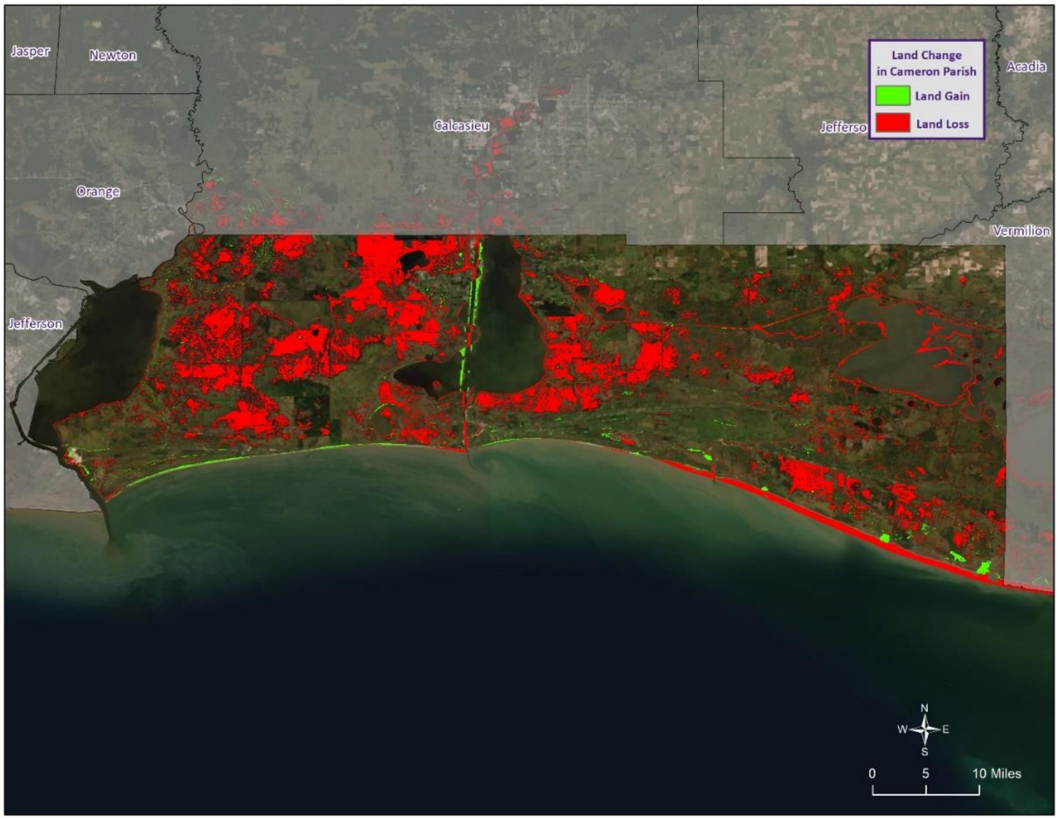


Figure 2-7: Historical Areas of Land Loss and Gain between 1932 and 2010.
(Source: State of Louisiana Hazard Mitigation Plan)

Figure 2-8: Maximum Annual Subsidence Rates Based on Subsidence Zones in Coastal Louisiana.
(Source: State of Louisiana Hazard Mitigation Plan)

Estimated Potential Loses

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

There are many global sea level rise scenarios from which to select; however, within a 10-year timeframe, methods that predict accelerating sea level rise rates do not deviate significantly from straight line methods. Therefore, a linear sea level rise projection for the sea level rise occurring in 10 years (SLR2024) using a linear global sea level rise rate of 3.1 mm/year was used (IPCC, 2007), which is also in accordance with the CPRA Coastal Master Plan. This resulted in an increase of 0.1 feet, which was applied to the NOAA MOM storm surge elevation results over the model output domain.

$$SLR_{2024} = 0.0031 \frac{m}{year} x\ 10\ years$$
$$SLR_{2024} = 0.031\ meters = 0.10\ ft\ in\ 2024$$

To estimate the effects of subsidence, the elevation profile for southern Louisiana was separated into sections based on subsidence zones. The 20th percentile values for subsidence were used, in accordance with the CPRA Master Plan, and subtracted from the digital elevation model (DEM) for each zone and re-joined to create a final subsided ground elevation layer.

To perform the economic loss assessment, depth grids were created for current conditions (SLOSH MOM Results – Current Land Elevation) and for projected 2024 conditions ([SLOSH MOM Results + 0.1 ft sea level rise] – [Current Land Elevation – Subsidence]). Hazus was used to calculate economic loss for the current and future depth grids.

Figure 2-9 shows the projected increase in total flood loss resulting from a SLOSH Category 1 MOM in the year 2014, with many areas expecting increase in losses. Some areas that would be currently unaffected by a SLOSH Category 1 MOM would be impacted in ten years based on subsidence and sea level rise projections (*Figure 2-10*).

To determine annual potential loss estimates for coastal land loss, increased exposure estimates over the next 10 years calculated using Hazus were annualized at the parish level (*Figure 2-11*). To provide an annual estimated potential loss per jurisdiction, the total loss for the census block groups within each jurisdiction were calculated. Based on hazard exposure, *Table 2-13* provides an estimate of annual potential losses for Cameron Parish.

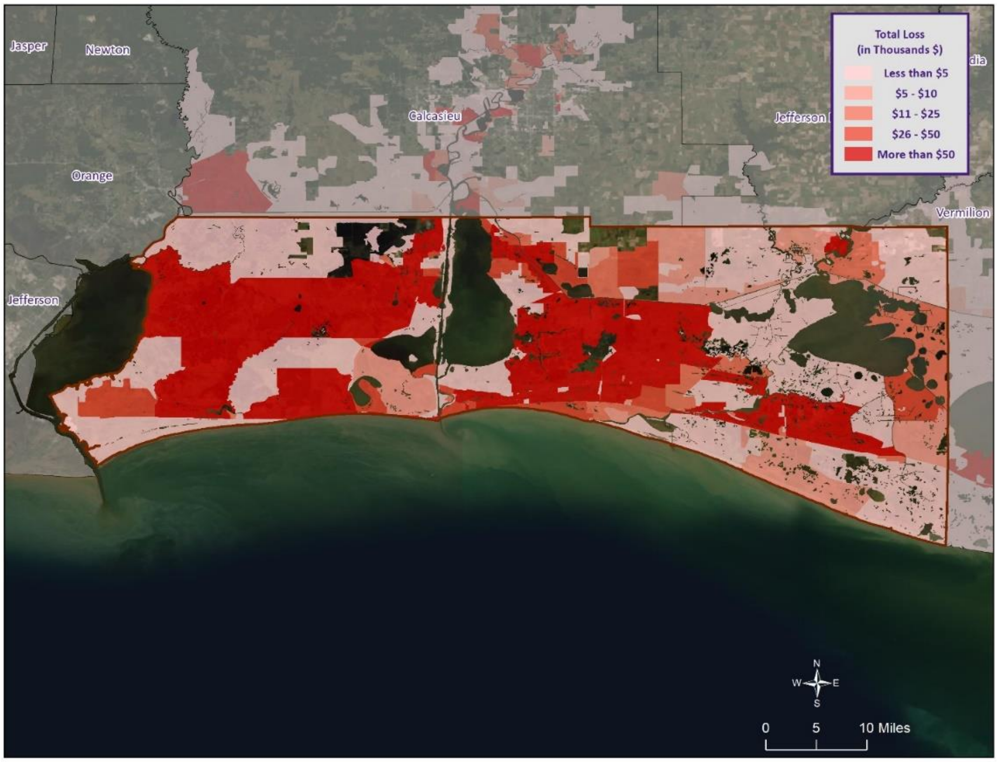


Figure 2-9: Increase in Total Loss Estimates in 2024 by Census Block Group Based on the Hazus Flood Model and NOAA SLOSH Model.
(Source: State of Louisiana Hazard Mitigation Plan)

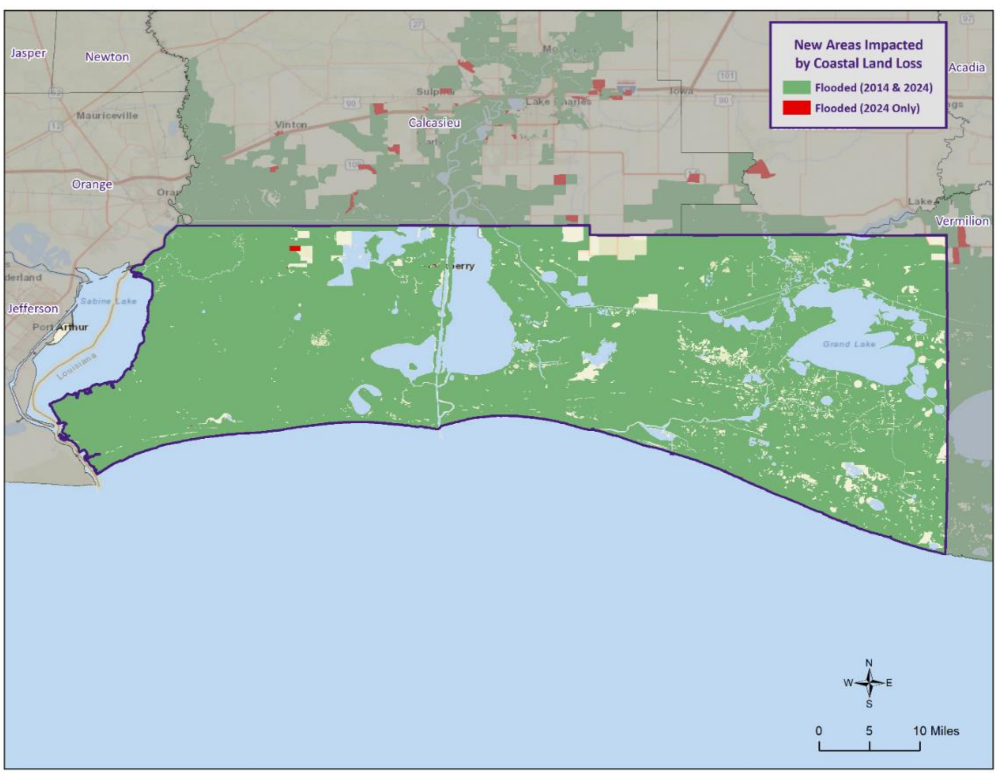


Figure 2-10: Census Block Groups not Currently Impacted by Category 1 Hurricane Storm Surge but Expected to be Impacted in 2024 are Shown in Red.
(Source: State of Louisiana Hazard Mitigation Plan)

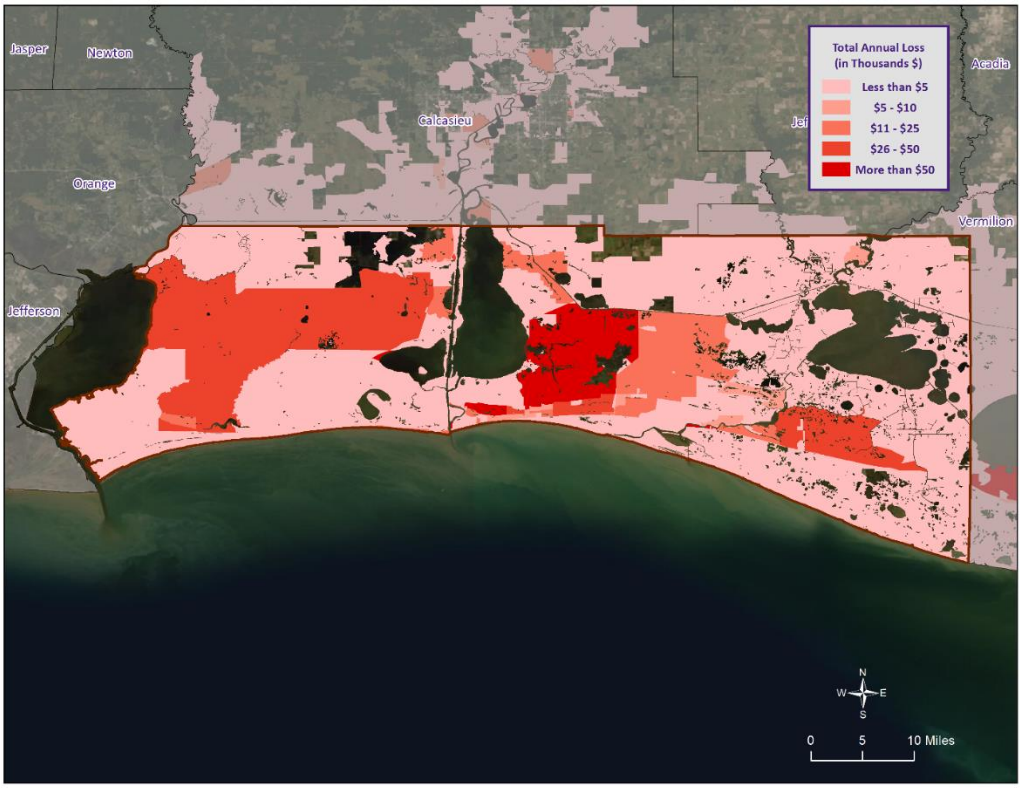


Figure 2-11: Estimated Annual Losses for Coastal Land Loss by Census Block Group.

The following table shows the current and future exposure potential based on the Hazus inventory database.

Table 2-13: Estimated Annual Losses for Coastal Land Loss in Cameron Parish. (Source: Hazus)

Coastal Land Loss Estimated Annual Potential Losses
$1,379,000

Threat to People

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

Table 2-14: Number of People Susceptible to Coastal Land Loss in Cameron Parish.

Number of People Exposed to Hurricane Hazards			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Cameron Parish	6,839	5,110	75%

The Hazus hurricane model was used to identify populations vulnerable to coastal land loss throughout the jurisdiction in the table below:

Table 2-15: Population Vulnerable to Coastal Land Loss in Cameron Parish.

Cameron Parish		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	5,110	74.7%
Persons Under 5 years	299	5.9%
Persons Under 18 years	939	18.4%
Persons 65 Years and Over	658	12.9%
White	4,891	95.7%
Minority	219	4.3%

Vulnerability

See Appendix C for parish and municipality buildings that are susceptible to coastal land loss and subsidence.

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. And drought can occur anywhere, triggered by changes in the local-to-regional-scale atmospheric circulation over an area, or by broader-scale circulation variations such as the expansion of semi-permanent oceanic high-pressure systems or the stalling of an upper-level atmospheric ridge in place over a region. The severity of a drought depends upon the degree and duration of moisture deficiency, as well as the size of the affected area. Periods of drought also tend to be associated with other hazards, such as wildfires and/or heat waves. Lastly, drought is a slow onset event, causing less direct—but tremendous indirect—damage. Depletion of aquifers, crop loss, and livestock and wildlife mortality rates are examples of direct impacts. Since the groundwater found in aquifers is the source of about 38% of all county and city water supplied to households (and comprises 97% of the water for all rural populations that are not already supplied by cities and counties), droughts can potentially have direct, disastrous effects on human populations. The indirect consequences of drought, such as unemployment, reduced tax revenues, increased food prices, reduced outdoor recreation opportunities, higher energy costs as water levels in reservoirs decrease and consumption increases, and water rationing, are not often fully known. This complex web of impacts causes drought to affect people and economies well beyond the area physically experiencing the drought.

This hazard is often measured using the Palmer Drought Severity Index (PDSI, also known operationally as the Palmer Drought Index). The PDSI, first developed by Wayne Palmer in a 1965 paper for the U.S. Weather Bureau, measures drought through recent precipitation and temperature data with regard to a basic supply-and-demand model of soil moisture. It is most effective in long-term calculations. Three other indices used to measure drought are the Palmer Hydrologic Drought Index (PHDI), the Crop Moisture Index (CMI), which is derived from the PDSI, and the Keetch-Byram Drought Index (KBDI), created by John Keetch and George Byram in 1968 for the U.S. Forest Service. The KBDI is used mainly for predicting the likelihood of wildfire outbreaks. As a compromise, the PDSI is used most often for droughts since it is a medium-response drought indicator. The objective of the PDSI is to provide measurements of moisture conditions that are standardized so that comparisons using the index can be made between locations and between months. *Table 2-16* displays the range and Palmer classifications of the PDSI index while *Figure 2-12* displays the current drought monitor for the state of Louisiana and its parishes.

Table 2-16: Palmer Drought Severity Index Classification and Range

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

The PDSI best measures the duration and intensity of drought-inducing circulation patterns at a somewhat long-term time scale, although not as long-term as the PHDI. Long-term drought is cumulative, so the intensity of drought during the current month is dependent on the current weather patterns in addition to the effects of cumulative patterns of previous months. Although weather patterns can change almost overnight from a long-term drought pattern to a long-term wet pattern, as a medium-response indicator, the PDSI responds relatively rapidly. Data compiled by the National Drought Mitigation Center indicates normal conditions currently exists within Cameron Parish.

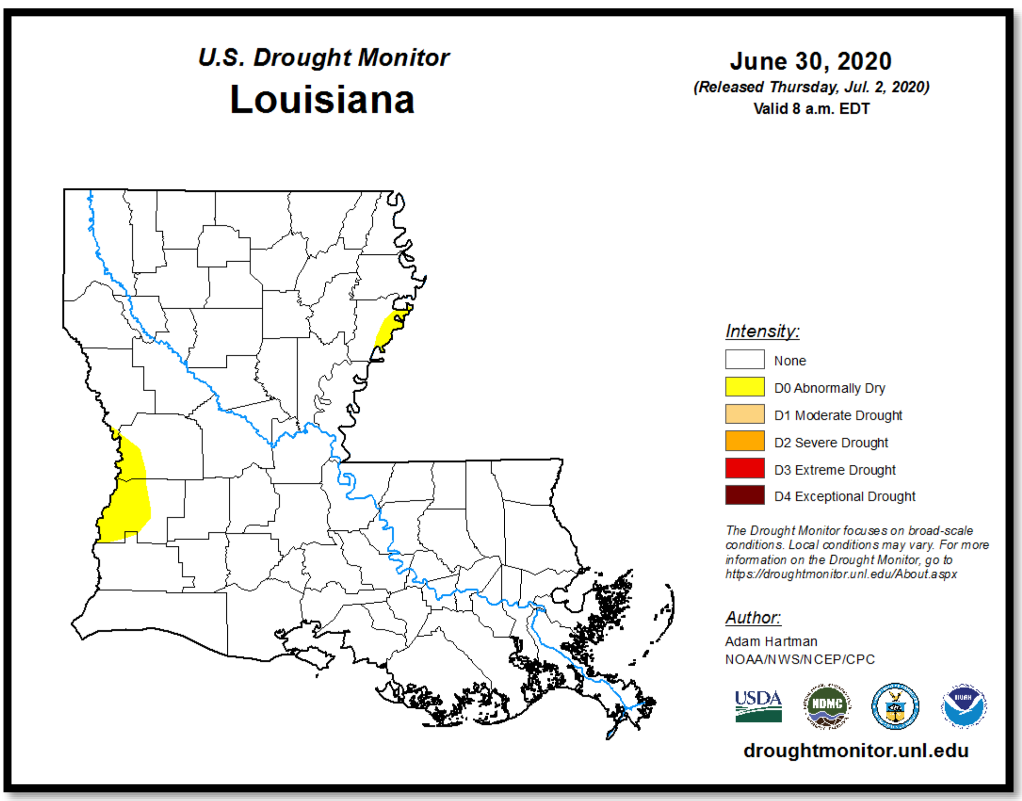


Figure 2-12: United States Drought Monitor for the State of Louisiana and its Parishes. (Source: The National Drought Mitigation Center)

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 Cameron Parish is on the agricultural community. The worst-case drought scenario for Cameron Parish would be a severe drought (D2).

Previous Occurrences / Extent

Historically, there have been two drought incidents in Cameron Parish. Drought events have ranged from Mild to Moderate per the National Climatic Data Center. Since the last update, there has been no drought event within the boundaries of Cameron Parish.

Frequency / Probability

Based on two drought events since 1989, the annual chance of occurrence of a drought event occurring within a given year is calculated at 7% for Cameron Parish.

