Plaquemines Parish Adaptation Strategy



Project Team

Led by the Louisiana Office of Community Development (OCD) and the Foundation for Louisiana (FFL), the multidisciplinary Louisiana's Strategic Adaptations for Future Environments (LA SAFE) team developed strategies in concert with an extensive community engagement campaign to provide an integrated approach in the development of an adaptation strategy for coastal Louisiana.

Funder

U.S. Department of Housing and Urban Development (HUD)



Partners

Louisiana Office of Community Development Disaster Recovery Unit, Lead Partner Foundation for Louisiana, Partner







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Other Partners

Franklin Associates, JCW, NOVAC, Coastal Communities Consulting, Greater New Orleans, Inc., Coalition to Restore Coastal Louisiana, Restore or Retreat, Restore the Mississippi River Delta, National Wildlife Federation, Environmental Defense Fund, Lake Pontchartrain Basin Foundation, Gulf Restoration Network, Bayou Interfaith Shared Community Organizing, Lower 9th Ward Center for Sustainable Engagement & Development, Zion Travelers Cooperative Center

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LA SAFE MISSION

Working together for community resilience, economic prosperity, and a better quality of life for everyone in Louisiana.

LA SAFE GOALS

- 1. To generate parish-wide, community-driven adaptation strategies focused on opportunities for residents and stakeholders to proactively adapt and prepare for anticipated environmental changes over the next 10, 25, and 50 years.
- 2. To implement a catalytic project in each of the six parishes that demonstrates adaptive development practices that conform to current and future flood risks. Furthermore, LA SAFE is intended to identify and support development of resilience-building projects and practices that can serve as models for the entire region.
- 3. To create a statewide adaptation model that enhances long-term sustainability and resilience for all Louisiana parishes.

LA SAFE is a comprehensive strategy for community **adaptation** and **resilience**, concepts that may have different meanings to different people. For the purposes of this strategy, the following definitions will be used.

Adaptation

the process of modifying behavior to suit changing environmental conditions.

Resilience

the capacity of individuals, communities, and systems to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.

Executive Summary

The document that follows provides an overview of the LA SAFE program developed in six Louisiana parishes facing increased flood risk associated with environmental changes. It then describes the process and products of the LA SAFE effort in Plaquemines Parish specifically. In addition to a vision for the future of the parish—and the goals, strategies, and actions identified to achieve that vision—these chapters also provide information that describes past, present, and likely future conditions in the parish, as well as an in-depth look at the activities and outputs of the community engagement process that has driven the development and prioritization of recommended adaptation strategies. Additional information on the background, research, analysis, planning process, and stakeholder engagement involved in the LA SAFE process can be found in the following chapters, as well as in the LA SAFE Regional Adaptation Strategy.

The Plaquemines Parish Adaptation Strategy comprises—

Chapter 1: LA SAFE Program

Provides an overview of the scope of work and adaptation planning objectives designed to support LA SAFE's mission to work together for community resilience, economic prosperity, and a better quality of life for everyone in Louisiana. This chapter includes an in-depth look at the community engagement process that took place over the course of five rounds of meetings conducted in the Plaquemines Parish communities of Belle Chasse, Davant, Port Sulphur, and Buras. The resident input collected during this process identified shared concerns and hopes for the future, generated ideas for adaptation strategies, and helped determine priorities to guide planning and investment. Inclusive resident engagement has been and continues to be the driving force of LA SAFE.

Chapter 2: Hazards and Vulnerabilities

Provides detailed descriptions of hazards such as land loss, subsidence, heavy precipitation, and storm surge that contribute to growing flood risk in Plaquemines Parish. Drawing upon Louisiana's Coastal Protection and Restoration Authority (CPRA) storm surge modeling and FEMA floodplain data, this chapter defines characteristics of high-, moderate-, and low-risk flood zones as well as the impacts of socioeconomic vulnerabilities that amplify risk, such as poverty, aging, rising insurance costs, geographical shifts in population, and a shortage of affordable housing in the parish.

Chapter 3: Existing Conditions

Describes key features of Plaquemines Parish's natural environment and the ways in which topographical features and natural assets have affected early settlement patterns and the subsequent development of housing stock, transportation infrastructure, and economic activity. This chapter also describes the heritage and major cultural traditions and assets found in the parish. To lay groundwork for the vision and strategies detailed in Chapter 4, this chapter summarizes the implications of growing flood risk for the parish's assets in these categories—natural environment, housing, transportation, economy, and culture—as well as describes opportunities for preservation, growth, and investment.

Executive Summary

Chapter 4: Vision and Strategies

Presents the vision for high-, moderate- and low-risk zones and strategies for adaptation developed for Plaquemines Parish by residents and community leaders working closely with planning and design experts throughout the LA SAFE engagement process. The strategies address five adaptation goals:

- Manage flooding and subsidence
- Direct growth to low-risk areas
- Improve mobility throughout the parish and region
- Strengthen and diversify local economies
- Protect and promote historic and cultural assets

The strategies presented in this chapter include best practices for stormwater management, inclusive development and revitalization of key corridors in low-risk zones, expansion of transportation choices and implementation of Complete Streets, provision of support for local fisheries, provision of education and job training programs, expansion of access to waterways, and enhancement of community assets for recreational and educational use. Each strategy is supported by actions and steps needed for implementation. Case studies are provided to document demonstrated success of key strategies.