Estimated Potential Loses

According to the NCEI Storm Events Database, there have been two drought events which have impacted Cameron Parish which resulted in limited to no damage to crops in the parish. When examining the drought hazard, the main impact will primarily be on the crops. The following table presents an analysis of agricultural exposure which are susceptible to droughts by type for Cameron Parish.

Table 2-17: Agricultural Exposure by Crop Type for Droughts in Cameron Parish.
(Source: LSU AG Center 2018 Parish Totals)

Agricultural Exposure by Type for Drought			
Forestry	Rice	Soybeans	Hay
$47,910	$14,111,036	$1,721,900	$1,122,956

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

Vulnerability

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

Excessive 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 *Figure 2-13* and *Table 2-18* 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, and that strong winds of hot, dry air can be extremely hazardous.

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

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

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution   Extreme Caution   Danger   Extreme Danger

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

Table 2-18: 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

Excessive heat typically impacts a region and not one specific parish or jurisdiction. Because excessive heat is a climatological bases hazard, it has the same probability of occurring in Cameron Parish as all of the adjacent parishes. The entire planning area of Cameron Parish is equally at risk for excessive heat. Based on historical data, the worst-case scenario for Cameron Parish involving excessive heat would be a high risk level on the HI scale with temperatures ranging from 103°F to 115°F.

Previous Occurrences / Extent

Per the NCEI Storm Events Database, there have been no occurrence of excessive heat events in Cameron Parish since 1989.

Frequency / Probability

Based on historical data, the annual chance of occurrence of an excessive heat event occurring within a given year is calculated at less than 1% for Cameron Parish.

Estimated Potential Loses

According to the NCEI Storm Events Database, there have been no excessive heat events which have impacted Cameron Parish which has resulted in no injuries, deaths, or crop damage.

Vulnerability

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

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.

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

Based on stream gauge levels and precipitation forecasts, the National Weather Service (NWS) posts flood statements, watches, and warnings. The NWS issues the following weather statements with regard to 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 change 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 change over time. Finally, it is important to note that each flood event is unique. Two hypothetical events at the same location, given the same magnitude of stream flow, may still produce substantially different impacts if there were different antecedent moisture characteristics, different times of 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 2-14*.

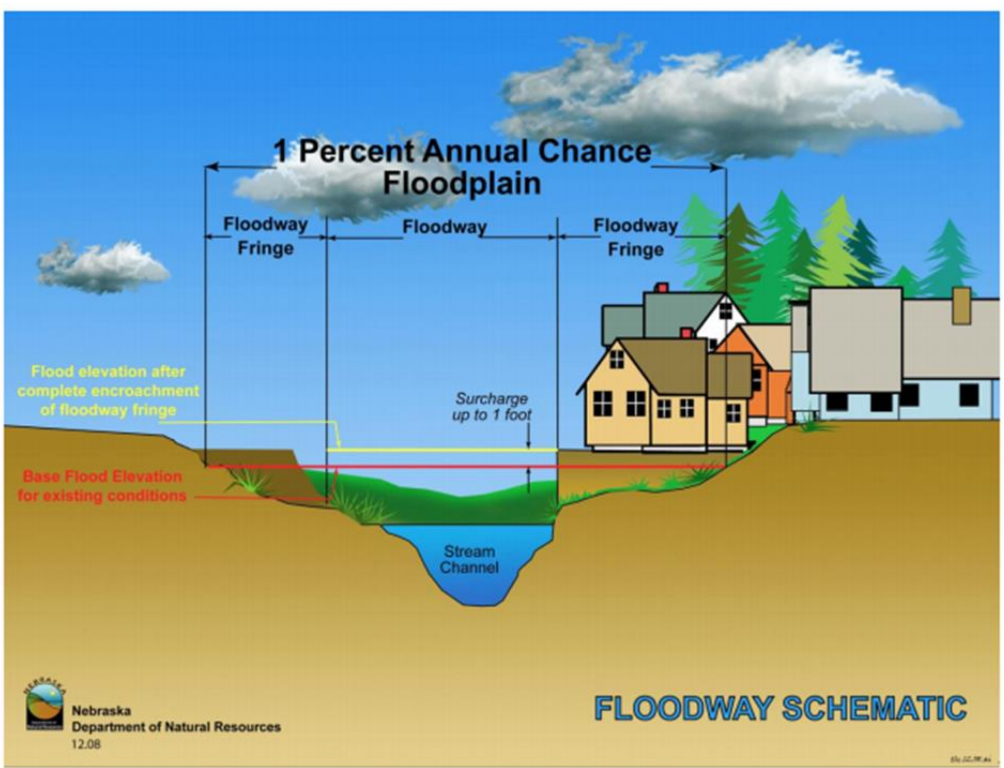


Figure 2-14: Schematic of 100-year Floodplain. The Special Flood Hazard Area (SFHA) extends to the end of the floodway fringe.
(Source: Nebraska Department of Natural Resources)

A SFHA is the land area covered by the floodwaters of the base flood (red line in *Figure 2-14*), 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 usually are not salvageable. Electrical appliances and gasoline engines will flood, making them worthless until they are professionally dried and cleaned.

Many buildings that have succumbed to flood waters may look sound and unharmed after a flood, but water has the potential to cause 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 Cameron Parish are provided in the table below:

Table 2-19: Repetitive Loss Structures for Cameron Parish.

Jurisdiction	Number of Structures	Residential	Commercial	Government	Total Claims	Total Claims Paid	Average Claim Paid
Cameron Parish	442	411	25	6	957	$64,313,620	$67,203

Off the 442 repetitive loss structures, 434 were geocoded in order to provide an overview of where the repetitive loss structures are located throughout the parish. *Figure 2-15* shows the approximate location of the structures, while *Figure 2-16* shows where the highest concentration of repetitive loss structures are located. Through the repetitive loss map, it is clear the primary concentrated area of repetitive loss structures is focused around the unincorporated area of Hackberry along the western shoreline of Calcasieu Lake and along the southern coast near the unincorporated area of Cameron in close proximity to the Gulf of Mexico.

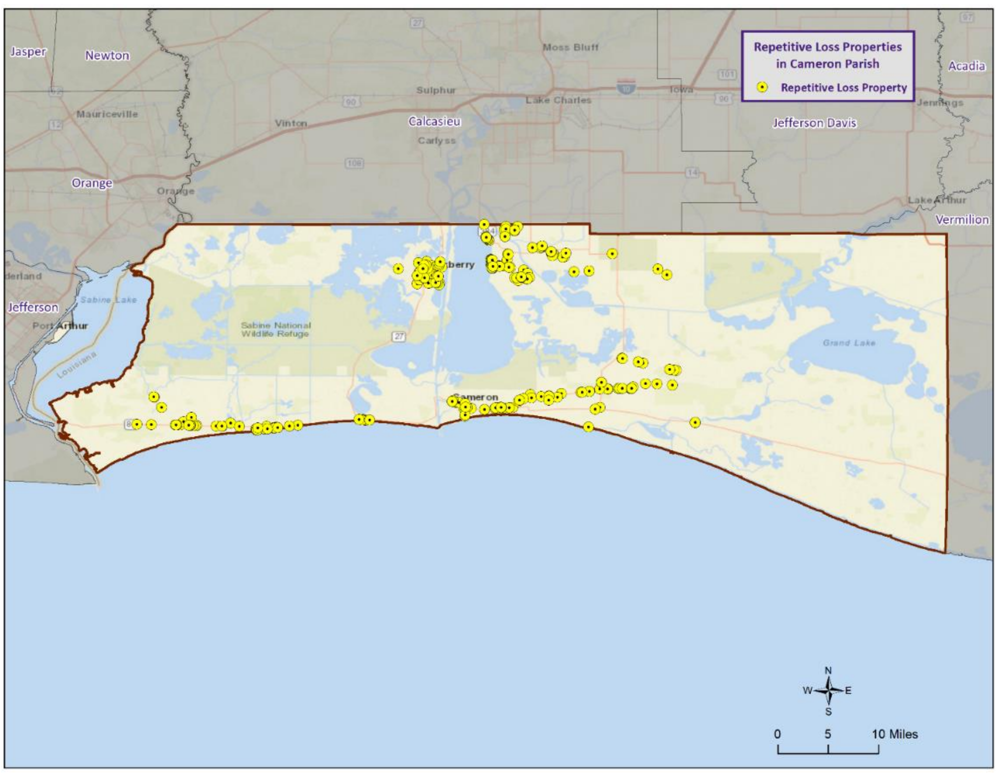


Figure 2-15: Repetitive Loss Properties in Cameron Parish.

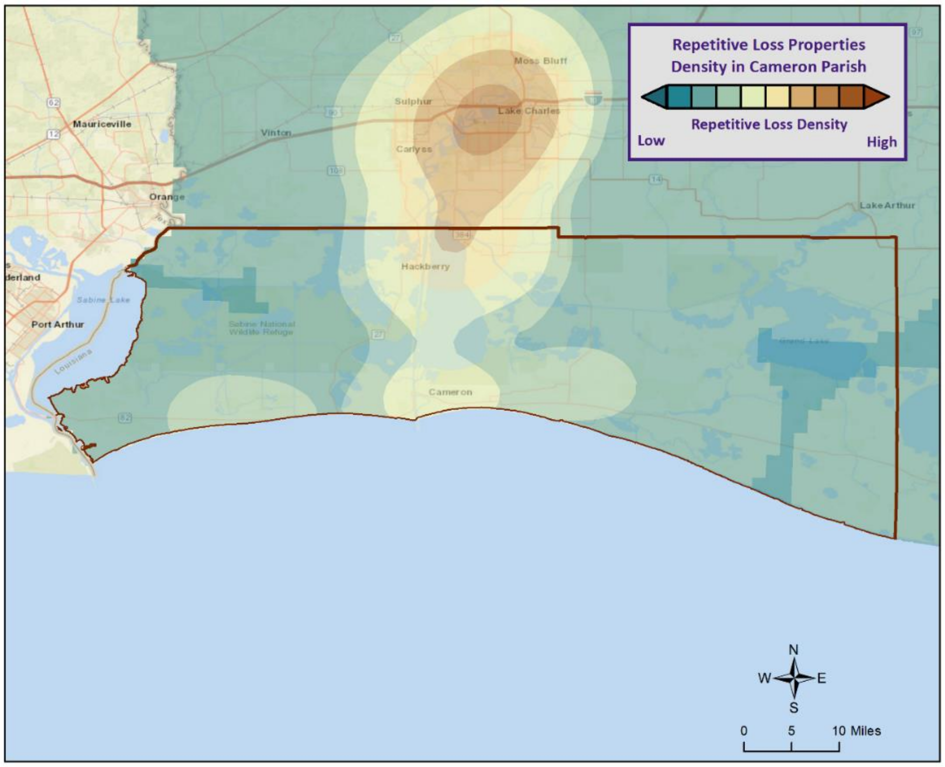


Figure 2-16: Repetitive Loss Property Densities in Cameron Parish.

National Flood Insurance Program

Flood insurance statistics indicate that Cameron Parish has 1,584 flood insurance policies with the NFIP, with total annual premiums of $1,966,454. Cameron Parish participates in the NFIP. Cameron Parish 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 Cameron Parish is provided in the tables to follow.

Table 2-20: Summary of NFIP Policies for Cameron Parish.

Location	No. of Insured Structures	Total Insurance Coverage Value	Annual Premiums Paid
Cameron Parish	1,584	$382,031,700	$1,966,454

Table 2-21: Summary of Community Flood Maps for Cameron Parish.

CID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Date Joined the NFIP	Tribal
225194#	Cameron Parish	9/1/1970	9/4/1970	11/16/2012	9/4/1970	No

According to the Community Rating System (CRS) list of eligible communities dated October 1, 2019, Cameron Parish does not participate in the CRS program.

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 floods 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 Cameron 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 Cameron Parish experiences.

Flash Floods: Flash floods are characterized by a rapid rise in water level, high velocity, and large amounts of debris. They are 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, by definition, is river-based. Most of the riverine flooding problems occur when a river crests at flood stage levels, causing extensive flooding in low-lying areas.

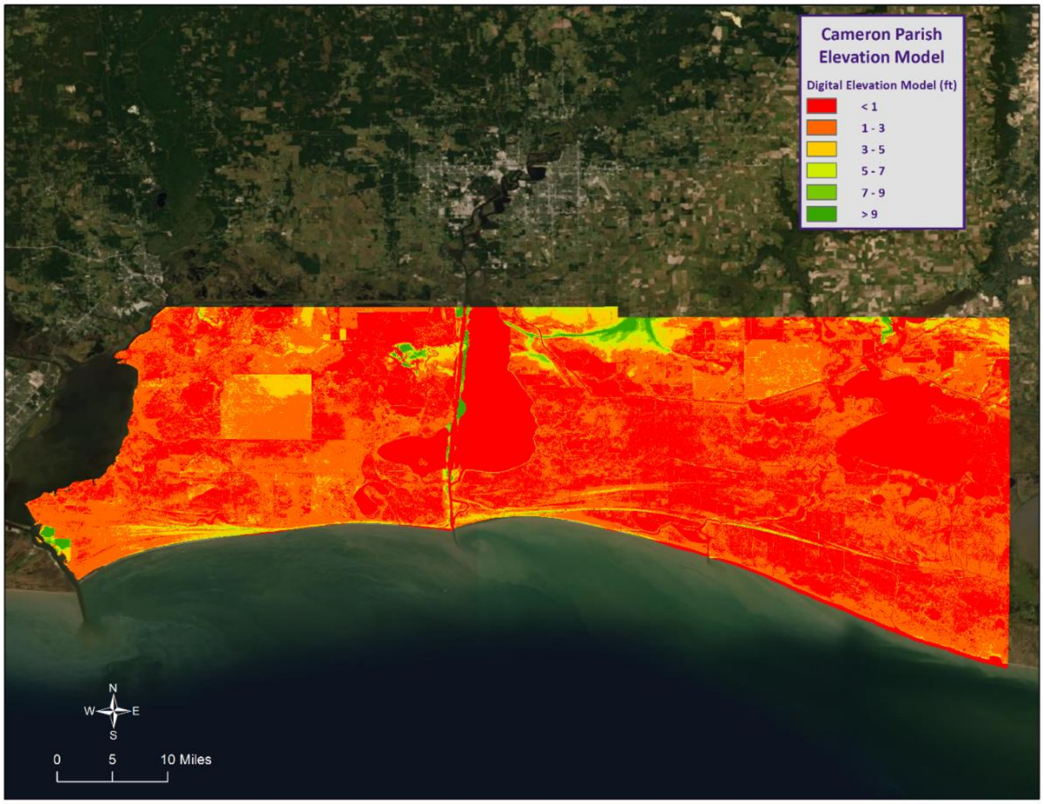


Figure 2-17: Elevation throughout Cameron Parish.

The digital elevation model (DEM) in the figure above for Cameron Parish is instructive in visualizing where the low-lying and high risk areas are for the parish. Elevations in Cameron Parish are extremely lower than those of the surrounding parishes such as Vermilion Parish. The highest elevations in the parish are approximately 9 feet. These higher elevations are sporadically located throughout the parish with the majority of these areas located in the northern portion of the parish.

Location

Cameron parish has experienced significant flooding in its history and can expect more in the future. Cameron Parish is located along the eastern portion of the Sabine River Basin which make the parish susceptible to riverine flooding. The Sabine River is formed by three tributaries which begin in Collin County and Hunt County in northeast Texas, and it becomes the boundary between Texas and Louisiana near Logansport, Louisiana. Cameron Parish is also susceptible to storm surge in the southern areas of the parish from the Gulf of Mexico. The worst-case scenarios for Cameron Parish are flood depths of approximately 18 feet.

The following is a flood zone map displaying 100- and 500-year flood zones for Cameron Parish:

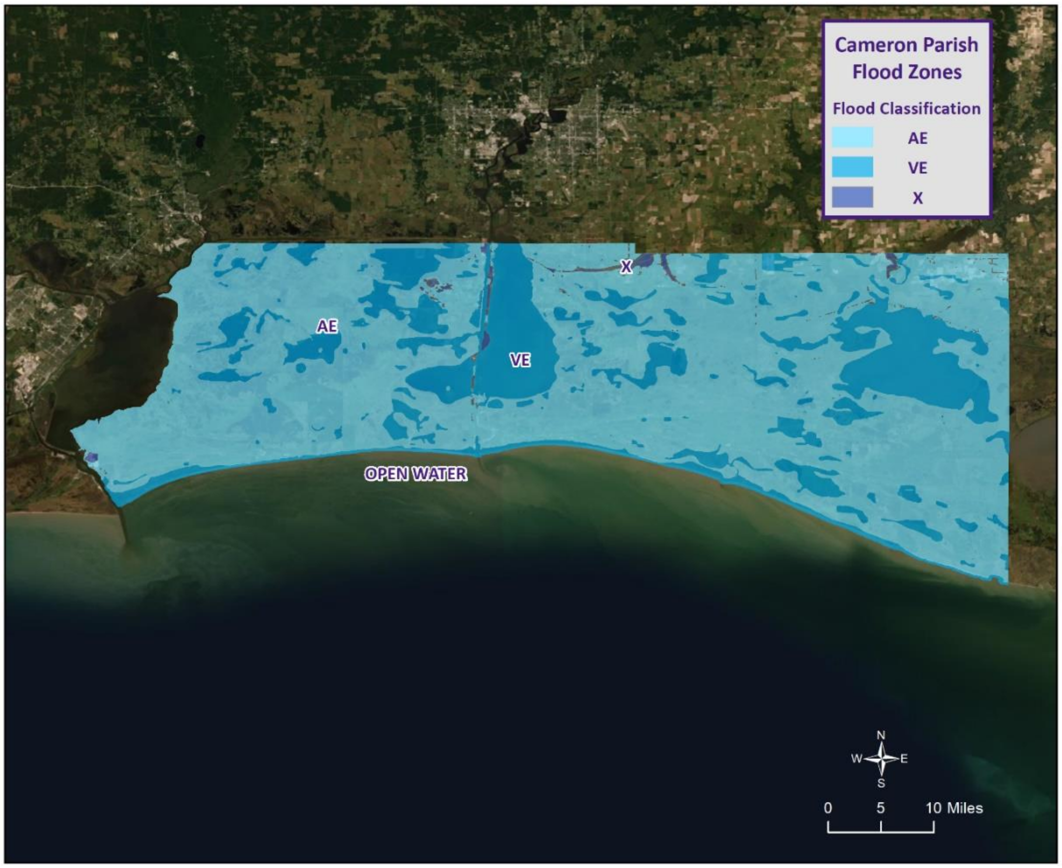


Figure 2-18: Cameron Parish Areas within Flood Zones.

Previous Occurrences / Extents

Historically, there have been 9 flooding events that have caused significant flooding in Cameron Parish between 1989 and 2019. Below is a brief synopsis of the flooding evet which occurred since the last Cameron Parish HMP Update in 2015.

Table 2-22: Historical Floods in Cameron Parish with Locations since the 2015 Cameron Parish HMP Update.

Date	Extents	Type of Flooding	Estimated Damages	Location
August 14, 2016	Heavy rain over the northern sections of the Mermentau River Valley gradually worked to Cameron Parish and the coast. The river crested during the afternoon of the 18th on the northeast side of Cameron Parish and dropped through the remainder of the month. Most of the impacts across the area were flooded roadways and marshland, however 47 structures still flooded.	Flood	$25,000,000	GRAND CHENIER

Date	Extents	Type of Flooding	Estimated Damages	Location
August 30, 2017	Western sections of Cameron Parish received 20 to 40 inches of rain from Tropical Storm Harvey. While some secondary roads had minor flooding from rain and storm surge flooding was worse in early September when the flood wave from the Neches and Sabine passed through Sabine Lake. Some temporary workers had camper trailers flood during the event.	Flash Flood	$50,00	SABINE LAKE
September 1, 2017	Water covered most secondary roads in southwest Cameron Parish as flood water from Harvey drained toward the gulf. Water depth in some locations was around waist deep and kept residents away from their homes during the first week of September. Shallow water also covered portions of highway 82 near Holly Beach and between Johnson Bayou and Port Arthur.	Flood	$0	SABINE LAKE
September 19, 2019	Tide along the coast ran 1 to 2 feet above normal during Imelda filling the marshes of Southwest Cameron Parish. Heavy rain from Imelda produced around 1 foot accumulation around Johnson Bayou flooding most secondary roads and making some impassable since rain water could not flow off as fast with the higher tides.	Flash Flood	$0	JOHNSON BAYOU

Frequency / Probability

The NCEI Storm Events Database identified nine flooding events within the Cameron Parish planning area since 1989. The table below shows the probability and return frequency for Cameron Parish.