Chapter 5: Achieving the Vision

Describes the six catalytic adaptation projects chosen by residents as priorities to be considered for LA SAFE funding. This chapter also describes the process for developing and evaluating the project proposals. Each project has been designed to demonstrate implementation of adaptation concepts that address the LA SAFE goals established by parish residents, build resilience for the parish, and deliver multiple benefits to the community. The six proposed projects include—

- Plaquemines Harbor of Refuge
- Belle Chasse Wetland Park
- Emerging Industry Business Incubator
- Fisher and Farmer Loan Program
- Mental Health and Substance Abuse Program
- Red Star Yeast Building Redevelopment

Funded Project Descriptions

Mental Health and Substance Abuse Program

The Mental Health and Substance Abuse Program for Plaquemines Parish is a Public Services/ Education program as outlined in the LA SAFE Guidelines. Areas projected to experience high future flooding risk are, in many cases, currently experiencing significant environmental, cultural, economic and social challenges. Severe, repetitive flooding events in recent years have devastated many low-lying communities along our coast, especially in Plaquemines Parish. As these events have occurred, populations have already started moving upland, disrupting community cohesion and the coast's broader social fabric. These impacts, compounded with unfavorable future projections, have taken a significant emotional toll. This program will provide case management services for residents struggling with mental health and substance abuse issues. These services will help disadvantaged populations living in at-risk communities work through the emotional impacts of past disaster events and future increased flood risk. Plaquemines Community C.A.R.E. is an existing program that provides an array of mental health and substance abuse services to residents of Plaquemines Parish. The LA SAFE contribution will allow for the expansion of these services and reach of C.A.R.E. for mental health and substance abuse counseling to the southern and East Bank areas of the Parish. The southern and East Bank areas of the Parish are underserved primarily due to the remoteness and logistical challenges in assignment of clinicians and health care workers to these remote and isolated areas.

Plaquemines Harbor of Refuge

The Plaquemines Harbor of Refuge project is primarily a Resilient Infrastructure project located in Empire, Louisiana. Plaquemines Parish is a Sportsman's Paradise with some of the world's best commercial and recreational fishing. The seafood industry is one of the leading employers in Louisiana, producing millions of pounds of shrimp, oysters, crabs and fish annually. However, as flood risk increases and land loss continues to occur, this industry's viability faces a significant threat—specifically as it relates to vital equipment and infrastructure. This proposal would create a harbor of refuge for vessels to shelter in place during disaster events. The Parish-operated harbor would incorporate marina amenities, wet-and dry-docking facilities as well as green infrastructure to help manage stormwater.

All images in this strategy are credited to the LA SAFE team, unless otherwise noted.

Executive Summary





Background and Mission

In efforts to plan for a vibrant and sustainable future for our state, addressing growing flood risk will be a primary concern for Louisiana communities. Climate scientists agree that warming temperatures are likely to result in more frequent flooding that occurs with increased intensity. These impacts will be compounded by the effects of human activities that accelerate erosion and subsidence along the coast.

Over the years, Louisiana residents have responded to flood risk in various ways: first, by settling on higher ground along the rivers and bayous, then by building levees, and eventually by restoring wetlands. During the next 50 years, Louisiana is projected to lose more land along its coast than it can rebuild, even if restoration efforts are completed as currently planned. As delta land continues to subside and erode, sea level rise is expected to accelerate. With less wetland buffer, the state's coastal regions face increased storm surge and flood risk that will impact families and communities in ways large and small, acute and chronic.

Louisiana communities must develop and implement risk reduction strategies that include mitigation, adaptation, and structural measures. Increasing flood risk is already causing socioeconomic and demographic repercussions. Due to the combined effects of man-made and natural land loss as well as sea level rise, people are moving from flood-prone areas to higher ground seeking safety. In lower-risk areas to which people are moving, tax bases are growing, but the infrastructure is overburdened. Communities in areas most at risk are losing population and facing declining median household incomes. These trends are likely to continue as risk increases.

Fifty years from now, high-ground, low-risk areas will be even more scarce. How parishes and municipalities develop this land will influence the region's population capacity, cost of living, economic opportunities, and quality of life. Some of the high-risk areas are where much of the region's economic activity takes place. Planning for the future of these areas where our working coast is located is as important as planning for low-risk areas where populations are expected to grow.

The challenge is greater than coastal restoration. CPRA's projections indicate that land is being lost faster than it can be built. This understanding means that, just as people have done throughout human history, Louisianans must plan to adapt to the changing landscape and environmental conditions.





Flooding

Above: Standing floodwater remains in Braithwaite after Hurricane Isaac.

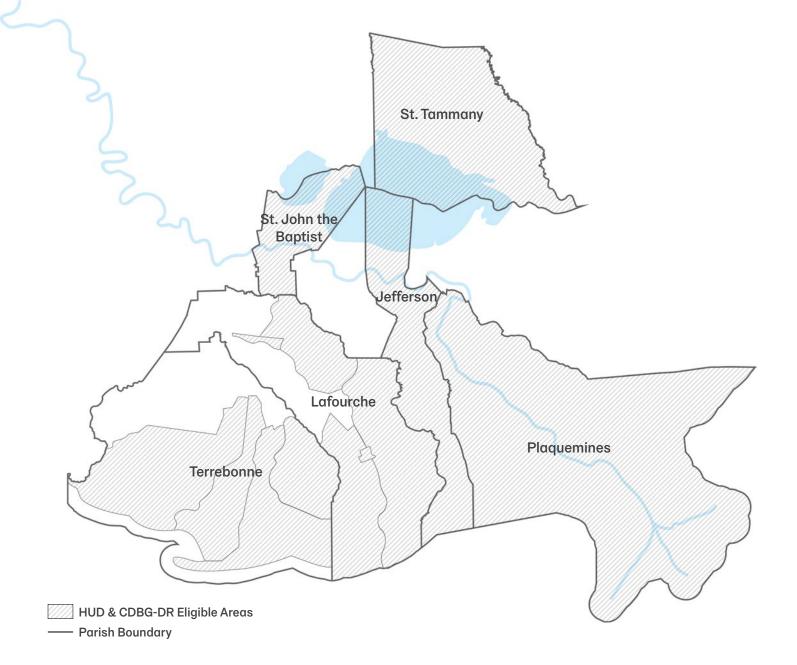


Property Damage

Left, Top: Flood damage in Braithwaite. Photo Credit: FEMA/Patsy Lynch

Left, Bottom: A home is pushed off of its foundation and into the road as a result of Hurricane Isaac.