Table 2-23: Annual Flood Probabilities for Cameron Parish.

Jurisdiction	Annual Probability	Return Frequency
Cameron Parish	30%	1 event every 2 to 3 years

Based on historical record, the overall flooding probability for the entire Cameron Parish Planning area is 30% with 9 events occurring over a 30-year period.

Estimated Potential Losses

Using the Hazus Flood Model, the 100-year flood scenario, along with the Parish DFIRM, was analyzed to determine losses from this worst-case scenario. *Table 2-32* shows the total economic losses that would result from this occurrence.

Table 2-24: Estimated Losses in Cameron Parish from a 100-year Flood Event. (Source: Hazus)

Jurisdiction	Estimated Total Losses from 100-Year Flood Event
Cameron Parish	$744,672,000

The Hazus Flood model also provides a breakdown for seven primary sectors (Hazus occupancy) throughout the parish. The losses for Cameron Parish by sector are listed in the following table:

Table 2-25: Estimated 100-year Flood Losses for Cameron Parish by Sector. (Source: Hazus)

Cameron Parish	Estimated Total Losses from 100-Year Flood Event
Agricultural	$1,911,000
Commercial	$101,431,000
Government	$5,145,000
Industrial	$33,910,000
Religious / Non-Profit	$12,471,000
Residential	$551,610,000
Schools	$38,194,000
Total	**$744,672,000**

Threat to People

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

Table 2-26: Vulnerable Populations Susceptible to a 100-year Flood Event. (Source: Hazus)

Number of People Exposed to Flood Hazards			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Cameron Parish	6,839	6,114	89.4%

The Hazus flood model was also extrapolated to provide an overview of vulnerable populations throughout Cameron Parish in the following table:

Table 2-27: Vulnerable Populations Susceptible to a 100-year Flood Event in Cameron Parish. (Source: Hazus)

Cameron Parish		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	6,114	89.4%
Persons Under 5 Years	358	5.9%
Persons Under 18 Years	1,123	18.4%
Persons 65 Years and Over	787	12.9%
White	5,852	95.7%
Minority	262	4.3%

Vulnerability

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

Sinkholes

Sinkholes are areas of ground—varying in size from a few square feet to hundreds of acres, and reaching in depth from 1 to more than 100 ft.—with no natural external surface drainage. Sinkholes are usually found in karst terrain—that is, areas where limestone, carbonate rock, salt beds, and other water-soluble rocks lie below the Earth's surface. Karst terrain is marked by the presence of other uncommon geologic features such as springs, caves, and dry streambeds that lose water into the ground. In general, sinkholes form gradually (in the case of cover subsidence sinkholes), but they can also occur suddenly (in the case of cover-collapse sinkholes).

Sinkhole formation is a very simple process. Whenever water is absorbed through soil, encounters water-soluble bedrock, and then begins to dissolve it, sinkholes start to form. The karst rock dissolves along cracks; as the fissures grow, soil and other particles fill the gaps, loosening the soil above the bedrock. Figure 1 illustrates the development of a cover subsidence sinkhole. As the soil sinks from the surface, a depression forms, which draws in more water, funneling it down to the water-soluble rock. The increase of water and soil in the rock pushes open the cracks, again drawing more soil and water into it. This positive feedback loop continues, unless clay plugs into the cracks in the bedrock, at which time a pond may form. A sudden cover-collapse sinkhole occurs when the top soil above dissolving bedrock does not sink, but forms a bridge over the soil that is sinking beneath it. Underground soil continues to fill the bedrock fissures, until finally the soil bridge collapses and fills the void beneath it.

Both kinds of sinkholes can occur naturally or through human influence. While sinkholes tend to form naturally in karst areas, sinkholes can form in other geological areas that have been altered by humans such as mining, sewers, hydraulic fracture drilling, groundwater pumping, irrigation, or storage ponds. In all of these cases, and others, the cause for the sinkhole is that support for surface soil has been weakened or substantially removed.

In the United States, 20% of land in the United States is susceptible to sinkholes. Most of this area lies in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. In Louisiana, most of the sinkholes are precipitated by the human-influenced collapse of salt dome caverns. The collapse of a salt dome is usually a slow process; however, it may occur suddenly and without any advance warning.

Location

Currently, there are nine identifiable salt dome locations in Cameron Parish. *Figure 2-19* displays the location of the salt domes within Cameron Parish. The location of the salt domes are dispersed throughout Cameron Parish. Of the nine salt dome locations, four of them have no people, homes, or essential infrastructure within a two-mile buffer of the salt dome location. While the majority of salt domes are located in areas of the parish which are uninhabited, there are five salt domes located near populated areas. These five locations were analyzed to determine the potential loss exposure if a sinkhole were to occur.

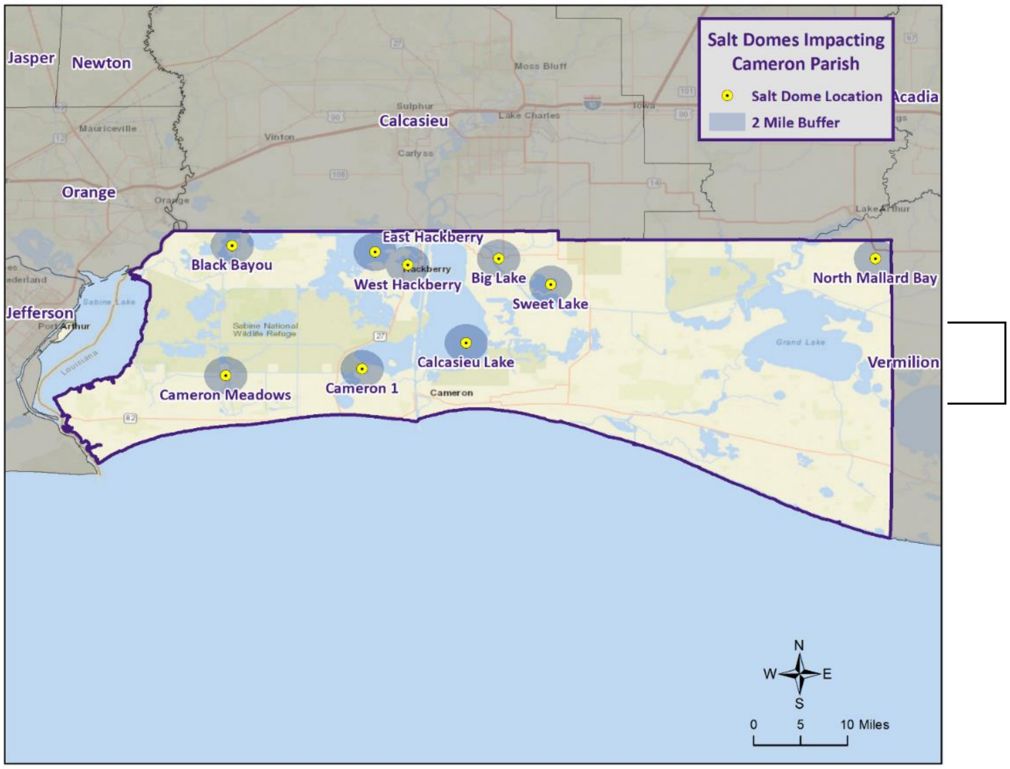


Figure 2-19: Salt Dome Locations in Cameron Parish.

Previous Occurrences / Extent

There have been no recorded incidents of sinkholes or salt dome collapses in Cameron Parish to date.

Frequency / Probability

Since there has been no recorded incidents of sinkhole or salt dome collapse in Cameron Parish, the annual chance of occurrence is calculated at less than 1%.

Estimated Potential Losses

The salt domes were analyzed to determine the number of people and houses that are potentially susceptible to losses from a sink hole materializing from the salt dome. The following table is based on conducting a two-mile buffer around the center of the salt dome. The values were determined by querying the 2010 U.S. Census block data to determine the number of houses and people located within two miles of the salt dome. Critical facilities were also analyzed to determine if they fell within the two-mile buffer of the salt dome. Total value for all occupancy group from Hazus was used to estimate a total loss of all facilities that were within two miles of the salt domes.

Table 2-28: Estimated Potential Losses from a Sinkhole formation.
(Source: U.S. 2010 Census Data and Hazus)

Salt Dome Name	Total Building Exposure	Critical Infrastructure Exposure	Number of People Exposed	Number of Houses Exposed
Bike Lake	$154,186,000	5	1,071	326
East Hackberry	$2,484,000	0	103	31
North Mallard Bay	$5,915,000	1	82	24
Sweet Lake	$31,816,000	0	177	49
West Hackberry	$194,988,000	4	979	288

The salt dome which poses the greatest threat to Cameron Parish is the West Hackberry Salt Dome, which encompasses the in unincorporated area of Hackberry. There is a total of 979 people who could potentially be exposed to a sinkhole formation along with four critical infrastructures, and over $150 million in total building exposure.

Vulnerability

See Appendix C for parish and municipality building exposure to a sinkhole hazard.

Thunderstorms

The term “thunderstorm” is usually used as a catch-all term for several kinds of storms. Here “thunderstorm” is defined to include any precipitation event in which thunder is heard or lightning is seen. Thunderstorms are often accompanied by heavy rain and strong winds and, depending on conditions, occasionally by hail or snow. Thunderstorms form when humid air masses are heated, which causes them to become convectively unstable and therefore 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, multicell, 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 multicell 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, and warming the surrounding environment, thus making it less dense than the surrounding air. This process intensifies the updraft and creates a localized lateral rush of air from all directions into the area beneath the thunderstorm to feed continued updrafts. At the mature stage, the rising air is accompanied by downdrafts caused by the shear of falling rain (if melted completely), or hail, freezing rain, sleet, or snow (if not melted completely). The dissipation stage is characterized by the dominating presence of the 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) have the ability to issue advisory messages based on forecasts and observations. The following are the advisory messages that may be issued with definitions of each:

- *Severe Thunderstorm Watch*: Issued to alert people to the possibility of a severe thunderstorm developing in the area. Expected time frame for these storms is 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 counties (parishes).

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

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

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

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

Hazard Description

Hailstorms

Hailstorms are severe thunderstorms in which balls or chunks of ice fall along with rain. Hail develops in the upper atmosphere initially as ice crystals that are bounced about by high-velocity updraft winds. The ice crystals grow through deposition of water vapor onto their surface, fall partially to a level in the cloud where the temperature exceeds the freezing point, melt partially, get caught in another updraft whereupon re-freezing and deposition grows another concentric layer of ice, and fall after developing enough weight, sometimes after several trips up and down the cloud. The size of hailstones varies depending on the severity and size of the thunderstorm. Higher surface temperatures generally mean stronger updrafts, which allows more massive hailstones to be supported by updrafts, leaving them suspended longer. This longer time means larger hailstone sizes. The following tables 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 homes and other structures, automobiles, and crops. While the damage to individual structures or vehicles is often minor, the cumulative cost to communities, especially across large metropolitan areas, can be quite significant. Hailstorms can also be devastating to crops. Thus, the severity of hailstorms depends on the size of the hailstones, the length of time the storm lasts, and where it occurs.

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

High Winds

In general, high winds can occur in a number of different ways, within and without thunderstorms. The Federal Emergency Management Agency (FEMA) distinguishes these as shown in *Table 2-31* on the next page.

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

Table 2-32 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	
12	74+	Hurricane	

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

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

Lightning

Lightning is a natural electrical discharge in the atmosphere that is a by-product of thunderstorms. Every thunderstorm produces lightning. There are 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

Hailstorms are a meteorological phenomenon that can occur anywhere. Therefore, the entire planning area for Cameron Parish is at risk for hailstorms. The worst-case scenario for hailstorms is hail up to a 1.75" diameter.

Previous Occurrences / Extents

Historically, there have been 42 hail incidents in Cameron Parish. Hailstorm diameters have ranged from 0.75" to 1.75" per the National Climatic Data Center since 1989. The most frequently recorded hail sizes have been 1.75 inches in diameter. Since the last update, there has been one significant hailstorm events in Cameron Parish since the 2015 Cameron Parish HMP update.

Table 2-34: Previous Occurrences for Hailstorm Events since the 2015 Hazard Mitigation Plan Update. (Source: NCEI Storm Events Database)

Location	Date	Hail Size (in)	Property Damage	Crop Damage
CAMERON	March 29, 2017	1.75	$0	$0

Frequency

Hailstorms occur frequently within Cameron Parish with an annual chance of occurrence calculated at 100% based on the records for the past 30 years (1989-2019). On the next page, *Figure 2-20* displays the density of hail storm events in Cameron Parish, while *Figure 2-21* provides an overview of hailstorm size based on location.

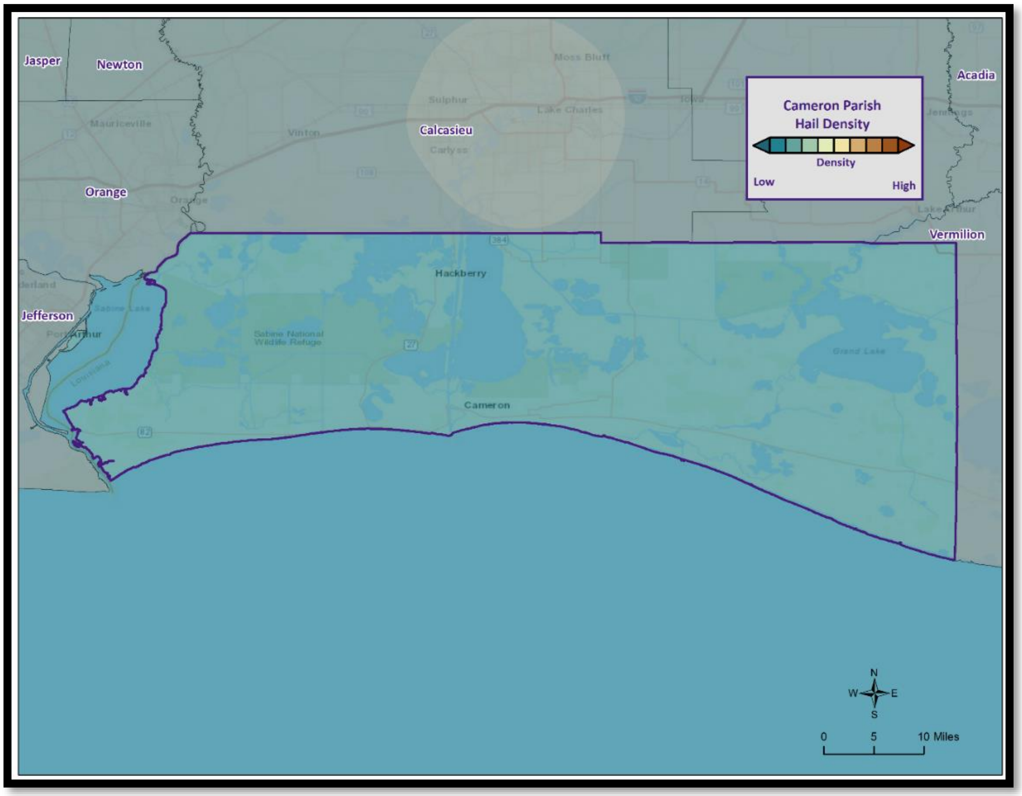


Figure 2-20: Density of Hailstorms by Diameter from 1950-2019.

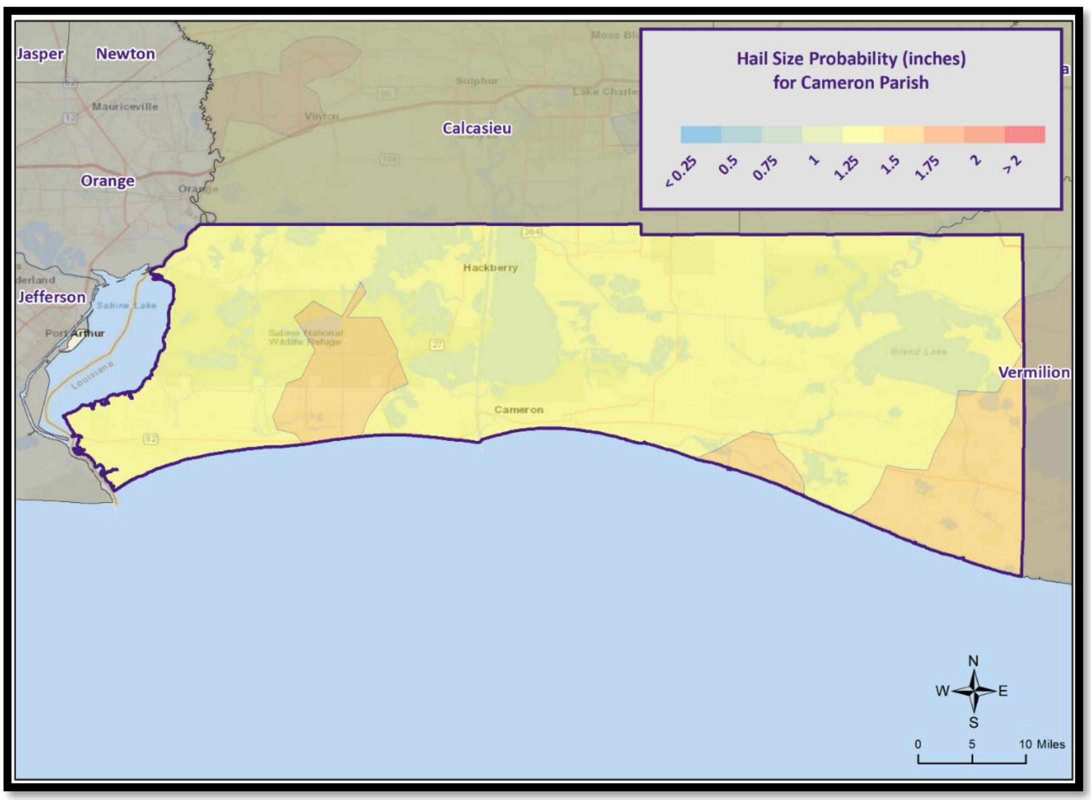


Figure 2-21: Hail Size Probability in Inches for Cameron Parish.

Estimated Potential Losses

Since 1989, there have been 42 significant hail events that have resulted in property damages according to NCEI Storm Events Database. The total property damages associated with those storms have totaled approximately $2,000. 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 the NCEI Storm Events Database (1989 - 2019). This provides an annual estimated potential loss of $67 and $48 per event. The following table provides an estimate of potential property losses for Cameron Parish.

Table 2-35: Estimated Annual Property Losses in Cameron Parish resulting from Hail Damage.

Estimated Annual Potential Losses from Hail for Cameron Parish
$67

There have been no reported injuries or fatalities as a result of a hail events over the 30-year record.

Vulnerability

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

High Winds

Location

Because high winds are a meteorological phenomenon that can occur anywhere, the entire planning area for Cameron Parish is at risk from high winds. The worst-case scenario for thunderstorm high wind is wind speeds of approximately 81 mph.

Previous Occurrences / Extents

Historically, there have been 100 thunderstorm high wind events in Cameron Parish. High winds have ranged from 58 mph to 81 mph per the National Climatic Data Center since 1989. The most frequently recorded high wind speed has been 58 mph. Since the last update, there have been 10 high wind events in Cameron Parish. *Table 2-36* provides an overview of the high wind speeds which impacted the Cameron Parish Planning area since the 2015 Cameron Parish HMP update.