Photo Credit: Lake Pontchartrain Basin Foundation



An Opportunity for New Solutions

To help address these complex issues in a holistic manner, the National Disaster Resilience Competition (NDRC), sponsored by the U.S. Department of Housing and Urban Development (HUD) and the Rockefeller Foundation, awarded funding for LA SAFE—Louisiana's Strategic Adaptations for Future Environments. The LA SAFE program supported an inclusive public process to identify adaptation strategies and is providing funding for at least one catalytic project in each parish.

The LA SAFE planning process focused on six parishes heavily impacted by Hurricane Isaac in 2012: **Jefferson, Lafourche, Plaquemines, St. John the Baptist, Jefferson, St. Tammany, and Terrebonne**—as well as the region as a whole. Four of the LA SAFE parishes—Jefferson, Plaquemines, St. John the Baptist, and St. Tammany—are eligible to receive investments anywhere in the parish because they meet the HUD's Community Development Block Grant—Disaster Recovery (CDBG—DR) requirements. In Terrebonne and Lafourche Parishes, only certain census tracts meet those requirements. To receive funding, a locale must meet threshold requirements in the three

categories of most impacted, distressed, and unmet recovery needs as a result of a "Qualifying Disaster"—in this case, Hurricane Isaac.

While ongoing efforts such as the implementation measures in the 2017 Coastal Master Plan and the Morganza to the Gulf levee system strive to reduce risk to populations from storm surge flooding via large restoration and protection projects, LA SAFE recognizes that the environmental challenges facing the region cannot be solved by engineering alone. Through policies, programs, and projects, LA SAFE offers a set of community-driven strategies designed to provide a holistic approach to reducing long-term risk and increasing Louisiana's ability to prepare for and recover from disasters and other disruptions.

The adaptation strategies in LA SAFE's regional and parish plans integrate stormwater management, housing and development, transportation, education, economy, and jobs, and culture and recreation to provide community benefits that improve quality of life while mitigating flood risk.

Through intensive public engagement and technical review processes, the Louisiana Office of Community Development (OCD) has identified at least one catalytic LA SAFE project to receive funding in each parish.

LA SAFE seeks a balance between natural forces and smart growth, where communities learn to adapt to risk by building with nature and living with water.

Community-Driven Planning

Community engagement is central to the LA SAFE planning process. LA SAFE engaged 602 residents and community leaders in Plaquemines Parish over the course of five rounds of meetings. Meetings were held in Belle Chasse, Davant, Port Sulphur, and Buras.

The LA SAFE team worked with these stakeholders to document and evaluate existing conditions in the parish, analyze risk, identify shared goals, and develop a vision for the future. The goals that residents set evolved into policies, programs, and six catalytic projects that address community needs stemming from environmental degradation and increasing flood risk. Specifically, residents established goals and values during the Round 1 meetings, identified areas of opportunity in Round 2 meetings, developed a vision in Round 3 meetings, identified potential projects in Round 4 meetings, and ranked project preferences in Round 5 meetings.

This collaboration was informed from start to finish by the best available data about future environmental conditions, best planning practices, and quality design expertise. The team also worked closely with residents to ensure that the strategies in the plan are closely aligned with the parish's culture and values.

The LA SAFE strategy that follows makes specific recommendations about how Plaquemines Parish might adapt to future conditions. Some of these recommendations come from existing parish plans, some from local stakeholders, and some from the expertise of the team's planners and designers. All have been vetted and prioritized by the parish's residents and community leaders. The recommendations that rose to the top draw from multiple disciplines and provide benefits across categories and risk areas.



Synthesizing Perspectives

Early in the meeting process, LA SAFE presented this framework for decision-making, which seeks the common ground among Community Vision, Current & Future Environmental Conditions, and Best Planning Practices.





Engaging the Community

Left: At Meeting 3, residents respond to program, policy, and project ideas that were based on resident input provided during previous meetings.

Right: A resident at Meeting 5 reviews the current and projected flood risk boards.



LEAD the Coast

Participants of Foundation for Louisiana's (FFL) LEAD (Leadership, Education, Advocacy, and Development) the Coast program served as table hosts and facilitators during the LA SAFE meetings. As coastal residents themselves, these table hosts had a personal understanding of the issues that impact their fellow community members. The LEAD the Coast Program provided them with additional coastal education and facilitation training. These table hosts helped to connect the LA SAFE project team with issues on the ground throughout the engagement process.



Photo Credit: Foundation for Louisiana



Parish Meeting Activities

At Meeting 1, residents participated in two activities.



What Does Change Mean to You?
The first activity, pictured above, asked residents to describe changes and challenges they've seen over the past 50 years. This activity included a map that depicts current and future land loss as well as population shifts that occurred between 2000 and 2010.



Adaptation Goals

The second activity focused on what residents value about Plaquemines Parish and what they see as future goals.

Round 1 Meetings

In the first round of meetings, residents identified challenges, values, and goals that set the course for the rest of the engagement process. To accomplish this, residents participated in two group activities that asked them to describe the changes they have seen, what they value about their community, and what they would like their community to look like in the future.

In the first activity, "What Does Change Mean to You?," Plaquemines Parish residents reviewed a map depicting future flood risk in the parish and described how they have been affected by changes to the environment, economy, and population over the past 50 years.

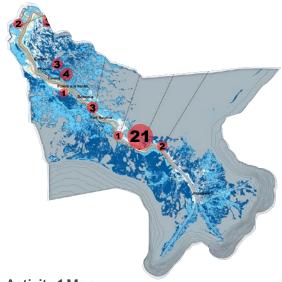
In the second activity, "Adaptation Goals," residents shared their goals and values in categories designated "Community & Culture," "Economy & Jobs," and "Environment & Sustainability." Residents were asked to consider these three categories in the context of the present strengths of the parish and future opportunities. They were asked what they want to preserve in their community and what the future of those things should look like.

Meeting Location Preference

To ensure that the subsequent engagement meetings were held in locations that would be accessible and convenient to the greatest number of people, residents were asked to suggest towns and potential meeting venues. These are shown to the right, on the Activity 1 map, with the size of the orange circles corresponding to the number of mentions each town received. The Round 2 meeting locations were based on this resident input.



Activity Location DiscussionThe activities were translated for Vietnamese-speaking residents by an LA SAFE team member.



Activity 1 Map Residents voted on potential Round 2 meeting sites. Sources: CPRA Land Loss Modeling Data 2017 for a Medium Scenario; For all basemap data see References

"It's peaceful. I like having family land. I want my kids to come back and live the same lifestyle."

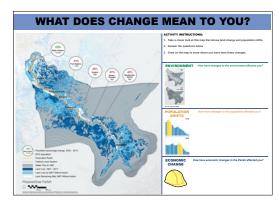
-Plaquemines Parish Resident, Round 1 Meeting

Round 1 Meeting Outcomes

In the first activity, residents described a parish struggling with population loss, job loss, and instability in the seafood industry. They also described continued land loss, business loss, and cost of living increases. Resident comments were compiled and categorized as challenges.

Responses from the second activity described what residents value in the parish and their goals for the future of their community. These were organized as strengths and opportunities, respectively. Among the strengths, residents value community closeness, natural resources, and hunting and fishing.

Among the opportunities most discussed were economic development and diversification, protection, restoration, and preservation of community stability. Residents also discussed building for water, preparing for population shifts, training for jobs, and improving infrastructure.





Activity 1: "What Does Change Mean to You?"

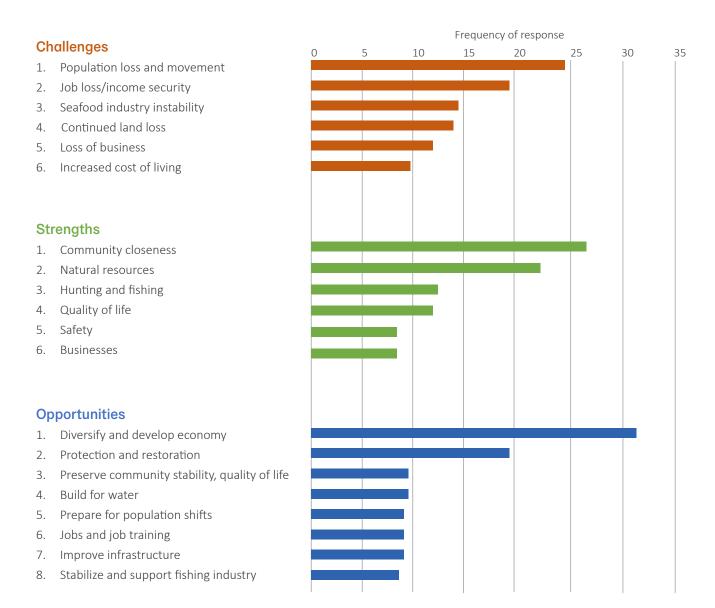
Residents described changes and challenges that they've witnessed in the past decades on sticky notes.



Activity 2: "Adaptation Goals"

Residents described what they value in the parish and what their future goals are.

At Meeting 1, **136 residents** wrote **371 responses** to the activity prompts that LA SAFE organized into challenges, strengths, and opportunities. Resident comments were grouped and evaluated by frequency. The list below summarizes the most-discussed topics at the meeting in order of frequency of mention.

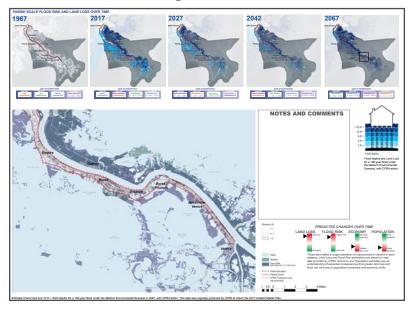


Round 2 Meetings

The second round of LA SAFE meetings in Plaquemines Parish were held in Belle Chasse, Davant, and Buras. Each of these meetings was inclusive of nearby areas and focused on the unique issues particular to these communities. Three meetings were held in Buras to accommodate languages in the community: English, Vietnamese, and Khmer (Cambodian).

Residents used question cards and maps to describe short-, medium-, and long-term goals for their communities. The question cards reflected nine major topics that emerged from Meeting 1 across all six parishes. Residents sat in small groups around an elevation map of their community that highlighted future high-ground areas. The top of their table sheet showed land loss and flood risk over time, from 50 years past to 50 years into the future. With these future conditions in mind, residents chose one topic in each of the three categories (see right) that they deemed the most relevant to the future of their community. They were then asked to indicate areas or locations on their map where current issues exist and to propose solutions in the 10-, 25-, and 50-year time frames.