Table 2-36: Previous Occurrences for Thunderstorm High Wind Events since the 2015 Hazard Mitigation Plan Update.
(Source: NCEI Storm Events Database)

Location	Date	Recorded Wind Speeds (mph)	Property Damage	Crop Damage
HOLLY BEACH	April 27, 2016	50	$3,000	$0
CAMERON	April 27, 2016	61	$0	$0
GRAND LAKE	March 29, 2017	50	$10,000	$0
JOHNSON BAYOU	May 3, 2017	50	$5,000	$0
HOLLY BEACH	October 22, 2017	50	$5,000	$0
CALCASIEU LAKE NORTH	April 14, 2018	55	$0	$0
GRAND CHENIER	July 3, 2018	50	$5,000	$0
GRAND CHENIER	November 1, 2018	50	$2,000	$0
HACKBERRY	April 7, 2019	50	$3,000	$0
JOHNSON BAYOU	May 10, 2019	54	$0	$0

Frequency

High winds are a common occurrence within Cameron Parish with an annual chance of occurrence calculated at 100% based on the records for the past 30 years (1989-2019). *Figure 2-22* displays the thunderstorm wind speed probability for Cameron Parish.

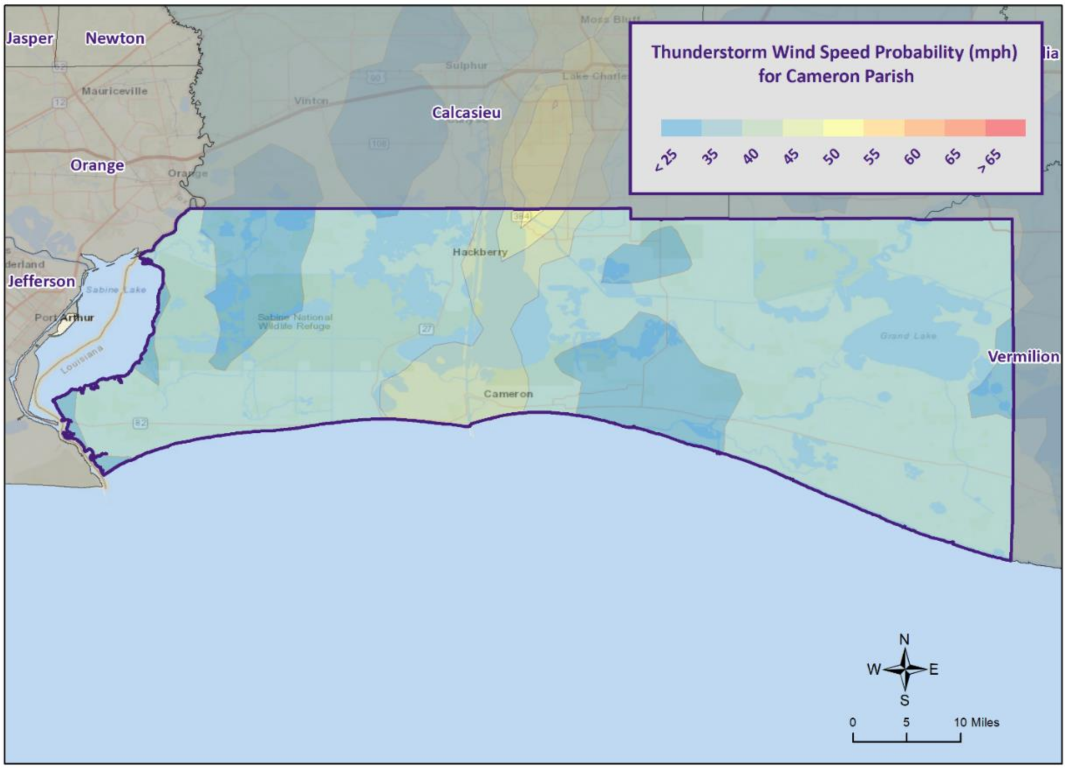


Figure 2-22: Thunderstorm High Wind Speed Probability in Miles Per Hour for Cameron Parish.

Estimated Potential Losses

Since 1989, there have been 100 significant wind events that have resulted in property damages according to NCEI Storm Events Database. The total property damages associated with those storms have totaled approximately $2,205,000. 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 the NCEI Storm Events Database (1989 - 2019). This provides an annual estimated potential loss of $73,500 and $22,050 per event. The following table provides an estimate of potential property losses for Cameron Parish:

Table 2-37: Estimated Annual Property Losses in Cameron Parish resulting from Wind Damage.

Estimated Annual Potential Losses from Thunderstorm Winds for Cameron Parish
$73,500

There have been three injuries and no reported fatalities as a result of a thunderstorm high wind event over the 30-year record.

Vulnerability

See appendix C for parish and municipality buildings that are susceptible to thunderstorm high winds.

Lightning

Location

Like hail and high winds, lightning is a meteorological phenomenon that can occur anywhere within the Cameron Parish planning area. The worst-case scenario for lightning events is a lightning activity level of 4 which is approximately 16 to 25 lightning strikes every 15 minutes.

Previous Occurrences / Extent

Historically, there has been 9 lightning events in Cameron Parish between the years 1989 and 2019. Since the last HMP update, there has been no significant lighting events within the boundaries of Cameron Parish.

Frequency

Lightning can strike anywhere and is produced by every thunderstorm, so the chance of lightning occurring in Cameron Parish is high. However, lightning that meets the definition that is used by the NCEI Storm Events Database that results in damages to property and injury or death to people is a less likely event. Cameron Parish experienced nine significant lightning events between the years 1989 and 2019 resulting in a 30% annual chance of occurrence.

Estimated Potential Losses

Since 1989, there have been five significant lightning events that have resulted in property damages according to NCEI Storm Events Database. The total property damages associated with those storms have totaled approximately $1,000. 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 lightning data in the NCEI Storm Events Database (1989 - 2019). This provides an annual estimated potential loss of $33 and $111 per event. The following table provides an estimate of potential property losses for Cameron Parish:

Table 2-38: Estimated Annual Property Losses in Cameron Parish resulting from Lightning Damage.

Estimated Annual Potential Losses from Lightning for Cameron Parish
$111

Per the NCEI Storm Events Database, there has been three fatalities and four injuries as a result of lightning in Cameron Parish.

Vulnerability

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

Tornadoes

Tornadoes (also called twisters and cyclones) are rapidly rotating funnels of wind extending between storm clouds and the ground. For their size, tornadoes are the most severe storms, and 70% of the world's reported tornadoes occur within the continental United States, making them one of the most significant hazards Americans face. Tornadoes and waterspouts form during severe weather events, such as thunderstorms and hurricanes, when cold air overrides a layer of warm air, causing the warm air to rise rapidly, which usually occurs in a counterclockwise direction in the northern hemisphere. The updraft of air in tornadoes always rotates because of wind shear (differing speeds of moving air at various heights), and it can rotate in either a clockwise or counterclockwise direction; clockwise rotations (in the northern hemisphere) will sustain the system, at least until other forces cause it to die 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 2-39* 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 2-39: 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 2-40: 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 with definitions of each:

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

Structures within the direct path of a tornado vortex are often reduced to rubble. Structures adjacent to the tornado’s path are often severely damaged by high winds flowing into the tornado vortex, known as inflow winds. It is here, adjacent to the tornado’s path, that the building type and construction techniques are critical to the structure’s survival. Although tornadoes strike at random, making all buildings vulnerable, mobile homes, homes on 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 missiles are generally stopped by interior walls. However, if a building has no partitions, any glass, brick, or other debris blown into the interior is life threatening. Following a tornado, damaged buildings are a potential health hazard due to instability, electrical system damage, and gas leaks. Sewage and water lines may also be damaged.

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

Location

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

Previous Occurrences / Extent

The NCEI Storm Events Database reports a total of 31 tornadoes or waterspouts occurring within the boundaries of Cameron Parish since 1989 ranging in extent from F0 to F1 under the Fujita Scale and EF0 on the Enhanced Fujita Scale. Cameron Parish can expect future tornadoes up to an EF2 under the Enhanced Fujita Scale as a worst-case scenario.

The most destructive tornado to impact Cameron Parish occurred in October of 1979. The tornado was responsible for over $1.5 million in damages. The tornado which resulted in the most injuries and fatalities occurred in August of 1962 resulting in over 30 injuries and two fatalities.

Since the 2015 HMP Update, seven tornados have occurred within the boundaries of Cameron Parish. Below is a list and brief description of the impact for the event.

Table 2-41: Historical Tornadoes in Cameron Parish with Locations since the 2015 Update.

Date	Impacts	Property Damage	Location	Magnitude
August 26, 2017	1.66 mile path with a width of 25 yards. A tornado associated with an outer rain band of Tropical Storm Harvey touched down west of Calcasieu Lake near Joe Dugas Road, where a travel trailer rolled over on its side. The tornado continued to the northwest, and pulled some shingles off a home near Hackberry High School. The region was in a mandatory evacuation at the time. Several people photographed or videoed the tornado.	$7,000	HACKBERRY	EF0
August 28, 2017	0.28 mile path with a width of 25 yards. A tornado touched down near Highway 82 and flipped a shed and damaged trees. The path continued to the northwest and removed a portion of roofing on a home on Bills Lane.	$15,000	JOHNSON BAYOU	EF0
July 8, 2018	0.09 mile path with a width of 10 yards. The Cameron Parish Sheriff's office relayed a report and photo of a waterspout on Black Lake near Hackberry. No damage occurred.	$0	HACKBERRY	EF0
August 7, 2018	0.14 mile path with a width of 10 yards. Pictures posted to social media indicated a landspout occurred near the town of Lake Arthur. No damage was reported as the landspout remained in a pasture.	$0	GRAND LAKE	EF0
October 31, 2018	0.15 mile path with a width of 50 yards. A weak tornado damaged 1 home and broke small branches along Granger Lane in Cameron Parish. The tornado developed in a field then dissipated in a field before reaching the next street. Maximum estimated winds were 79 MPH.	$5,000	GRAND LAKE	EF0
June 5, 2019	0.22 mile path with a width of 50 yards. The tornado began in the marsh just south of Highway 82 and moved northwest. Half of a tin roof was removed from a shed and multiple trees had broken limbs. The tornado dissipated after moving over a pond northeast of the shed. Max estimated wind speed was 85 mph.	$5,000	CREOLE	EF0
September 19, 2019	0.6 mile path with a width of 50 yards. A tornado flipped an RV over and damaged another along Everett Vincent Drive and Johnny Benoit Road.	$20,000	HACKBERRY	EF0

Frequency / Probability

Tornadoes occur frequently within Cameron Parish with an annual chance of occurrence calculated at 100% based on the records for the past 30 years (1989-2019). *Figure 2-23* displays the density of tornado touchdowns in Cameron Parish and neighboring parishes.

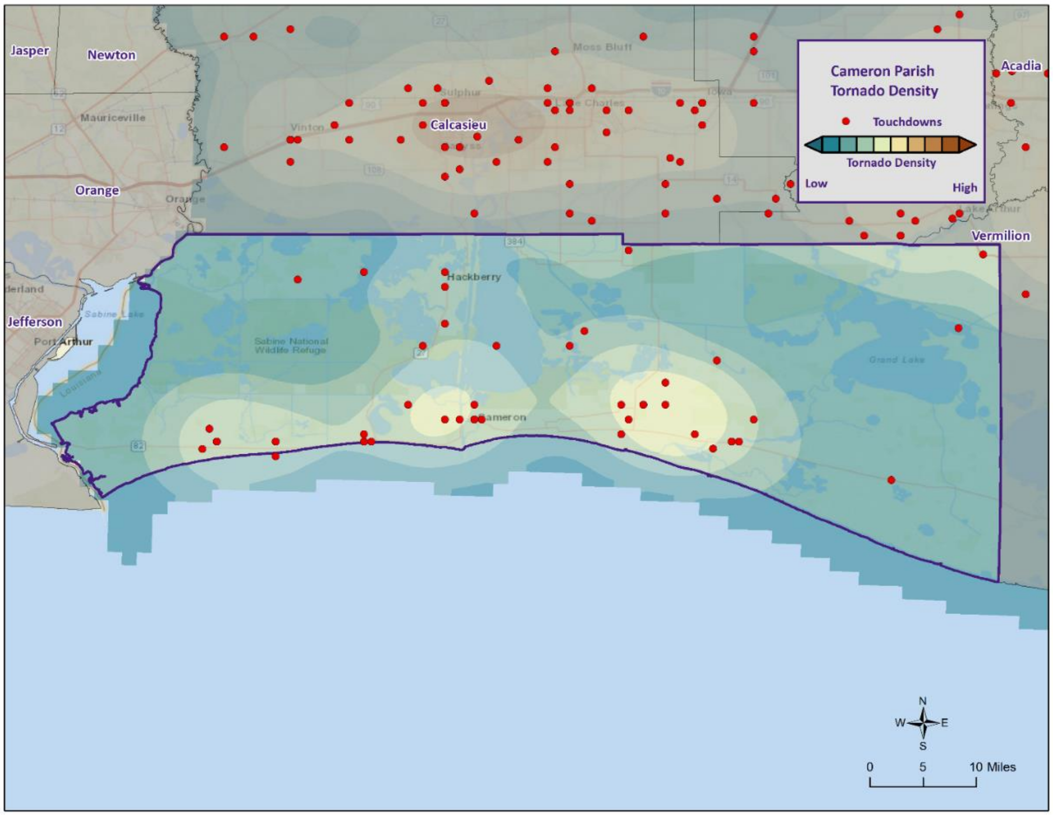


Figure 2-23: Location and Density of Tornadoes to Touchdown in Cameron Parish. (Source: NOAA/SPC Severe Weather Database)

Estimated Potential Loses

According to the NCEI Storm Events Database, there have been 31 tornadoes that have caused some level of property damage. The total damage from the actual claims for property is approximately $787,000 with an average cost of $25,387 per tornado event. When annualizing the total cost over the 30-year record, total annual loses based on tornadoes are estimated to be $26,233. *Table 2-42* provides an annual estimate of potential losses for Cameron Parish.

Table 2-42: Estimated Annual Losses for Tornadoes in Cameron Parish.

Estimated Annual Potential Losses from Tornadoes for Cameron Parish
$26,233

Table 2-43 presents an analysis of building exposure that are susceptible to tornadoes by general occupancy type for Cameron Parish along with the percentage of building stock that are mobile homes.

Table 2-43: Building Exposure by General Occupancy Type for Tornadoes in Cameron 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 (%)**
667,821	117,899	56,247	2,949	21,263	8,404	4,104	30.8%

Cameron Parish has suffered through a total of eight days in which tornadoes or waterspouts have accounted for seven injuries and no fatalities during this 30-year period.

In accessing the overall risk to population, the most vulnerable population throughout the parish are those residing in manufacturing housing. Approximately 30.8% of all housing in Cameron Parish consists of manufactured housing. The location and density of manufactured houses can be seen in *Figure 2-24*.

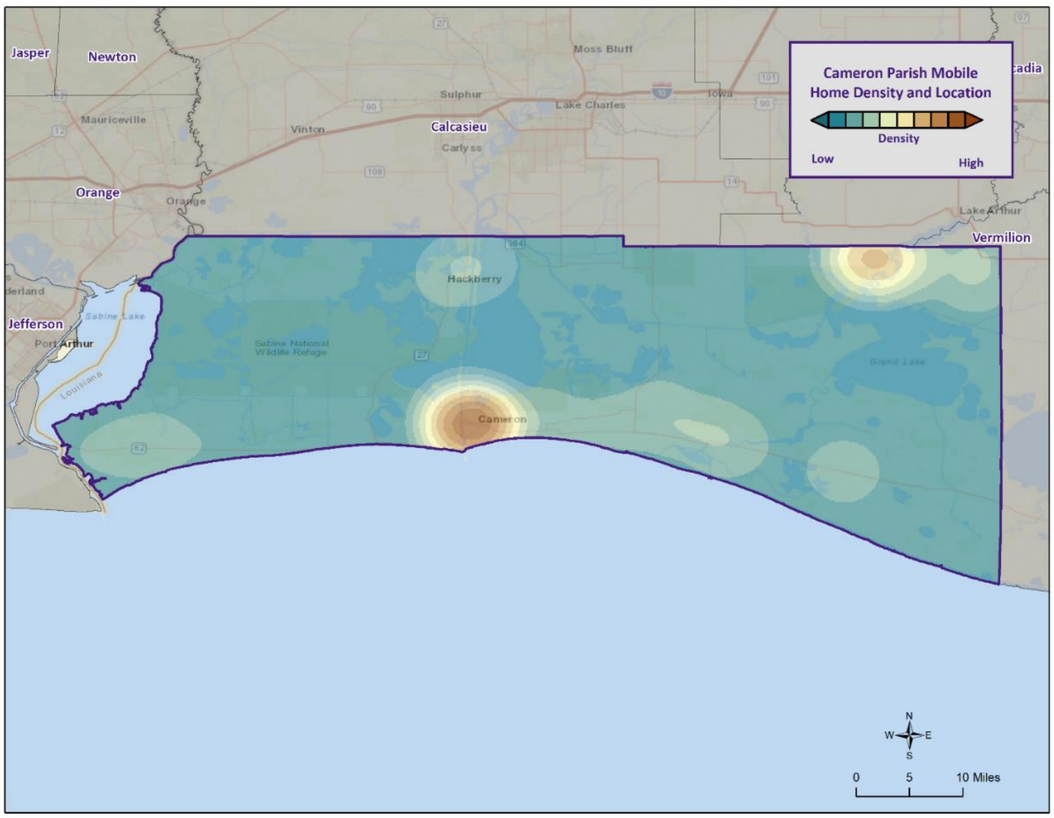


Figure 2-24: Location and Approximate Number of Units in Manufactured Housing Locations throughout Cameron Parish.

Vulnerability

See Appendix C for parish and municipality building exposure to tornadoes.

Tropical Cyclones

Tropical cyclones are among the worst hazards Louisiana faces. These spinning, low-pressure air masses draw surface air into their centers and attain strength ranging from weak tropical waves to the most intense hurricanes. Usually, these storms begin as clusters of oceanic thunderstorms off the western coast of Africa, moving westward in the trade wind flow. The spinning of these thunderstorm clusters begins because 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 2-44: 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 South Louisiana. With any single tropical cyclone event having the potential to devastate multiple parishes at once, tropical cyclones are a significant threat to the entire Cameron Parish planning area. The worst-case scenario for a tropical cyclone event in Cameron Parish is a Category 5 Hurricane.

Previous Occurrences / Extents

Cameron Parish has experienced 20 major tropical cyclone events since 2002. Hurricane Katrina has been by far the worst hurricanes to impact Cameron Parish in recorded history. Katrina’s devastation was compounded with Hurricane Rita just days after. The table on the next page provides a list of tropical cyclones which have impacted Cameron Parish since 2002.

Table 2-45: Historical Tropical Cyclone Events in Cameron Parish from 2002 - 2019.

Date	Name	Storm Type At Time of Impact
2002	Isidore	Tropical Storm
2002	Lili	Hurricane – Category 1
2005	Rita	Hurricane – Category 3
2007	Humberto	Hurricane – Category 1
2008	Edouard	Tropical Storm
2008	Gustav	Tropical Storm
2008	Ike	Hurricane – Category 2
2017	Cindy	Tropical Storm
2019	Barry	Tropical Storm

Since the last Cameron Parish HMP update in 2015, there have been two tropical cyclone events which have impacted the parish. Below is a brief description of the two events and the impact they had on Cameron Parish.

Tropical Storm Cindy (2017)

Tropical Storm Cindy was the first tropical cyclone to make landfall in Louisiana since Hurricane Isaac in 2012. The third named storm of the 2017 Atlantic hurricane season, Cindy formed out of a broad area of low pressure that developed in the northwestern Caribbean Sea near the Yucatan Peninsula in June 2017. The disturbance gradually organized as it drifted northwards into the Gulf of Mexico before organizing into a tropical storm on June 20, 2017. Tropical Storm Cindy peaked with sustained winds of 60 mph on June 21, and weakened slightly prior to making landfall in southwestern Louisiana on June 22. The storm quickly weakened as it moved further inland eventually degenerating into a remnant low on June 23, 2017.