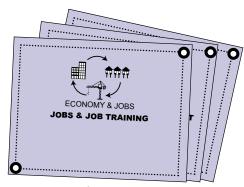






Community & Culture
Culture & Tourism

Youth & Education Access to Services & Amenities



Economy & Jobs

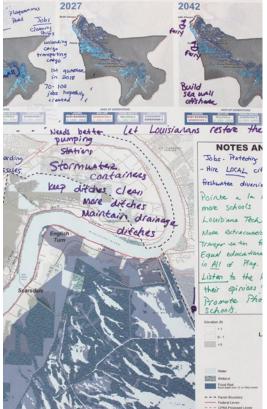
Jobs & Job Training Local Economic Development Property Value & Cost of Living



Environment & Sustainability

Water Management Transportation Parks & Public Spaces





Round 2

Top: A resident identifies a location on the map as part as one of the activities.

Left: A table sheet on which notes related to Economy & Jobs are in blue and Environment & Sustainability are in green.

Right: Residents mark areas of challenges and strengths on a map.

"I like this idea of the bike path. Kids could ride their bikes to Belle Chasse High School if you built an overpass as well."

> —Plaquemines Parish Resident, Round 2 Meeting



Round 2 Meeting Outcomes

The summaries below describe the most prevalent discussions at each of the five meetings in Round 2. In addition to documenting the group conversations, the LA SAFE team collected the notes and comments that residents had written on the maps. The map on the right provides a summary of the compiled comments.



Belle Chasse

Residents at the Belle Chasse meeting envisioned future growth in public transportation, including improved bike lanes and walking paths, while also improving infrastructure and drainage. Many residents expressed the desire for more family-friendly amenities, subsidized home insurance costs, and restrictions to the amount of concrete on new developments.



Davant

Residents at the Davant meeting emphasized the importance of educating their youth on the environment and the coastal economy while also promoting ecotourism. Many residents would like to see more recreation for the youth and more transportation improvements, such as a bus service that is available seven days a week, water taxis, bike lanes, boat docks, and completed bridges. They stressed the importance of subsidies for home insurance costs and assistance for elevating homes. Many residents discussed environmental concerns. They suggested tree planting for surge protection, ditch cleaning, pump improvement, and levee construction.



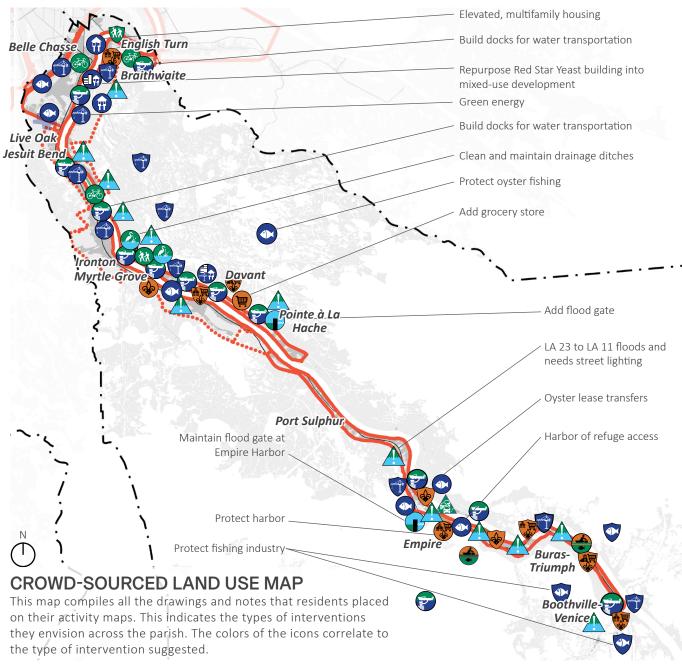
Maps of Meeting 2 Locations

Plaquemines Parish Meeting 2 maps show elevation, wetlands, and future land loss to illustrate future areas of high ground.

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; For all basemap data see References

Buras

Buras residents from all three meetings discussed the economic struggles they face. For the Vietnamese- and Khmer-speaking residents, the main focus was on the fishing industry. The most common ideas were to promote local seafood, protect docks, build more public docks, restrict imports, protect the ecosystem from oil and gas pollution, and build a bigger, safer harbor for fishing boats. English-speaking residents suggested renewable energy and more aquaculture and oyster farms. They also desired more festivals to support and sustain tourism and local culture. Many residents described their communities struggling to make ends meet, stuck between low seafood prices and high flood insurance costs, with utilities that are deficient, amenities that are too far away, and not enough resources or room for their boats to dock.



Sources: For all basemap data see References

Legend

ECONOMY & JOBS



General Economic Investment



Industry/Economic Investment



Housing & Development



Job Centers



Seafood Industry

ENVIRONMENT & SUSTAINABILITY







Bike Trail



Multimodal Transportation



Traffic Problem

COMMUNITY & CULTURE



Cultural Assets



Schools & Educational Assets



Groceries & Amenities



Recreational Fishing & Ecotourism

FLOOD RISK REDUCTION



Flood Protection



Rainwater Retention Area/Nature Preserve



Flooding Problem

TYPE OF ICON



Asset/area to be protected



Potential new/ improved asset

Round 3 Meetings

During Round 3, residents completed three activities. First, they were polled about the strategies LA SAFE should pursue in the parish. Residents responded using clickers, and the results were captured and displayed in real time. For the second activity, residents rated their level of agreement with vision statements for three typological risk levels in the parish. In the third activity, residents responded to program, policy, and project ideas that were based on resident input provided during previous meetings.