The minimum sea level pressure of 1004.4 mb, along with the highest wind gust, and highest sustained wind in southeast Louisiana were all measured by the New Orleans Lakefront Airport. The highest wind gust recorded was 49 mph, and the highest maximum sustained wind was 44 mph. Tropical storm force winds were primarily experienced in gusts as squalls moved through the area. The winds did cause minor damage to trees, roofs, and power lines. The only known injuries in southeast Louisiana resulted from a tree falling on a mobile home in Houma, Louisiana.

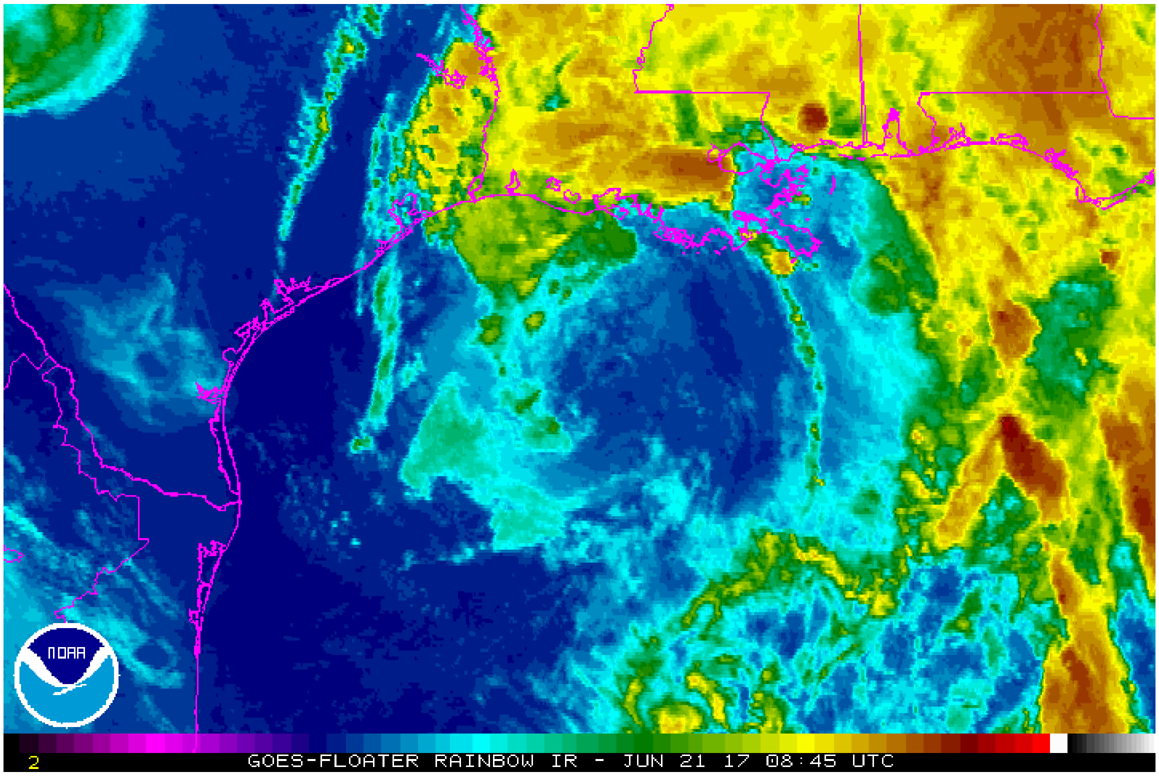


Figure 2-25: Tropical Cyclone Cindy Rain Bands across the Gulf Coast Area. (Source: NOAA)

A storm tide of generally four to six feet occurred along the Gulf Coast of southeast Louisiana from St. Bernard Parish to Terrebonne Parish. The highest measured storm tide was 6.18 feet NAVD88 at the USCOE gauge near Mandeville, Louisiana. Impacts from storm surge were minor to moderate with flooding occurring in low lying areas and roadways outside of levee systems.

Many areas of southeast Louisiana received three to five inches of rain with a few measurements in excess of six inches. Maximum storm total rainfall was 6.52 inches measured in S.t Bernard Parish. The rainfall resulted in some minor river flooding across portions of the north shore of Lake Pontchartrain.

The impact in Cameron Parish was minimal. Tropical Storm Cindy moved into Cameron Parish early on the 22nd. Sporadic power outages occurred, but no damage was reported. Several hundred people evacuated work trailers during the event. The tide gauge at Cameron reported multiple hours of wind gusts over 35 knots with a peak gust of 54 knots.

Tropical Storm Barry (2019)

Hurricane Barry initial developed from a disturbance that moved from Georgia southwest to the northeast Gulf of Mexico on July 8-9, 2019. The weak low pressure system continued to move west-southwest and strengthen, and was eventually classified as Tropical Storm Barry on the morning of July 11th, 95 miles south-southeast of the mouth of the Mississippi River. Barry continued to move slowly west then northwest and briefly reached hurricane strength on the morning of July 13th before landfall in south-central Louisiana near Intracoastal City, Louisiana in Vermillion Parish. Tropical storm force winds reached the southeast Louisiana coast by midday on Friday, July 12th and spread slowly northwest reaching the Baton Rouge area during the evening of the 12th. Tropical storm wind impacts had ended across all of southeast Louisiana by midday on July 14th. Tropical storm force winds were primarily measured in gusts across southeast Louisiana. The exception was in Terrebonne and Assumption Parishes, close to the landfall location, where sustained tropical storm force winds and frequent gusts caused more significant power line and tree damage. A few tropical storm wind gusts were recorded in the metro New Orleans area but were not very impactful. No hurricane force wind gusts were recorded in southeast Louisiana.

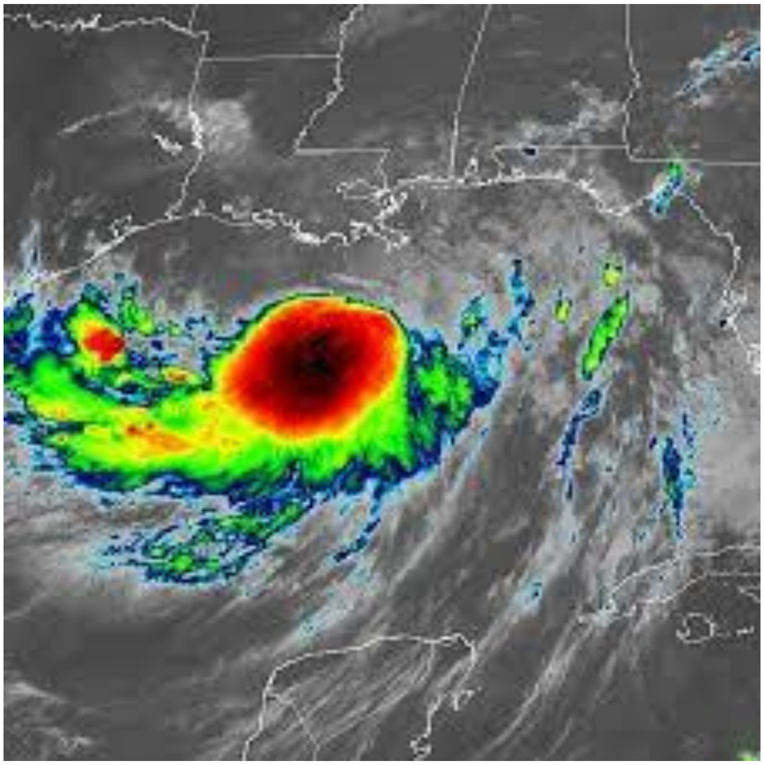


Figure 2-26: Hurricane Barry Rain Bands in the Gulf Coast Area. (Source: NOAA)

Mostly minor to moderate storm surge flooding occurred across coastal southeast Louisiana, including Lake Pontchartrain, and a small part of the Mississippi Coast. Terrebonne Parish had significant storm surge flooding in the lower portion of the parish with storm tides of five to eight feet, locally up to nine feet. Several local levees were overtopped on the morning of July 13th flooding roads and a few homes. The highest storm tide reading was 9.11 feet NAVD88 at a USGS tide gauge at Caillou Lake near Dulac, Louisiana.

Storm total rainfall was generally between four and eight inches with a maximum rainfall of 8.83 inches recorded northeast of Denham Springs, Louisiana in Livingston Parish. Isolated flash flooding of streets and secondary roadways occurred on July 13th in the greater Baton Rouge area, but flash flooding was not widespread or significant. The lower Mississippi River was at unusually high stages from late August with the state at the New Orleans Carrolton gauge near 16.5 feet. The combination of storm surge entering the lower Mississippi River with very high river stages prompted concern of potential overtopping of levees along the Mississippi River in lower Plaquemines Parish prompting some evacuations of the area.

In Cameron Parish, Hurricane Barry made landfall just east of the parish boundary and only tropical storm conditions were felt in the area. Isolated power outages were reported. The peak gust reported at the Cameron tide gauge was 48 knots with a sustained wind of 40 knots.

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

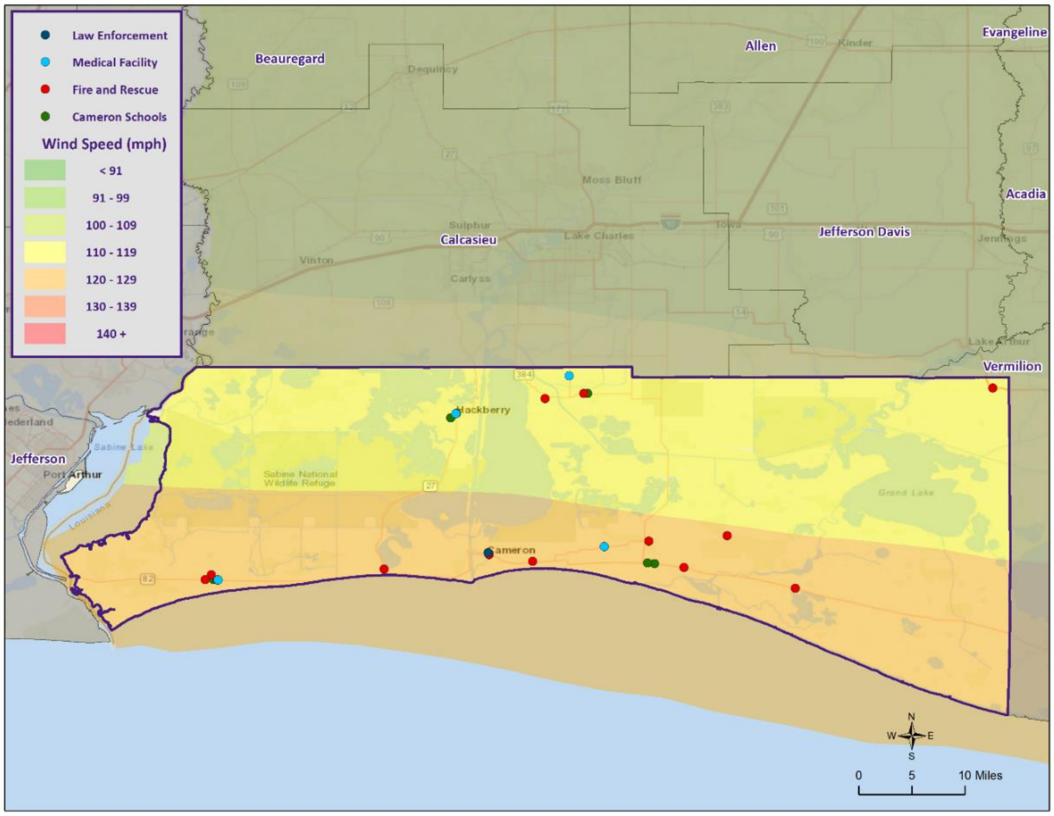


Figure 2-27: Winds Zones for Cameron Parish in Relation to Critical Facilities

Frequency / Probability

Tropical cyclones are large natural hazard events that regularly impact Cameron Parish. The annual chance of occurrence for a tropical cyclone is estimated at 53% for Cameron Parish with 9 events occurring within 17 years (2002 to 2019). 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 Cameron 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 100-Year Hurricane Model, the 100-year hurricane scenario was analyzed to determine losses from this worst-case scenario. The following table shows the total economic losses that would result from this occurrence.

Table 2-46: Total Estimated Losses for a 100-Year Hurricane Event (Source: Hazus)

Jurisdiction	Estimated Total Losses from 100-Year Hurricane Event
Cameron Parish	$106,033,312

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

Table 2-47: Ratio of Total Losses to Total Estimated Value of Assets for Cameron Parish (Source: Hazus)

Jurisdiction	Estimated Total Losses from 100-Year Hurricane Event	Total Estimated Value of Assets	Ratio of Estimated Losses to Total Value
Cameron Parish	$106,033,312	$878,687,000	12.1%

Based on the Hazus Hurricane Model, estimated total losses for Cameron Parish was 12.1% of the total estimated value of all assets.

The Hazus Hurricane Model also provides a breakdown for seven primary sectors (Hazus occupancy) throughout the parish. The losses for Cameron Parish by sector are listed in the table below.

Table 2-48: Estimated Losses in Cameron Parish for a 100-Year Hurricane Event (Source: Hazus)

Cameron Parish	Estimated Total Losses from 100-Year Hurricane Event
Agricultural	$438,894
Commercial	$10,358,532
Government	$912,476
Industrial	$4,330,787
Religious / Non-Profit	$1,240,713
Residential	$88,535,047
Schools	$216,863
Total	**$106,033,312**

Threat to People

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

Table 2-49: Number of People Susceptible to a 100-Year Hurricane Event in Cameron Parish (Source: Hazus)

Number of People Exposed to Hurricane Hazards			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Cameron Parish	6,839	6,839	100%

The Hazus hurricane model was also extrapolated to provide an overview of vulnerable populations throughout Cameron Parish. These populations are illustrated in the following table:

Table 2-50: Vulnerable Populations in Cameron Parish for a 100-Year Hurricane Event (Source: Hazus)

Cameron Parish		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	6,839	100.0%
Persons Under 5 Years	400	5.9%
Persons Under 18 Years	1,256	18.4%
Persons 65 Years and Over	881	12.9%
White	6,546	95.7%
Minority	293	4.3%

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.

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 2-51: Southern Group of State Foresters Wildfire Risk Assessment Fire Intensity Scale. (Source: Southern Wildfire Assessment Portal)

Fire Intensity	
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 worse-case scenario for Cameron Parish is a level 5 on the fire intensity scale. The following figure displays the areas of wildland-urban interface and intermix in Cameron Parish.

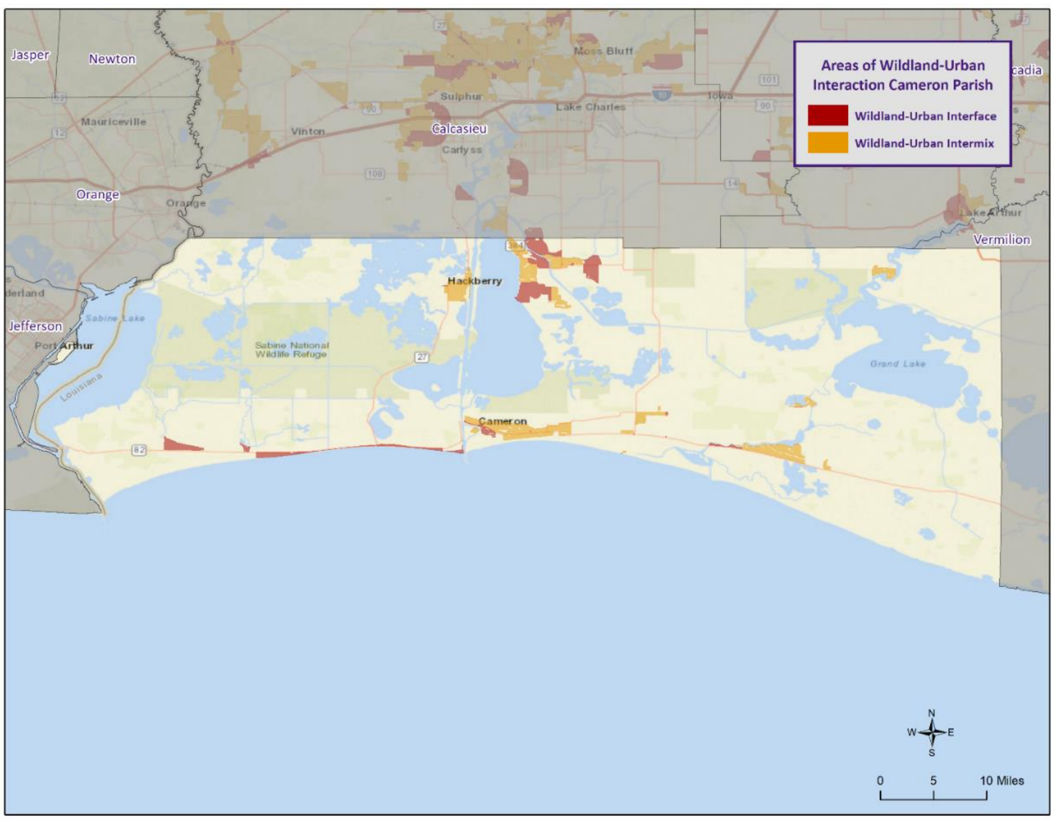


Figure 2-28: Wildland-Urban Interaction in Cameron Parish.

Previous Occurrences / Extents

The NCEI Storm Events reports one wildfire event occurring within the boundaries of Cameron Parish between the years 1989 and 2019. Since the 2015 Cameron Parish HMP Update, there have been no wildfire events occurring within the boundaries of Cameron Parish.

Frequency / Probability

Based on historical records, there has been one significant wildfire event within the boundaries of Cameron Parish; therefore, the annual chance of occurrence for wildfires is estimated at less than 3%.

Estimated Potential Loses

According the NCEI Storm Events database, there have been one wildfire events which have caused property damage, crop damage, injuries, or fatalities in Cameron Parish. In assessing over risk to population, the most vulnerable population throughout the parish consists of those residing in areas of wildland-urban interaction.

Using Hazus, 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 2-52: Total Building Exposure by Wildland-Urban Interaction Areas. (Source: Hazus)

Jurisdiction	Estimated Total Building Exposure
Cameron Parish	$5,316,000

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

Table 2-53: Estimated Exposure for Unincorporated Cameron Parish by Sector. (Source: Hazus)

Cameron	Estimated Total Building Exposure by Sector
Agricultural	$155,000
Commercial	$1,415,000
Government	$120,000
Industrial	$376,000
Religious / Non-Profit	$105,000
Residential	$3,145,000
Schools	$0
Total	**5,316,000**

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 2-54: Population Located within a Wildland-Urban Interaction Areas. (Source: 2010 U.S. Census Data)

Number of People Located in Wildland-Urban Interaction Areas			
Location	**# in Community**	**# in Hazard Area**	**% in Hazard Area**
Cameron Parish	6,839	986	14%

The 2010 U.S. Census data was also extrapolated to provide an overview of populations located within wildland-urban interaction areas throughout the jurisdiction. The date is illustrated in the table below.

Table 2-55: Population in Cameron Parish Located within a Wildland-Urban Interaction Area. (Source: 2010 Census Data)

Cameron Parish		
Category	**Total Numbers**	**Percentage of People in Hazard Area**
Number in Hazard Area	986	14.4%
Persons Under 5 Years	58	5.9%
Persons Under 18 Years	181	18.4%
Persons 65 Years and Over	127	12.9%
White	944	95.7%
Minority	42	4.3%

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.

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3. Capability Assessment

This section summarizes the results of Cameron Parish 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, Cameron Parish is able to identify strengths that could be used to reduce losses and reduce risk throughout the communities. 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

Cameron 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, and take an integrated and strategic look holistically at hazard mitigation in Cameron 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 Cameron Parish include the following:

Table 3-1: Planning and Regulatory Capabilities

Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
	Cameron Parish	Comments
Plans	**Yes / No**	
Comprehensive / Master Plan	YES	Parish has a Coastal Restoration Committee to update yearly
Capital Improvements Plan	NO	
Economic Development Plan	NO	Comprehensive Economic Development Strategy
Local Emergency Operations Plan	YES	Yearly
Continuity of Operations Plan	YES	
Transportation Plan	NO	Evacuation Planning
Stormwater Management Plan	NO	
Community Wildfire Protection Plan	NO	
Other plans (redevelopment, recovery, coastal zone management)	NO	
Building Code, Permitting and Inspections	**Yes / No**	
Building Code	YES	I CODES 2012
Building Code Effectiveness Grading Schedule (BCEGS) Score	NO	
Fire Department ISO/PIAL rating	5	
Site plan review requirements	NO	
Land Use Planning and Ordinances	**Yes / No**	
Zoning Ordinance	NO	
Subdivision Ordinance	YES	
Floodplain Ordinance	YES	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	NO	
Flood Insurance Rate Maps	YES	
Acquisition of land for open space and public recreation uses	NO	
Other	NO	

Cameron Parish will work to expand their capabilities by adding to these plans, as well as work to create new plans that will address a long-term recovery and resiliency framework. In instances where there are no existing plans, there will be a commitment to explore opportunities to create new plans that will address long-term recovery and resiliency framework as parish and local resources allow.

Building Codes, Permitting, Land Use Planning and Ordinances

The Cameron Parish Planning and Development Office is responsible for all Building Code, Permitting, Land Use Planning and Ordinances. Cameron Parish follows the National Electrical Code, Louisiana State Plumbing Code, International Residential Code, International Building Code (for commercial work), International Mechanical Code, and the International Fuel Gas Code, and will require all building, mechanical, gas, electrical, and plumbing work to comply with these codes. The Parish also has a Flood Damage Prevention Ordinance, Coastal Use Permits, and a Coastal Zone Program that are followed. Permitting and inspections capabilities are in place within the Parish.

As of the 2020 update, Cameron Parish and its communities 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 Cameron Parish Government is also responsible for enforcing the parish ordinances related to health and safety, property maintenance standards, and condemnation of unsafe structures.

The Cameron Parish Government 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, Cameron Parish as a whole has a system in place to coordinate and share these capabilities through the OHSEP and through this Parish Hazard Mitigation Plan.

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

Administration, Technical, and Financial

As a community, Cameron 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 on the following page shows examples of resources in place in Cameron Parish.

Table 3-2: Administration and Technical Capabilities

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

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

The following financial resources are available to fund mitigation actions in Cameron Parish:

Table 3-3: Financial Capabilities

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

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 communities and the parish as a whole to maximize opportunities for implementation of activities through greater acceptance and consensus of the community.

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

Table 3-4: Education and Outreach 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.		
	Cameron Parish	Comments
Program / Organization	Yes / No	
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	YES	Cameron Community Action Agency also assists with getting information to Head Starts and low income families
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	No	
Storm Ready certification	No	
Firewise Communities certification	No	
Public/Private partnership initiatives addressing disaster-related issues	No	
Other	No	

The communities within Cameron Parish rely on Cameron OHSEP and/or Cameron Parish Government agencies for the above listed planning and regulatory, administrative and technical, financial, and education and outreach capabilities.

As reflected with above existing regulatory mechanisms, programs and resources within the parish, Cameron Parish remains committed to expanding and improving on the existing capabilities within the parish. Communities, along with Cameron Parish will work together 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 parish, will all enhance and expand risk reduction for all of Cameron Parish.

Flood Insurance and Community Rating System

Cameron Parish is not currently participating in the Community Rating System (CRS). However, becoming a participant in the CRS was 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.

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

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

There are 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.

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.

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

As of September 2019, 317 communities in the State of Louisiana participate in the Federal Emergency Management Agency's National Flood Insurance Program (NFIP). Of these communities, 47 (or 15%) participate in the Community Rating System (CRS). Jefferson Parish leads the state with a rating of Class 5, followed by the City of Mandeville in St. Tammany Parish with a Class 6 rating. 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. Once the parish has obtained a CRS rating and is a participant, the parish will receive CRS credit for this plan when it is adopted. To retain that credit, though, the parish must submit an evaluation report on progress toward implementing this plan to FEMA by October 1 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 (CRS) that resulted 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 to evaluate the CRS and refine the program to meet its stated goals. The changes helped to 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.

Since the revision of the 2013 Coordinator's Manual, FEMA released the 2017 CRS Coordinator's Manual which continued the evolution of the CRS program and its mission to reward communities that prioritize mindful floodplain regulations. As with the 2013 manual, the changes made in the 2017 manual impact

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

each CRS community differently. Some communities see an increase in the points they receive since points for certain activities have increased (e.g., Activity 420 Open Space Preservation). Other communities 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 have to identify new CRS credits in order to remain in the CRS class. Most notably, as it relates to this hazard mitigation plan, more credit was made available for Activity 410 Floodplain Mapping.

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 2017 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 the 2017 manual will impact their community and when.

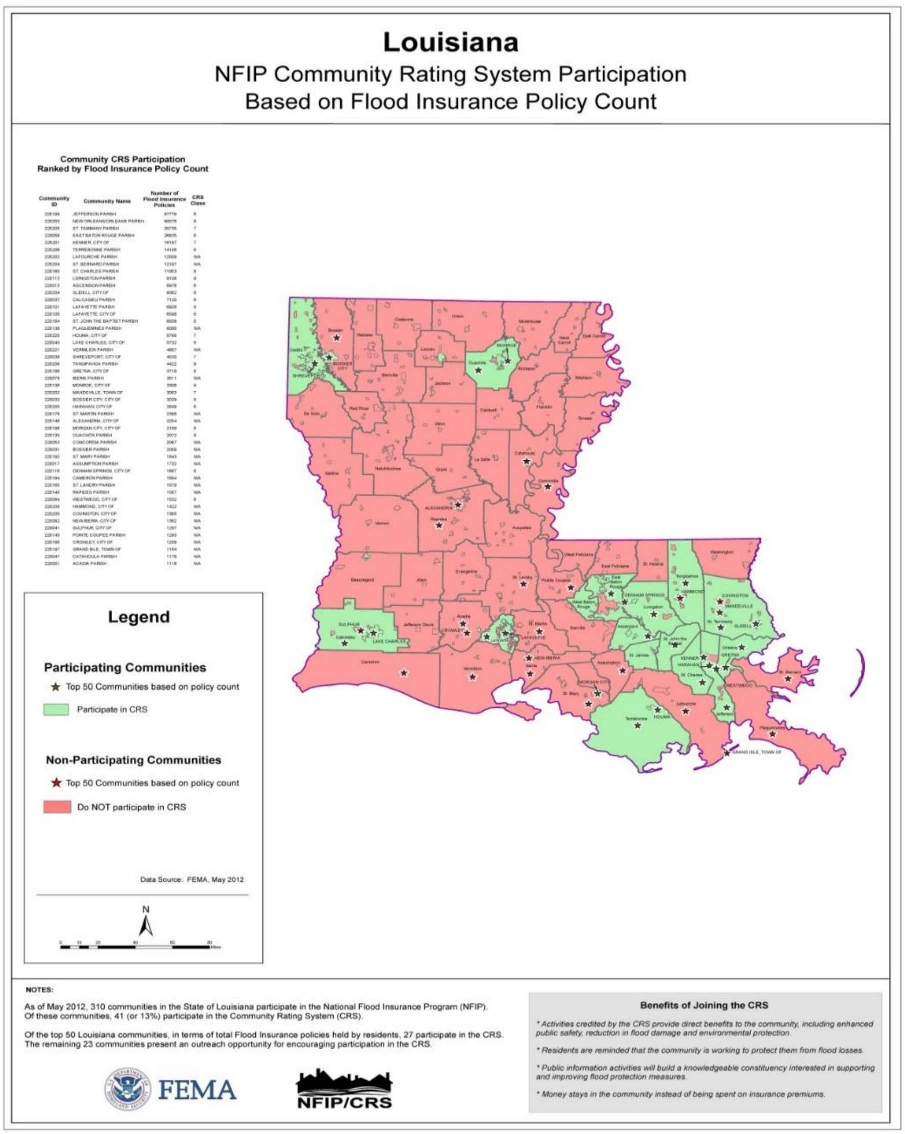

Figure 3-2: Louisiana CRS Participation
(Source: FEMA[2])

[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 program against a nationally recognized benchmark.

4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.

5. The public information activities will build a knowledgeable constituency interested in supporting and improving flood protection measures.

6. A community would have an added incentive to maintain its flood programs over the years. The fact that its CRS status could be affected by the elimination of a flood related activity or a weakening of the regulatory requirements for new developments would be taken into account by the governing board when considering such actions.

7. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

**More information on the Community Rating System can be found at https://www.fema.gov/national-flood-insurance-program-community-rating-system **

NFIP Worksheets

Parish NFIP worksheets can be found in Appendix E: State Required Worksheets.

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4. Mitigation Strategy

Introduction

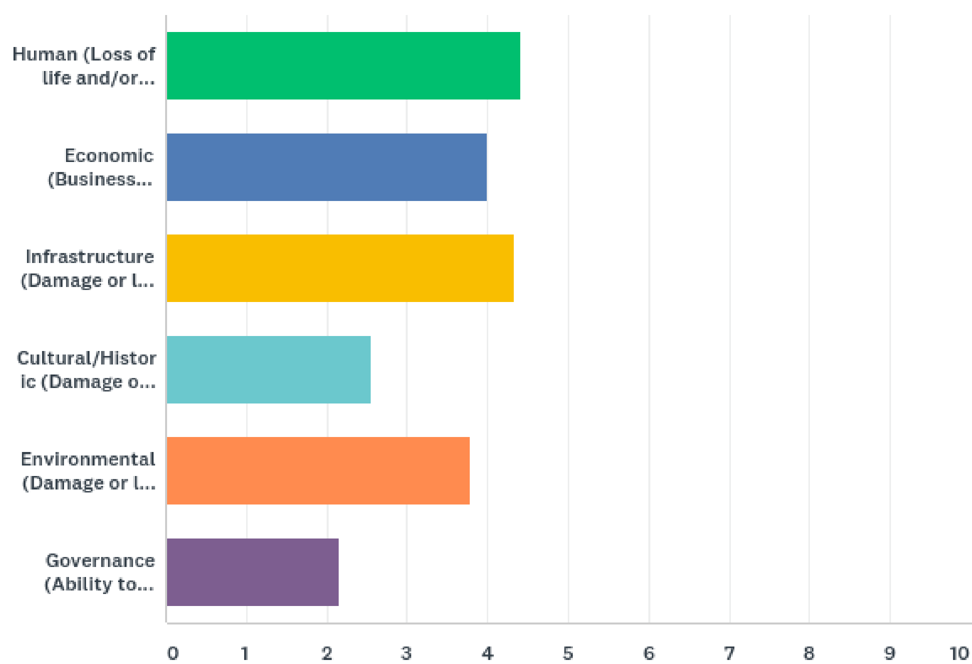
Cameron Parish's Hazard Mitigation Strategy has a common guiding principle and is the demonstration of the parish's commitment to reduce risks from hazards. The strategy also serves as a guide for parish and local decision makers as they commit resources to reducing the effects of hazards.

Cameron 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 2020 HMP update are a product of analysis and review of the Cameron Parish Hazard Mitigation Plan Steering Committee under the coordination of the Cameron Parish Office of Homeland Security and Emergency Preparedness. The committee was presented a list of projects and actions, new and from the 2015 plan, for review from April 2020 – August 2020.

An online public opinion survey of Cameron Parish residents was conducted between May 2020 and August 2020. The survey was designed to capture public perceptions and opinions regarding natural hazards in Cameron 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.

When asked to gauge from a list which categories were most susceptible to impacts caused by natural hazards, the top three categories selected were:

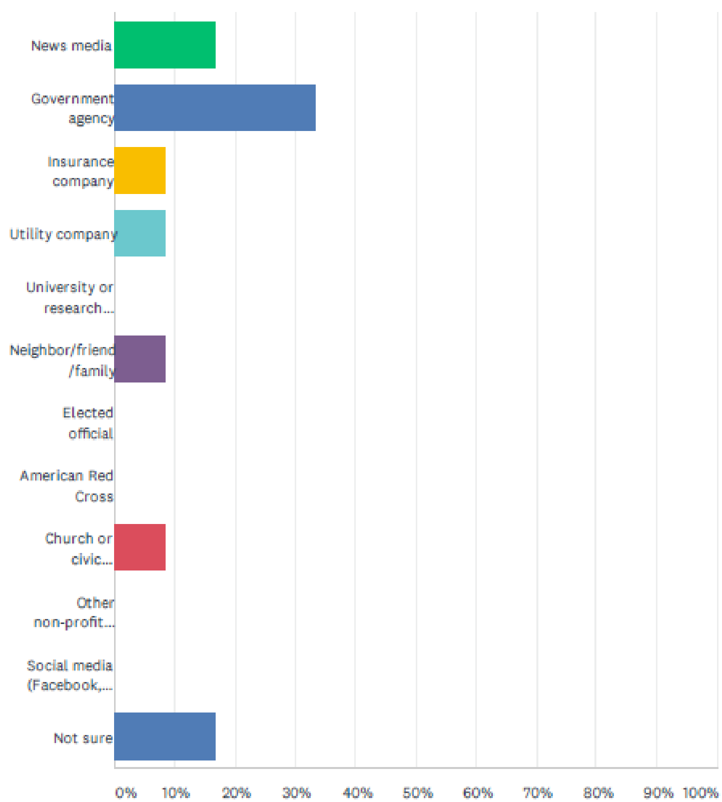
1. Human (Loss of life and/or injuries)
2. Infrastructure (Damage or loss of bridges, utilities, schools, etc.)
3. Economic (Business closures and/or job losses)



The survey results also indicated which natural disasters citizens were *most concerned* with being affected by in Cameron Parish. The top three natural disasters selected were:

1. Tropical Storm or Hurricane
2. Flooding
3. Tornado

	NOT CONCERNED	NOT VERY CONCERNED	NEUTRAL	SOMEWHAT CONCERNED	VERY CONCERNED	TOTAL	WEIGHTED AVERAGE
Drought	13.33% 2	33.33% 5	20.00% 3	13.33% 2	20.00% 3	15	2.93
Flood	0.00% 0	6.67% 1	0.00% 0	33.33% 5	60.00% 9	15	4.47
Severe Thunderstorm	0.00% 0	0.00% 0	13.33% 2	66.67% 10	20.00% 3	15	4.07
Tornado	0.00% 0	0.00% 0	6.67% 1	60.00% 9	33.33% 5	15	4.27
Tropical Storm or Hurricane	0.00% 0	0.00% 0	0.00% 0	13.33% 2	86.67% 13	15	4.87
Severe Winter Storm	0.00% 0	33.33% 5	26.67% 4	26.67% 4	13.33% 2	15	3.20
Hail	0.00% 0	20.00% 3	20.00% 3	46.67% 7	13.33% 2	15	3.53



The results shown above are related to the manner in which the general population receives information on how to make their home safer from natural disasters. These results are encouraging because it shows that the public has high confidence in the information being disseminated by local government agencies. Implementation of the outreach activities put forth by parish officials and offices seem to have been executed in a successful manner

This activity confirms that the goals and action items developed by the Cameron Parish Hazard Mitigation Plan Steering Committee are representative of the outlook of the community at large. Full survey results can be found here:

https://www.surveymonkey.com/results/SM-MMNSHBQB7/

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 Cameron 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, Cameron Parish 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 Cameron Parish Hazard Mitigation Plan Update Steering Committee represent long-term commitments by the parish. After assessing these goals, the committee decided that the current remain valid.

The goals are as follows:

1. Reduce the loss of life or property

2. Protect critical public facilities and thoroughfares

3. Ensure post-disaster operability of strategic facilities and thoroughfares

4. Develop incentive and community outreach/education programs that assist homeowners in protecting residential properties

5. Provide a long term mitigation solution in locations which experience repetitive hazard damage

6. Provide a cooperative, inter-jurisdictional / inter-agency solution to a problem

7. Show development and implementation of comprehensive programs, standards, and regulations that reduce future hazard damage

8. Avoid inappropriate future development in areas that are vulnerable to hazard damage

9. Reduce the level of hazard vulnerability in existing structures and developed property

10. Restore or protect natural resources, recreational areas, open space, or other environmental values

The Mitigation Action Plan focuses on actions to be taken by Cameron Parish. All of the activities in the Mitigation Action Plan will be focused on helping the parish and its communities 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 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.

2020 Mitigation Actions and Update on Previous Plan Actions

The Cameron Parish Hazard Mitigation Plan Steering Committee identified new actions that would reduce and/or prevent future damage within Cameron Parish and their respective communities. In that effort, the parish focused on a comprehensive range of specific mitigation actions. These actions were identified in thorough fashion by the consultant team and the committee by way of frequent and open communications and meetings held throughout the planning process. The addition of these new actions, coupled with any ongoing and/or carried over projects from their previous update, provide Cameron Parish with a solid mitigation strategy through which risk and losses will be reduced throughout the parish and its communities.

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 actions relative to the parish-wide goals are listed in the tables on the following pages. Additionally, action updates from the previous plan updates can be found in the same tables.

Cameron Parish Completed Mitigation Actions

Completed Mitigation Projects in Cameron Parish	Action Description	Funding Source	Timeframe	Responsible Party, Agency, or Department	Hazard	Status
Education and Outreach	Enhance the public outreach programs for the parish and all communities by increasing awareness of risks and safety for flooding, coastal hazards tropical cyclone, sinkholes, wind, lightning, hail, and tornadoes 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	1-5 years	Cameron Parish OHSEP	Tropical Cyclones, Wind, Hail, Lightning, Flooding, Tornadoes, Coastal Hazards, Sinkholes, Wildfires	Completed
Implementation of New State/Federal Initiatives through Public Outreach	Implement current and newly developed initiatives as directed by State and/or Federal regulations for public programs such as (but not limited to: PPGP, Pilot Reconstruction, SRL, RFC, PDM, FMA)	FEMA, Local	1-5 years	Public Works	Tropical Cyclones, Flooding, Wildfires	Completed
Continuity of Operations for Parish (Generators, Cooperative Agreements, Communications Equipment)	Purchase of generators and communications equipment for emergency response personnel and parish buildings so that day to day operations may continue during events to protect the life and safety of residents.	FEMA, Local	1-5 years	Cameron Parish OHSEP/Public Works	Tropical Cyclones, Wind, Lightning, Flooding, Tornadoes, Sinkholes, Wildfires	Completed
Emergency Warning Systems and Communications Equipment	Improve communication within the parish by purchasing, installing and implementing warning systems and communications equipment.	FEMA, Local	1-5 years	Cameron Parish OHSEP, Public Works	Tropical Cyclones, Wind, Hail, Lightning, Flooding, Tornadoes, Coastal Hazards, Sinkholes, Wildfires	Completed

Cameron Parish Existing Mitigation Actions						
Parish Specific Action	**Action Description**	**Funding Source**	**Timeframe**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
Building Retrofits	Benefits: Reduces damage from high winds, and helps assure that the public buildings can be used, occupied and operable during or after storms.	FEMA	1-5 years	Public Works	Wind, Tornadoes, Tropical Cyclones	Ongoing
Drainage Improvements	Ensure usability of roads and buildings that serve a public purpose such as government, healthcare, and school districts by retrofitting and improving drainage structures to reduce flood risk	FEMA, Local	1-10 years	Public Works	Tropical Cyclones, Flooding, Tornadoes, Wind	Ongoing
Acquisitions	Continue to mitigate flood damage by acquiring properties in the parish	FEMA, Local	1-5 years	Cameron Parish OHSEP	Tropical Cyclones, Flooding, Coastal Hazards, Sinkholes	Deleted
Elevation of Severe Repetitive Loss Properties	Mitigate parish flood damage by elevating homes and buildings throughout the parish.	FEMA. Local	1-5 years	Cameron Parish OHSEP/Public Works	Tropical Cyclones, Flooding	Ongoing
Safe Room Project	Construction of a safe room for first responders located in Cameron Parish.	FEMA	1-10 years	Cameron Parish OHSEP/Public Works	Tornadoes, Wind	Carried Over
Properties at Risk Study	Conduct and complete a study to determine the effects of risks to parish properties and implement a campaign to alert affected citizen of magnitude potential and provide mitigation suggestions.	FEMA, Local, Corps of Engineers	1-5 years	Cameron Parish OHSEP	Tropical Cyclones, Wind, Hail, Lightning, Flooding, Tornadoes, Coastal Hazards, Sinkholes, Wildfires	Carried Over
Water Rationing Program Implementation	Implement water rationing program for times of drought	FEMA, Local	1-5 years	Cameron Parish OHSEP, Local agencies	Drought	Carried Over
Development of Drought Emergency Operations Plan	Development of a long-term emergency plan for drought and implementation of measures contained in the plan	FEMA, Local, NOAA	1-5 years	Cameron Parish OHSEP	Drought	Carried Over