Round 3 Meeting Outcomes

When residents were asked what they believed to be the most important issue for the future of Plaquemines Parish, the majority believed that transportation was very important. Among transportation options, Complete Streets was the most popular, with 20% support. Jobs and job training was cited as the best strategy to retain the youth in the parish. With regards to development, residents most want to expand in established communities on high ground. When asked about job opportunities, residents expressed the need to expand healthcare. Medical services was also cited as the biggest factor to improve the quality of life for the elderly.



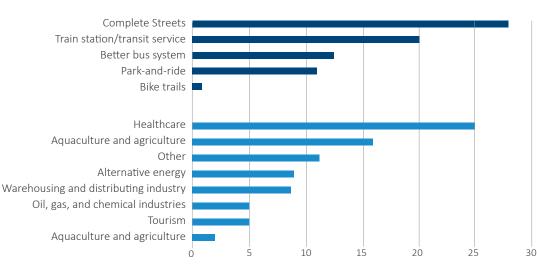


In Plaquemines Parish, LA SAFE held three meetings in Round 3 to accommodate languages: English, Vietnamese, and Khmer (Cambodian).

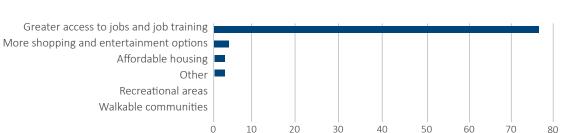
Activity 1 Responses

Q5: If LA SAFE invested in a transportation project, which project would you most like to see funded?

Q6: Which types of job opportunities would you like to see expanded in your parish?



Q8: What is the highest priority to retain youth in the parish?



In the second activity, the LA SAFE team presented a vision for the parish based on resident input received at previous meetings along with data illustrating future flood risk data. The vision that the team presented was organized into five planning categories and three risk levels: high-risk, moderate-risk, and low-risk. Residents evaluated the vision for each risk level using their clickers. Seventy percent strongly agreed, agreed, or slightly agreed with the vision presented for each risk level. These vision drawings and the text displayed at the meeting are shown on the right.

70% of Meeting 3 participants agreed with the visions presented for each risk level.

Visions Presented at Round 3

The images below are the PowerPoint slides and description summaries of the visions that residents responded to using their clickers.

What we expect over 50 years: Minimal flood risk Economic growth Population increase

Vision

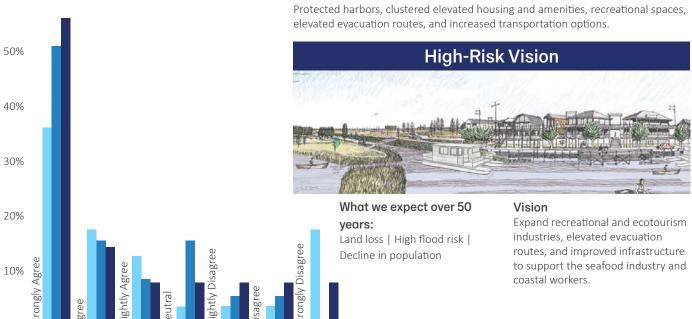
Denser residential and commercial development, increased transportation options, improved stormwater management, and more green space.



What we expect over 50 years:

Land loss in surrounding areas | Moderate local flood risk Not much change in population

Vision





Meeting 3 Activity

Residents choose strategies they like and dislike.

Activity 3 focused on the range of projects, programs, and policies that LA SAFE could implement. Each table group evaluated 16 – 20 strategies within three of the five planning categories. Residents discussed the strategies shown and used green and red stickers to identify strategies they liked and disliked.

The list to the right shows the highest-rated strategies from each planning category organized within subcategories. Strategies within each subcategory are listed by popularity. Strategies that received scores above average are represented by darker colors and are listed below each subcategory. Less popular strategies are represented in the lighter color and are not individually listed.

The results from this activity illustrate the strategies that Plaquemines Parish residents at the meeting were most interested in. After the meeting, the LA SAFE team used these results to begin forming projects, programs, and policies that honor resident preferences.

Top Strategies from Activity Three

The following categories emerged as a result of resident feedback from Meetings 1 and 2 and were introduced as an organizational framework in Meeting 3.



STORMWATER MANAGEMENT

Drainage Improvements

- Plant cypress trees to break up storm surge
- Dredge canals, drains, and culverts
- Improved parish drainage system
- Culvert/ditch maintenance
- Cross-parish stormwater management

Green Streets

Green Development

- Community gardens and planting programs
- Drainage requirements for new development



HOUSING AND DEVELOPMENT

Home Elevation

- Raised and protected neighborhoods
- Homeowner tax credit for elevating homes
- Policies to encourage resilient, elevated housing development

Community Spaces

• Community gathering and market spaces

Denser Development

- Increased affordable housing options
- Senior/elderly specific housing

Town Square Development

• Family-friendly recreation in town center

Alternative Development



Biking and Walking Paths

- Increase walkability and sustainable streetscape
- Increase bike lane connectivity
- Green levees

Alternative Transit

• Improve bus transportation across parish lines

Upgrade Transportation Infrastructure

- Update and build bridges
- Improved evacuation routes



EDUCATION, ECONOMY, AND JOBS

CULTURE AND RECREATION

Water-Based Recreation

- Public boat launches
- Public boat docks
- Natural water play area

Youth Activities

- Summer camp restoration programs
- Support culturally focused camps and after-school programs

Outdoor Recreation

• Healthy living programs and activities

Historic Preservation

Support Commercial Fishing

- Expand boat harbors
- Local financial assistance and loans for fishers
- Commercial fishing
- Support aquaculture

Create Jobs

- Incentivize essential service providers
- Business incubator to help residents start new businesses
- Attract recreational and entertainment establishments

Job Training

• Job training programs

Coastal restoration construction jobs and training

Improve Education

• Provide incentives to retain and attract good teachers

Increase Tourism

"We need expanded boat harbors."