Cameron Parish Existing Mitigation Actions						
Reduction of Future Development	Reduce future development in floodplains and correct in appropriate development already in floodplains. This may include modification of codes, new zoning and ordinances.	FEMA, Police Jury	1-5 years	Cameron Parish OHSEP, Local Agencies, Public Works	Tropical Cyclones, Flooding, Coastal Hazards	Ongoing
Capital Improvement Projects for Sabine River	Carry out long-range capital improvement projects to support implementation of projects recommended by the US Army Corps of Engineers related to the Sabine River in relation to drainage improvements	FEMA, USARCOE, Local	1-5 years	Cameron Parish OHSEP, Public Works	Flooding, Tropical Cyclones	Ongoing

Cameron Parish New Mitigation Actions

Cameron Parish New Mitigation Actions						
Parish Specific Action	**Action Description**	**Funding Source**	**Timeframe**	**Responsible Party, Agency, or Department**	**Hazard**	**Status**
Generators and Communications Equipment for Essential Facilities	Purchase of generators and communications equipment for emergency response personnel and parish buildings so that day to day operations may continue during events to protect the life and safety of essential personnel and citizens	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP/Public Works	Tropical Cyclones, Wind, Lightning, Flooding, Tornadoes, Coastal Hazards, Sinkholes, Wildfires	New
Education and Outreach for NFIP	Continue to promote the purchase of flood insurance. Advertise the availability, cost, and coverage of flood insurance through the NFIP. This 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.	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP/Public Works	Flooding, Tropical Cyclone	New
Potable Water Supplies to Critical Facilities	Create redundancy of potable water supply to critical facilities, especially hospitals in the parish, and provide protection of potable water supply by acquisition/installation of backflow preventers at appropriate critical locations in the unincorporated areas	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP/Public Works	Tropical Cyclones, Wind, Lightning, Flooding, Tornadoes, Coastal Hazards, Sinkholes, Wildfires Drought	New
Flood Proofing of Critical Facilities	Flood-proof critical structures within the parish unincorporated areas to help promote continuation of critical services during a storm event	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP	Flooding, Tropical Cyclones	New
Enhanced Public Awareness Campaigns for All-Hazards	Increase public awareness of hazards and hazardous areas. Actions may include distribution of public awareness information regarding all hazards and potential mitigation measures; implementation of educational program for children and merchants; providing public education on the importance of maintaining the ditches,	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP	Tropical Cyclones, Wind, Lightning, Flooding, Tornadoes, Sinkholes, Coastal Hazards, Wildfires,	New

Cameron Parish New Mitigation Actions						
	promotion of the purchase of flood insurance for public. Sponsor a "Multi-Hazard Awareness Week", to educate the public on all hazards. Utilize social media for mass message distribution.				Drought, Extreme Heat	
Coastline Restoration Projects	Identify and implement coastline preservation and restoration projects that continue to protect the parish coastline from coastal hazards.	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP	Tropical Cyclones, Coastal Hazards	New
Elevate or acquire all RL and SRL structures in Cameron Parish in flood zones	Elevations parish wide of RL & SRL structures	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP/Grants Administrator	Flood, Tropical Cyclones	New
Cooling Shelter Construction	Construct or enhance a cooling facility for the public to utilize during periods of extreme heat to protect life and safety of citizens.	HMGP, Federal, local	1-5 years	Cameron Parish OHSEP	Extreme Heat	New

Action Prioritization

During the prioritization process, 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. Therefore, many projects were prioritized with these factors in mind. In addition, prioritization of the mitigation actions was performed based on the following economic criteria: i) whether the action can be performed with the existing parish resources; ii) whether the action requires additional funding from external sources; and iii) relative costs of the mitigation actions.

In all cases, the committee 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 prioritized the possible activities that could be pursued. Steering committee members consulted appropriate agencies in order to assist with the prioritizations. The results were items that address the major hazards, are appropriate for those hazards, are cost-effective, and are affordable. The steering committee met internally for mitigation action meetings to review and approve Cameron Parish mitigation actions. On-going actions, as well as actions which can be undertaken by existing parish 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.

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

Appendix A: Planning Process

Purpose

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

The Cameron Parish Hazard Mitigation Plan Update

The Cameron Parish Hazard Mitigation Plan Update process began in April 2019 with a series of meetings and collaborations between the contractor (SDMI) and the participating agencies. Update activities were intended to give each participating agency 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.

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

Date	Meeting or Outreach	Location	Public Invited	Purpose
04/20/2020	Kick Off Meeting	Cameron, LA	No	Discuss with Parish HM Director the expectations and requirements of the project.
5/28/2020	Initial Planning Meeting	Cameron, LA	No	Discuss with the plan Steering Committee expectations and requirements of the project. Assign plan worksheets to Parish.
7/8/2020	Risk Assessment Overview	Cameron, LA	Yes	Discuss and review the Risk Assessment with the Steering Committee. Discuss and review expectations for Public Meeting.
7/8/2020	Public Meeting	Cameron, 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 Cameron 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 Cameron Parish. In addition, questions covered the methods and techniques preferred for reducing the risks and losses associated with these hazards. Survey Results: https://www.surveymonkey.com/r/CameronHM2020

Planning

The plan update process consisted of several phases:

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

Coordination

The Cameron Parish Office of Homeland Security and Emergency Preparedness (OHSEP) oversaw the coordination of the 2020 Hazard Mitigation Plan Update Steering Committee during the update process. The parish OHSEP was responsible for identifying members for the committee.

The Parish Director and SDMI were jointly responsible for inviting the steering committees and key stakeholders to planned meetings and activities. SDMI assisted the Parish Director with press releases 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 steering committee encouraged participation from a broad range of parish 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
- Action item development
- Plan document draft review
- Formal adoption of the Hazard Mitigation Plan document following provisional approval by the State of Louisiana and FEMA

The 2020 Hazard Mitigation Plan Update Steering Committee consisted of representatives from the following parish, municipal or community stakeholders:

- Cameron Parish Government
- Cameron Office of Homeland Security and Emergency Preparedness
- Cameron Parish Public Works
- Cameron Parish Sheriff's Department
- Cameron Parish Fire Department
- Cameron Parish School Board
- Cameron Parish Pilot/American Press (media)
- Cameron Parish Police Jury
- Cameron Parish Council On Aging

The Vermilion Parish OHSEP Director was invited via email and phone call to participate in an effort to collaborate with neighboring communities. The Parishes discussed mitigation strategies they might partner together on in the future. The Cameron Parish OHSEP also included the US Army Corps of Engineers in Mitigation Action development planning and will continue to partner with the USARCE on ensuring mitigation actions in the future are a collaborative effort. SDMI assisted Cameron Parish with encouraging the collaboration with these neighboring communities via email by extending an invitation to the Cameron Hazard Mitigation Plan Update Meetings. The participation of the GOHSEP Region 1 Coordinator during the process also contributed to neighboring community representation.

As part of the coordination and planning process, the parish was provided the State Required Hazard Mitigation Plan Update Worksheet. The completed worksheets can be found in Appendix E – State Required Plan Update Worksheets.

Below is a detailed list of the 2020 HMPU Steering Committee:

Cameron Parish Hazard Mitigation Planning Committee				
Name	**Title**	**Agency**	**Email**	**Phone**
Danny Lavergne	OHSEP Director	Cameron OHSEP	oep@cameonpj.org	(337) 775-7048
Ashley Buller	OHSEP Asst. Director	Cameron Parish OHSEP	abuller@cameronpj.org	(337) 775-7048
Katie Armentor	Parish Administrator	Cameron Parish Police Jury	karmentor@cameronpj.org	(337) 775-5718
Kara Bonsall	Coastal Zone Administrator	Cameron Parish Police Jury	kbonsall@cameronpj.org	(337) 775-2612
Shawn Bonsall	Fire Chief	Cameron Parish Fire District #9	ogfd@camtel.net	(337) 274-8291
Toby Landry	Fire Chief	Cameron Parish Fire District #4	toby.landry@yahoo.com	(337) 912-0045
Ronnie Doucett	Fire Chief	Johnson Bayou Fire Department	rwdoucett@gmail.com	(337) 526-7171
Tim Dupont	Fire Chief	Cameron Fire Department	tbdupont@camtel.net	(337) 912-0927
Michael Welsh	Fire Chief	Hackberry Fire Department	mlwhvd@camtel.net	(337) 274-2717
Emily Mock	Road Superintendent	Cameron Parish Police Jury	emock@cameronpj.org	(337) 775-5718
Charley Lemons	Superintendent of Schools	Cameron Parish School Board	Charley_lemons@camsch.org	(337) 775-5784
Chris Savoie	Chief Deputy	Cameron Parish Sheriff's Office	chris@cameronso.org	(337) 775-5111
Ron Johnson	Sheriff	Cameron Parish Sheriff's Office	sheriffjohnson@gmail.com	(337) 775-5111
Orson Billings	Tax Assessor	Cameron Parish Police Jury	cpao@camtel.net	(337) 775-5416

Cameron Parish Hazard Mitigation Planning Committee				
Dinah Landry	Executive Director	Cameron Parish Council on Aging	dblandry@aol.com	(337) 598-5158
Cyndi Sellers	Reporter	Cameron Pilot/American Press	cyndisell@hotmail.com	(337) 764-3352

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 Cameron Parish programs and planning.

A measure of integration and coordination is achieved through the HMPU participation of Steering Committee members and community stakeholders who administer programs such as: floodplain management under the National Flood Insurance Program (NFIP), coastal protection and restoration, parish planning and zoning and building code enforcement.

Cameron Parish will continue to integrate the requirements of this Hazard Mitigation Plan into other local planning mechanisms that are to be identified through future meetings of the Parish, 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 any 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 Cameron Parish Hazard Mitigation Steering Committee will remain charged with ensuring that the goals and strategies of new and updated local planning documents for their communities 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 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 data and plans used in the planning process include those listed below.

- Louisiana Coastal Master Plan
- Parish Emergency Operations Plan
- State of Louisiana Hazard Mitigation Plan
- Flood Insurance Rate Maps
- Cameron Comprehensive Plan for Coastal Restoration and Protection

Further information on the plans can be found in the Capabilities Assessment, Section 3.

Meeting Documentation and Public Outreach Activities

The following pages contain documentation of the meetings and public outreach activities conducted during this hazard mitigation plan update for Cameron Parish.

Meeting #1: Hazard Mitigation Plan Update Kick-Off

Date: April 20, 2020

Location: Conference Call – Various Locations

Purpose: Discuss the expectations and requirements of the hazard mitigation plan update process and establish an initial project timeline with the Parish's OHSEP Director and any additional personnel.

Public Initiation: No

Meeting Invitees:

Name	Title	Agency
Danny Lavergne	Director	Cameron Parish OHSEP
Ashley Buller	Assistant Director	Cameron Parish OHSEP
Jeffrey Giering	State Hazard Mitigation Office	GOHSEP
Lauren Morgan	Associate Director	Stephenson Disaster Management Institute
Chris Rippetoe	Program Manager	Stephenson Disaster Management Institute

Meeting #2: Hazard Mitigation Plan Update Initial Planning Meeting

Date: May 28, 2020

Location: Cameron, Louisiana

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

Meeting Invitees:

Cameron Parish Hazard Mitigation Planning Committee		
Name	**Title**	**Agency**
Danny Lavergne	OHSEP Director	Cameron OHSEP
Ashley Buller	OHSEP Asst. Director	Cameron Parish OHSEP
Katie Armentor	Parish Administrator	Cameron Parish Police Jury
Kara Bonsall	Coastal Zone Administrator	Cameron Parish Police Jury
Shawn Bonsall	Fire Chief	Cameron Parish Fire District #9
Toby Landry	Fire Chief	Cameron Parish Fire District #4
Ronnie Doucett	Fire Chief	Johnson Bayou Fire Department
Tim Dupont	Fire Chief	Cameron Fire Department
Michael Welsh	Fire Chief	Hackberry Fire Department
Emily Mock	Road Superintendent	Cameron Parish Police Jury
Charley Lemons	Superintendent of Schools	Cameron Parish School Board
Chris Savoie	Chief Deputy	Cameron Parish Sheriff's Office
Ron Johnson	Sheriff	Cameron Parish Sheriff's Office
Orson Billings	Tax Assessor	Cameron Parish Police Jury
Dinah Landry	Executive Director	Cameron Parish Council on Aging
Cyndi Sellers	Reporter	Cameron Pilot/American Press

Meeting #3: Risk Assessment Overview

Date: July 8, 2020

Location: Cameron, Louisiana

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

Public Initiation: No

Meeting Invitees:

Cameron Parish Hazard Mitigation Planning Committee		
Name	**Title**	**Agency**
Danny Lavergne	OHSEP Director	Cameron OHSEP
Ashley Buller	OHSEP Asst. Director	Cameron Parish OHSEP
Katie Armentor	Parish Administrator	Cameron Parish Police Jury
Kara Bonsall	Coastal Zone Administrator	Cameron Parish Police Jury
Shawn Bonsall	Fire Chief	Cameron Parish Fire District #9
Toby Landry	Fire Chief	Cameron Parish Fire District #4
Ronnie Doucett	Fire Chief	Johnson Bayou Fire Department
Tim Dupont	Fire Chief	Cameron Fire Department
Michael Welsh	Fire Chief	Hackberry Fire Department
Emily Mock	Road Superintendent	Cameron Parish Police Jury
Charley Lemons	Superintendent of Schools	Cameron Parish School Board
Chris Savoie	Chief Deputy	Cameron Parish Sheriff's Office
Ron Johnson	Sheriff	Cameron Parish Sheriff's Office
Orson Billings	Tax Assessor	Cameron Parish Police Jury
Dinah Landry	Executive Director	Cameron Parish Council on Aging
Cyndi Sellers	Reporter	Cameron Pilot/American Press

Meeting #4: Public Meeting

Date: July 8, 2020

Location: Cameron, Louisiana

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

Public Initiation: Yes

Meeting Invitees:

Cameron Parish Hazard Mitigation Planning Committee		
Name	**Title**	**Agency**
Danny Lavergne	OHSEP Director	Cameron OHSEP
Ashley Buller	OHSEP Asst. Director	Cameron Parish OHSEP
Katie Armentor	Parish Administrator	Cameron Parish Police Jury
Kara Bonsall	Coastal Zone Administrator	Cameron Parish Police Jury
Shawn Bonsall	Fire Chief	Cameron Parish Fire District #9
Toby Landry	Fire Chief	Cameron Parish Fire District #4
Ronnie Doucett	Fire Chief	Johnson Bayou Fire Department
Tim Dupont	Fire Chief	Cameron Fire Department
Michael Welsh	Fire Chief	Hackberry Fire Department
Emily Mock	Road Superintendent	Cameron Parish Police Jury
Charley Lemons	Superintendent of Schools	Cameron Parish School Board
Chris Savoie	Chief Deputy	Cameron Parish Sheriff's Office
Ron Johnson	Sheriff	Cameron Parish Sheriff's Office
Orson Billings	Tax Assessor	Cameron Parish Police Jury
Dinah Landry	Executive Director	Cameron Parish Council on Aging
Cyndi Sellers	Reporter	Cameron Pilot/American Press

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 parish and community specific 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 division 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.

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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 Cameron Parish Hazard Mitigation Plan Update must be reviewed and re-submitted for approval every five years. However, it is anticipated that the plan will need revisiting prior to the five-year period. To determine the need to update the plan, the plan administrator, currently the Director of the Cameron Parish OHSEP, will be responsible for monitoring and evaluating the plan.

On a quarterly basis, the plan administrator will monitor the plan to assess if significant changes have occurred in the premises upon which the plan was updated. The plan administrator will look at items such as:

- Changes in data used to determine vulnerabilities and loss estimates, in terms of quality and availability
- Changes in Federal or state plans that could affect the continued implementation of any mitigation actions
- The identification of new hazards requiring new mitigation actions
- Changes in the parish residents' perceptions relative to specific hazards
- Review and update any incorporation of existing or new planning programs
- Review and update the solicitation of public input
- Overview and documentation of any updates to sections of the plan that occurred over the last year.

Responsible Parties

Cameron Parish OHSEP will serve as the plan administrator. The administering agency for each mitigation action is responsible for providing a quarterly status report to the plan administrator detailing the progress of the mitigation action, difficulties encountered, success of coordination efforts, and any suggested revisions. The plan administrator will consolidate this information for the active mitigation action and will produce a status report for the plan as a whole.

The plan's status reports will be published in public places and communicated within the community through service, religious, professional, and social organizations.

Methods for Monitoring and Evaluating the Plan and Plan Evaluation Criteria

On an annual basis, the plan administrator will reconvene the Cameron Parish HMP Steering Committee including additional stakeholders to:

- Review the progress and goals of the mitigation actions to determine their relevance to changing situations in the parish, as well as changes in state or Federal policy, and to ensure they are addressing current and expected conditions
- Review the risk assessment portion of the plan to determine if this information should be updated or modified, given any new available data
- Review the list of critical facilities and modify as needed
- Any items that may have changed the level of risk to the parish and parish residents
- Review and update any incorporation of existing or new planning programs
- Review and update the solicitation of public input
- Overview and documentation of any updates to sections of the plan that occurred over the last year.

Additionally, the public will be canvassed to solicit public input to continue Cameron 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 annual 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.

For all revisions, prior to the required five-year update and for the five-year update, the plan administrator will assign plan update responsibilities to the Steering Committee members and other available resources as applicable. The plan administrator will manage the update process through to the completion of the next revision of the plan. The plan administrator will be responsible for having the revision reviewed and approved.

The review in the fourth year of the plan will become the basis for the five-year update revision. The plan administrator will have six months to make appropriate changes to the plan and obtain approval from the Cameron Parish Police Jury before submitting the updated plan to the State of Louisiana Hazard Mitigation Officer and FEMA for acceptance and re-approval. In order to provide the sufficient time for an iterative review and approval process, the plan should be submitted six months prior to the five-year deadline.

The plan administrator will notify all interested parties when changes have been made to the parish plan.

2020 Plan Version Plan Method and Schedule Evaluation

For the current plan update, the previously approved plan's method and schedule were evaluated to determine if the elements and processes involved in the required 2020 update were adequate. 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 the responsibility of the Cameron Parish Hazard Mitigation Plan Steering Committee to determine additional implementation procedures when appropriate. This may include integrating the requirements of the Cameron Parish Hazard Mitigation Plan into planning documents, processes, or mechanisms as follows:

- Ordinances, Resolutions, Regulations
- Comprehensive Economic Development Strategy
- Parish Emergency Operations Plans
- Parish Continuity of Operations Plan
- State of Louisiana Hazard Mitigation Plan
- Cameron Comprehensive Plan for Coastal Restoration and Protection

The above referenced ordinances, building codes, and regulations will be amended by a resolution in the parish council in order to incorporate the mitigation actions identified in the HMP.

Opportunities to integrate the requirements of this plan into other local planning mechanisms will continue to be identified through future meetings of the Cameron 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 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. The members of the steering committee will remain charged with ensuring that the goals and strategies of new and updated local planning documents for their agencies are consistent with the goals and actions of the Cameron 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, such as a Risk Assessment, Comprehensive Plan, Capital Improvements Plan, or Emergency Operations Plan, the parish 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 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. And while the development and maintenance of this stand-alone plan has been recognized as the most effective course of mitigation action implementation, individual facets of this plan have been used to bolster other planning and mitigation efforts. The following parish plans incorporate requirements of the Cameron Parish Hazard Mitigation Plan Update as follows:

- Comprehensive Master Plan – Updated annually by Cameron Parish Government
- Comprehensive Economic Development Strategy – Updated as annually by Cameron Parish Government
- Local Emergency Operations Plan – Updated annually by Cameron Parish OHSEP
- Continuity of Operations Plan – Updated as needed by Cameron 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 annually at the steering committee meeting. These efforts may include:

- 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.

Appendix C: Essential Facilities

Cameron Parish Essential Facilities

Cameron Parish Unincorporated Essential Facilities												
Type	Name	Coastal Hazards	Drought	Excessive Heat	Flooding	Sinkholes	Hail	Lightning	Wind	Tornadoes	Tropical Cyclones	Wildfires
Fire and Rescue	Cameron Fire District #1 Fire Station	X			X	X	X	X	X	X	X	X
	Cameron Parish Fire District # 9 Station	X			X		X	X	X	X	X	X
	Creole Fire Station	X			X		X	X	X	X	X	X
	Fire District #10 – Holly Beach Station	X			X		X	X	X	X	X	X
	Fire Station	X			X	X	X	X	X	X	X	X
	Fire Station	X			X	X	X	X	X	X	X	X
	Fire Station	X			X	X	X	X	X	X	X	X
	Grand Chenier District #9 Fire Station	X			X		X	X	X	X	X	X
	Grandlake Sweetlake Volunteer Fire Department	X			X		X	X	X	X	X	X
	Hackberry Volunteer Fire Department	X			X	X	X	X	X	X	X	X
	Johnson Bayou Fire Station	X			X		X	X	X	X	X	X
	Klondike Volunteer Fire Department	X			X		X	X	X	X	X	X
	Governmental Complex West	X			X		X	X	X	X	X	X
Government	Cameron Ferry - DOTD	X			X		X	X	X	X	X	X

Cameron Parish Unincorporated Essential Facilities												
Type	Name	Coastal Hazards	Drought	Excessive Heat	Flooding	Sinkholes	Hail	Lightning	Wind	Tornadoes	Tropical Cyclones	Wildfires
	Cameron Paris East Annex - District Attorney & Tax Assessor	X			X		X	X	X	X	X	X
	Cameron Parish Courthouse	X			X		X	X	X	X	X	X
	CDBG Housing Assistance Program	X			X		X	X	X	X	X	X
	Cameron Parish School Board Central Office	X			X		X	X	X	X	X	X
	DOTD Creole Maintenance Unit	X			X		X	X	X	X	X	X
	Cameron Parish School Board Temporary Warehouse	X			X		X	X	X	X	X	X
	Creole Solid Waste Collection Station	X			X		X	X	X	X	X	X
	Grand Chenier Solid Waste	X			X		X	X	X	X	X	X
	Parish Maintenance	X			X		X	X	X	X	X	X
	Cameron Parish - New Maintenance Garage For School Board	X			X		X	X	X	X	X	X
	Cameron Dump	X			X		X	X	X	X	X	X
	East Cameron Maintenance Facility	X			X		X	X	X	X	X	X
	Justice of the Peace - Carrie Broussard	X			X		X	X	X	X	X	X
	Cameron Parish Solid Waste Collection	X			X		X	X	X	X	X	X

Cameron Parish Unincorporated Essential Facilities												
Type	**Name**	**Coastal Hazards**	**Drought**	**Excessive Heat**	**Flooding**	**Sinkholes**	**Hail**	**Lightning**	**Wind**	**Tornadoes**	**Tropical Cyclones**	**Wildfires**
	Grand Lake Recreation District #5 & Cameron Parish Police Jury Ward Barn	X			X		X	X	X	X	X	X
	Cameron Parish Community Action Agency	X			X		X	X	X	X	X	X
	Cameron Public Transit	X			X		X	X	X	X	X	X
	Cameron Parish Maintenance Barn	X			X		X	X	X	X	X	X
	Big Pasture Solid Waste Collection Site	X			X		X	X	X	X	X	X
	Holly Beach Solid Waste	X			X		X	X	X	X	X	X
	DOTD Holly Beach Maintenance Unit	X			X		X	X	X	X	X	X
Law Enforcement	Cameron Parish Sheriff’s Office	X			X		X	X	X	X	X	X
Public Health	South Cameron Hospital	X			X		X	X	X	X	X	X
	South Cameron Memorial Hospital System Rural Health Clinic	X			X	X	X	X	X	X	X	X
Schools	Grand Lake School	X			X		X	X	X	X	X	X
	Hackberry High School	X			X	X	X	X	X	X	X	X
	Johnson Bayou School	X			X		X	X	X	X	X	X
	South Cameron High School	X			X		X	X	X	X	X	X
	South Cameron School Sports Complex	X			X		X	X	X	X	X	X

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Appendix D: Plan Adoption

MAGNUS MCGEE
President

SCOTT TRAHAN
Vice President

KATIE ARMENTOR
Administrator

MARY CARROLL
Secretary

KAYLA JOHNSON
Treasurer

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THOMAS MCDANIEL
District 5
Scott Trahan
District 6
Joe Dupont
District 7
MCKINLEY GUIDRY
District 8
Lawrence faulk, jr.

RESOLUTION

RESOLUTION NO. 1129

STATE OF LOUISIANA
PARISH OF CAMERON

A RESOLUTION OF THE CAMERON PARISH POLICE JURY
CAMERON PARISH HAZARD MITIGATION PLAN - 2020

WHEREAS, the Cameron Parish Police Jury recognizes the threat that natural hazards pose to people and property within; and

WHEREAS, the Parish of Cameron has prepared a multi-hazard mitigation plan, hereby known as CAMERON PARISH HAZARD MITIGATION PLAN – 2020 in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Cameron Parish Hazard Mitigation Plan – 2020 identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Cameron Parish from the impacts of future hazards and disasters; and

WHEREAS, adoption by the Cameron Parish Police Jury demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the Cameron Parish Hazard Mitigation Plan – 2020

NOW THEREFORE, BE IT RESOLVED, by the Parish of Cameron, Louisiana, that the Cameron Parish Police Jury adopts the Cameron Parish Hazard Mitigation Plan – 2020

ADOPTED by a vote of 8 in favor and 0 against, and 0 abstaining, this 13th day of November, 2020.

APPROVED:

MAGNUS MCGEE, PRESIDENT
CAMERON PARISH POLICE JURY

ATTEST:

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Appendix E: State Required Worksheets

During the planning process (Appendix A) the Hazard Mitigation Plan Update Steering Committee was provided state-required plan update process worksheets to be filled out. The worksheets were presented at the Initial Planning Meeting by SDMI as tools for assisting in the update of the Hazard Mitigation Plan, but also as a State Requirement (Element E) for the update. 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 state required worksheets.

Mitigation Planning Team

Cameron Parish Hazard Mitigation Planning Committee				
Name	**Title**	**Agency**	**Email**	**Phone**
Danny Lavergne	OHSEP Director	Cameron OHSEP	oep@cameonpj.org	(337) 775-7048
Ashley Buller	OHSEP Asst. Director	Cameron Parish OHSEP	abuller@cameronpj.org	(337) 775-7048
Katie Armentor	Parish Administrator	Cameron Parish Police Jury	karmentor@cameronpj.org	(337) 775-5718
Kara Bonsall	Coastal Zone Administrator	Cameron Parish Police Jury	kbonsall@cameronpj.org	(337) 775-2612
Shawn Bonsall	Fire Chief	Cameron Parish Fire District #9	ogfd@camtel.net	(337) 274-8291
Toby Landry	Fire Chief	Cameron Parish Fire District #4	toby.landry@yahoo.com	(337) 912-0045
Ronnie Doucett	Fire Chief	Johnson Bayou Fire Department	rwdoucett@gmail.com	(337) 526-7171
Tim Dupont	Fire Chief	Cameron Fire Department	tbdupont@camtel.net	(337) 912-0927
Michael Welsh	Fire Chief	Hackberry Fire Department	mlwhvd@camtel.net	(337) 274-2717
Emily Mock	Road Superintendent	Cameron Parish Police Jury	emock@cameronpj.org	(337) 775-5718
Charley Lemons	Superintendent of Schools	Cameron Parish School Board	Charley_lemons@camsch.org	(337) 775-5784
Chris Savoie	Chief Deputy	Cameron Parish Sheriff's Office	chris@cameronso.org	(337) 775-5111
Ron Johnson	Sheriff	Cameron Parish Sheriff's Office	sheriffjohnson@gmail.com	(337) 775-5111
Orson Billings	Tax Assessor	Cameron Parish Police Jury	cpao@camtel.net	(337) 775-5416
Dinah Landry	Executive Director	Cameron Parish Council on Aging	dblandry@aol.com	(337) 598-5158
Cyndi Sellers	Reporter	Cameron Pilot/American Press	cyndisell@hotmail.com	(337) 764-3352

Capability Assessment

Worksheet 4.1: Capability Assessment Worksheet		
Local mitigation capabilities are existing authorities, polices and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible.		
Planning and Regulatory		
Please indicate which of the following plans and regulatory capabilities your jurisdiction has in place.		
	Cameron Parish	**Comments**
Plans	Yes / No	
Comprehensive / Master Plan	YES	Parish has a Coastal Restoration Committee to update yearly
Capital Improvements Plan	NO	
Economic Development Plan	NO	Comprehensive Economic Development Strategy
Local Emergency Operations Plan	YES	Yearly
Continuity of Operations Plan	YES	
Transportation Plan	NO	Evacuation Planning
Stormwater Management Plan	NO	
Community Wildfire Protection Plan	NO	
Other plans (redevelopment, recovery, coastal zone management)	NO	
Building Code, Permitting and Inspections	Yes / No	
Building Code	YES	I CODES 2012
Building Code Effectiveness Grading Schedule (BCEGS) Score	NO	
Fire Department ISO/PIAL rating	5	
Site plan review requirements	NO	
Land Use Planning and Ordinances	Yes / No	
Zoning Ordinance	NO	
Subdivision Ordinance	YES	
Floodplain Ordinance	YES	
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)	NO	
Flood Insurance Rate Maps	YES	
Acquisition of land for open space and public recreation uses	NO	
Other	NO	

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

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

Education and Outreach		
Identify education and outreach programs and methods, already in place that could be used to implement mitigation activities and communicate hazard-related information.		
	Cameron Parish	Comments
Program / Organization	Yes / No	
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	YES	Cameron Community Action Agency also assists with getting information to Head Starts and low income families
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	YES	
Natural Disaster or safety related school program	No	
Storm Ready certification	No	
Firewise Communities certification	No	
Public/Private partnership initiatives addressing disaster-related issues	No	
Other	No	

Building Inventory

Cameron Parish Owned Building Information							
Cameron Parish							
Critical Facility (If Yes, Mark X)	Name of Building	Purpose of Building	Address	City	Assessed Value	Date Built	Construction Type
	Cameron Multi Purpose	Recreational	122 Recreation Center Lane	Cameron	257,625	8/20/2012	Metal
	Co-op Extension Office	office	180 Henry Street	Cameron	90,300	12/5/2012	Reinforced Masonry
	Correctional Facility	office	124 Recreation Center Lane	Cameron	1,672,800	4/9/2015	Reinforced Masonry
	East Annex Building	office	110 Smith Circle	Cameron	435,300	1/8/2010	Reinforced Masonry
	West Annex Building	office	148 Smith Circle	Cameron	713,250	8/14/2012	Reinforced Masonry
	Health Unit	Medical Office	107 Recreation Center	Cameron	90,000	3/2/2009	Reinforced Masonry
	Court House and Jail	office	119 Smith Circle	Cameron	648,000	1937	Reinforced Masonry
	Old D.A. Office	vacant	124 Smith Circle	Cameron	60,000	unknown	Metal
	Grand Lake Conference Center	office	10098 Gulf Hwy	Grand Lake	7,914	2/4/2013	Metal
	Hackberry Maint Barn	Maintenance Building	105 Parish Road	Hackberry	51,000	unknown	Metal
	East Cameron Maintenance Facility	Maintenance Building	153 LeBlanc Road	Creole	305,379	5/20/2009	Metal
	Johnson Bayou Maint. Barn	Maintenance Building	881 Smith Ridge	Johnson Bayou	34,904	9/14/2007	Metal
	Grand Chenier Maint. Barn	Maintenance Building	205 Recreation	Grand Chenier	25,313	9/14/2007	Metal
	Klondike Barn	Maintenance Building	440 Veterans Memorial Dr.	Gueydan	25,220	11/20/2014	Metal

Cameron Parish Owned Building Information							
Cameron Parish							
Critical Facility (If Yes, Mark X)	Name of Building	Purpose of Building	Address	City	Assessed Value	Date Built	Construction Type
	Pole Barn	Maintenance Building	6103 Holly Beach	Johnson Bayou	6,450	unknown	Metal
	Hackberry Waterworks	office	1190 Main Street	Hackberry	52,136	11/1/2007	Metal
	Grand Lake Waterworks	office	111 Dennis Lane	Bell City	21,547	8/1/1999	Metal
	Cameron Waterworks	office	126 Ann Street	Cameron	41,038	9/7/2006	Metal
	Grand Chenier Recreation	recreational	113 Recreation Lane	Grand Chenier	100,000	10/22/2010	Metal
	Grand Lake Recreation	Recreational	108 Recreation Lane	Grand Lake	100,000	unknown	Metal
	Hackberry Community Center	Recreational	1250B Recreation Lane	Hackberry	269,000	2018	Metal
	Hackberry Recreation Center	Recreational	1250A Recreation Lane	Hackberry	100,000	unknown	Metal
	Johnson Bayou Recreation Center	Recreational	135 Berwick Road	Johnson Bayou	200,000	5/22/2013	Metal
	Hackberry Multi Purpose Building	Recreational	986 Main Street	Hackberry	75,000	unknown	Metal
	Multi-Purpose Facility	Recreational	434 Veterans Memorial Drive	Lake Arthur	11,340	unknown	Metal
	Johnson Bayou Multi Purpose Building	Recreational	5556 Gulf Beach Hwy	Johnson Bayou	210,000	7/10/2008	Metal
	Grand Lake Library	Library	10200 Gulf Hwy	Grand Lake	22,553	8/16/2012	Metal
	Johnson Bayou Library	Library	4586 Gulf Beach Hwy	Johnson Bayou	98,700	11/3/2010	Reinforced Masonry
	Grand Chenier Library	Library	2863 Grand Chenier Hwy	Grand Chenier	90,375	12/11/2012	Metal

Cameron Parish Owned Building Information							
Cameron Parish							
Critical Facility (If Yes, Mark X)	Name of Building	Purpose of Building	Address	City	Assessed Value	Date Built	Construction Type
	Hackberry Library	Library	983 Main Street	Hackberry	7,500	unknown	Reinforced Masonry
	Lowry Library	Library	460 Lowry Hwy	Lake Arthur	25,090	10/22/2014	Metal
X	Cameron Fire Station	Fire Station	449 Marshall Street	Cameron	210,000	12/16/2009	Reinforced Masonry
	Cameron Fire Sub Station	Fire Station	122 Ridgecrest	Cameron	10,715	12/30/2008	Select One
	Muria Fire Station	Fire Station	129 Muria Road	Creole	243,958	8/13/2012	Reinforced Masonry
X	Grand Chenier Water and Fire Station	Fire Station	4011 Grand Chenier	Grand Chener	210,000	5/30/2008	Reinforced Masonry
	Grand Chenier Fire Station	Fire Station	1523 Oak Grove Hwy	Grand Chener	32,250	9/14/2007	Metal
	Hackberry Fire Station	Fire Station	1025 Main Street	Hackberry	559,125	11/5/2017	Metal
X	Hackberry Fire Station	Fire Station	110 Volunteer Lane	Hackberry	35,100	3/15/2010	Metal
X	Johnson Bayou Waterworks and Fire Station	Fire Station	6246 Gulf Beach Hwy	Johnson Bayou	157,358	10/8/2012	Metal
X	Johnson Bayou Fire Garage Station	Fire Station	6246 Gulf Beach Hwy	Johnson Bayou	157,358	10/8/2012	Metal
X	Holly Beach Fire Station	Fire Station	6051 Holly Beach Fire	Johnson Bayou	208,500	11/4/2011	Metal
	Grand Lake Fire Station	Fire Station	160 Big Pasture Road	Big Lake	14,100	9/17/2009	Metal
X	Grand Lake Fire Station	Fire Station	957 Hwy 384B	Grand Lake	18,900	12/10/2013	Metal
	Grand Lake Fire Station (Grangerville)	Fire Station	142 Mhires Lane	Bell City	14,100	unknown	Metal

Cameron Parish Owned Building Information							
Cameron Parish							
Critical Facility (If Yes, Mark X)	Name of Building	Purpose of Building	Address	City	Assessed Value	Date Built	Construction Type
X	Grand Lake Fire Station (Granger)	Fire Station	140 Granger Lane	Grand Lake	3,750	unknown	Metal
X	Lowry Fire Station	Fire Station	460 Lowry Hwy	Lake Arthur	18,000	7/15/2011	Metal
X	Klondike Fire Station	Fire Station	430 Veteran's Drive	Klondike	42,000	unknown	Metal
	Creole Community Center & Fire Station	Fire Station	184 E Creole Hwy B	Creole	15,120	5/16/2009	Metal
	Creole Fire Garage Station	Fire Station	184 E Creole Hwy B	Creole	20,000	5/16/2009	Metal
X	Creole Fire Station	Fire Station	135 Camille Lane	Creole	30,000	unknown	Metal
X	Grand Lake Fireman Center	Recreational	963 Hwy 384B	Grand Lake	13,500	1/15/2014	Metal
X	Sheriff's Office	Law Enforcement	124 Recreation Center Lane	Cameron			

Vulnerable Populations

Vulnerable Populations Worksheet					
Cameron Parish					
All Hospitals (Private or Public)	**Address**	**City**	**Zip Code**	**Latitude**	**Longitude**
South Cameron Memorial Hospital	5360 West Creole Hwy	Cameron	70631	N/A	N/A
Nursing Homes (Private or Public)	**Address**	**City**	**Zip Code**	**Latitude**	**Longitude**
None				N/A	N/A
Mobile Home Parks	**Address**	**City**	**Zip Code**	**Latitude**	**Longitude**
Long Acre Trailer Park	100 Long Acre Dr	Grand Lake	70607	N/A	N/A
Hebert Trailer Park	207 Hebert Trailer Park Rd	Grand Lake	70607	N/A	N/A
Shandy Acres	1471 Hwy 384	Grand Lake	70607	N/A	N/A
Twin Oaks Trailer Park	111 Twin Oaks Rd	Grand Lake	70607	N/A	N/A

National Flood Insurance Program (NFIP)

National Flood Insurance Program (NFIP)		
Cameron Parish		
Insurance Summary		**Comments**
How many NFIP polices are in the community? What is the total premium and coverage?	Total policies in community 1,652, coverage $403,023,200 total premium annually $2,021,649	
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?	3,113 claims paid since 1978, total claim paid $174,030,630, Substantial damage paid losses 1,575.	
How many structures are exposed to flood risk within the community?	305	
Describe any areas of flood risk with limited NFIP policy coverage.	N/A	
Staff Resources		**Comments**
Is the Community FPA or NFIP Coordinator certified?	Cameron Parish has 3 Certified FPA	
Is flood plain management an auxiliary function?	Yes	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Permit review inspections, town hall meetings, GIS, flood maps	
What are the barriers to running an effective NFIP program in the community, if any?	None	
Compliance History		**Comments**
Is the community in good standing with the NFIP?	Yes	
Are there any outstanding compliance issues (i.e., current violations)?	No outstanding issues	
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	Oct-19	
Is a CAV or CAC scheduled or needed? If so when?	No	
Regulation		**Comments**
When did the community enter the NFIP?	3-Apr-84	
Are the FIRMs digital or paper?	Digital and Paper	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Yes	
Community Rating System (CRS)		**Comments**
Does the community participate in CRS?	No	
What is the community's CRS Class Ranking?	N/A	
Does the plan include CRS planning requirements?	N/A	