—Plaquemines Parish Resident, Round 3 Meeting

"We need street lights. It's dark at night."

—Plaquemines Parish Resident, Round 3 Meeting

Round 4 Meetings

The purpose of the Round 4 meetings was to introduce and collect input on the draft vision statements and example adaptation strategies that were developed based on previous community input. Responses to these materials would then be used to refine the multitude of recommendations from the Round 3 meeting into six final project proposals to be presented and evaluated in Round 5.

For the Round 4 meetings in Plaquemines, the LA SAFE team engaged parish officials and stakeholders at a roundtable discussion and engaged with residents at a community open house. These events provided opportunities for the LA SAFE team to receive feedback on the vision statements and possible adaptation strategies from parish staff, residents, and other stakeholders. The LA SAFE team met with Plaquemines Parish stakeholders, parish government leaders, and staff on Oct. 19, 2017. The LA SAFE team also held community meetings with Vietnamese- and Khmer-speaking residents on Nov. 6, followed by an public open house on Nov. 9 in Port Sulphur.

"If we get federal dollars, I would really like to see elevations. There are a lot of people who don't have the opportunity or means to elevate, to move away, or anything. And the only way they are going to have help is to elevate."

—Plaquemines Parish Official, Round 4 Meeting

Roundtable Discussions

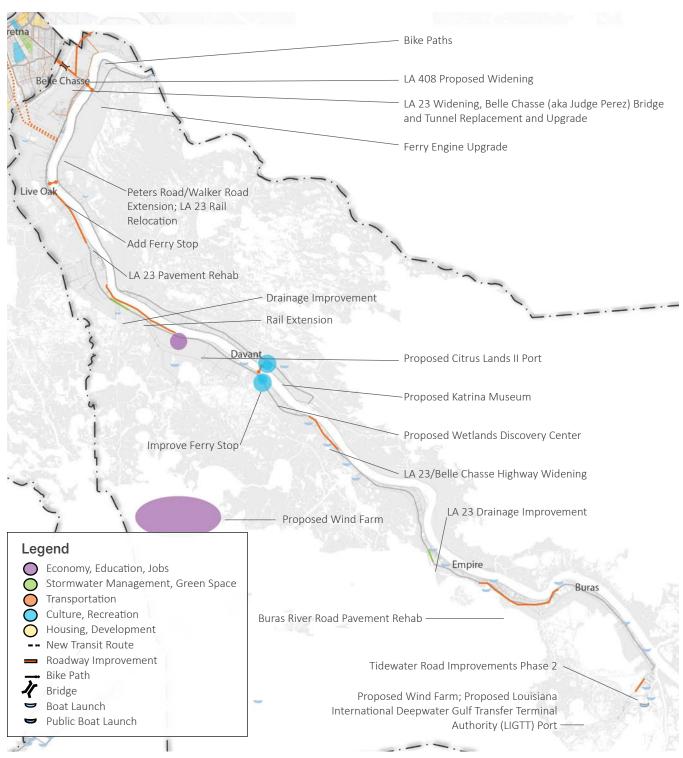
At the roundtable discussions, attendees reviewed and responded to the LA SAFE vision for Plaquemines Parish created through public input, and different types of adaptation strategies—including projects, programs, and policies—that can support community goals and existing plans. Participants discussed and critiqued several example strategies and proposed new ideas. The discussions helped the LA SAFE team ascertain which strategies are supported by the greatest number of stakeholders as well as identify potential hurdles that the strategies could face. The roundtable discussions also allowed the attendees to see how LA SAFE investments could align with existing efforts.

Public Open House

At the public open house in Port Sulphur, boards around the room included LA SAFE background information, the LA SAFE vision for Plaquemines Parish, an existing efforts map, and draft project concepts. LA SAFE team members discussed the material one-on-one with residents and answered questions. Residents left comments and notes on the draft project boards.

"The parish is on the front line. It's doing the same thing over and over and expecting a different result. How do we shift the way we think about energy policy in Louisiana? Oil and gas industry expertise can be used to create wind technology."

—Plaquemines Parish Resident, Round 4 Open House



EXISTING EFFORTS MAP

The LA SAFE team researched and compiled recommended projects from all of the Plaquemines Parish plans. This exercise revealed the existing efforts already underway. LA SAFE can leverage existing projects, avoid duplication, and narrow down the most effective interventions.

Sources: For all basemap data see References



PROJECT AND PROGRAM CONCEPTS

The graphic to the right, which was shared at Round 4 meetings, shows some of the draft concepts that were under development. The smaller circles show popular Meeting 3 strategies that were being integrated into project concepts. Resident recommendations influenced final project choices. Hero Canal was originally selected because of its northern location in the parish. The project description was adjusted after the preferences of the residents and parish leadership voiced concerns about the Hero Canal and provided information about why the Empire location is a better choice.

Sources: For all basemap data see References

Round 4 Meeting Outcomes

Overall, participants across both meetings expressed the most support for reducing flood risk by managing stormwater. Strategies addressing stormwater management included recreation areas that integrate stormwater retention, cross-parish drainage strategies, water-based recreation, and community garden and planting programs. Other topics discussed included medium- to high-density affordable resilient housing and new business incubators for residents. Parish officials and stakeholders further described existing efforts and optimal locations for projects within the parish. This informed the design of the final six catalytic projects presented in Round 5.

"[Hero Canal safe harbor] doesn't have any slips or anything. These guys all the way down in Triumph aren't going to be able to come all the way up here."

> —Plaquemines Parish Official, Round 4 Meeting



CREATE A LINEAR PARK ALONG PLANTERS CANAL

The linear park could connect to new development at the southern end of the canal near the Peters Road Extension/Hero Canal to a proposed stormwater park near Highway 23 and up to new development around the Woodlands Conservancy Park/F. Edward Hebert Blvd.



STORMWATER RETENTION AND RECREATIONAL PARK

Build a recreational park that will also serve as a stormwater retention area to increase recreational activities in the parish while helping to reduce some flood risk.



PUBLIC BOAT LAUNCHES

Build a new boat launch on the west bank across the river from Mardi Gras Pass. The location is in close proximity to Grand Bayou and Happy Jack and could also serve as a source for commerce in the community. It would allow easier access to the marshes on the east side of the river for recreation and a staging area for restoration activities. It could also support residents on the east bank during an emergency if the ferry was down as well as be a spot to anchor floating amenities.



SAFE HARBOR/ SEAFOOD MARKET

Build a safe harbor in an area with minimal flood risk to provide a safe haven for fishers to dock their boats during disasters. The safe harbor could also serve as an economic development engine that would allow fishers to sell their catch directly to consumers at the harbor.



MENTAL HEALTH & SUBSTANCE ABUSE SUPPORT



BIKE TRAILS ON LEVEES

Create recreational bike trails atop levees to increase connectivity and recreational options.



BORROW PIT PROJECT

Transform the use of a borrow pit to an attraction that incorporates uses for recreation, economic development, and stormwater management.



FINANCIAL ASSISTANCE & LOANS FOR FISHERS

Provide seed funding for a revolving loan fund targeting commercial fishery boat owners. Fishers can use their boats as collateral to borrow money to repair or update their boats or equipment or to diversify out of the fisheries and establish new businesses. Repayment plans will be flexible to meet the needs of fishing communities, such as plans that have smaller payments during the fishing off season and higher payments during fishing season.



RESILIENT ENERGY PROJECT

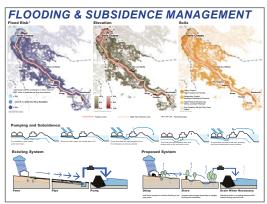
Round 5 Meetings

In the final round of Plaquemines Parish meetings, residents gathered on Dec. 19 at the Port Sulphur Community Center to evaluate the culmination of planning work that took place during the year. Information boards around the room and a video loop summarized the results from previous meetings, presented flooding and land loss information, and proposed a future vision for the parish that included physical interventions and policy recommendations. An additional meeting for Vietnamese- and Khmer-speaking residents was held on Dec. 20. Residents who speak these languages and live in Jefferson, Lafourche, and Terrebonne Parishes were also invited.

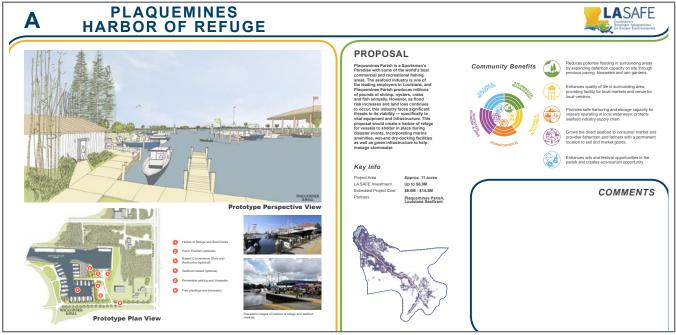
The central purpose of the meetings was for residents to evaluate and rank six catalytic projects that were developed in response to resident input collected during the previous four rounds of meetings. Each project is designed to provide multiple community benefits and support long-term sustainability. The project boards provided detailed descriptions, concept drawings, and example images along with information on estimated cost, location, and potential partners to give residents an idea of what implementation of each project would entail. Plaquemines Parish residents commented on each project and participated in a poll to rank their preferences.



Round 5 meeting.



The flooding and subsidence board shown at the meeting. This board was one of 12 informational boards that communicated the process and goals of LA SAFE.

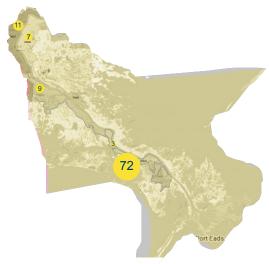


One of the six project boards shown at the meeting. All six projects are described in detail in Chapter 5.

Polling Process

At the meeting, residents were given six tokens: two gold tokens worth two points each, two green tokens worth one point each, and two blue tokens worth no points. Residents were instructed to place one token in each of six tubes that represented the six projects. At the end of the night, paper covers were removed from the tubes, revealing their contents. The color composition of each tube indicated the relative popularity of each of the projects, with gold being most popular and blue least popular. After the reveal, all points were counted. A board at the polling station explained how the public preference polling contributes to the larger selection criteria.

Knowing that some geographic bias was inevitable, LA SAFE also promoted an online version of the poll for three weeks following the meeting. In all, 167 Plaquemines Parish residents from around the parish cast their preferences.



Participation Across the Parish

The map shows the geographic distribution of meeting attendees and online poll participants. The circle size and number correspond to number of participants from each zip code.

Resident Participation by Zip Code

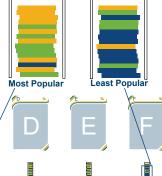
70041—72 responses 70040—7 responses 70037—11 responses 70050—3 responses 70083—9 responses 70038—1 responses

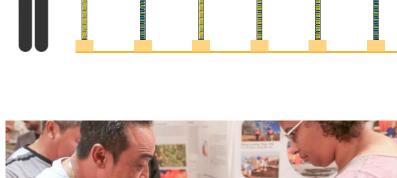


An LA SAFE team member discusses one of the six catalytic projects with residents.



Preference tokens at the meeting.







Residents cast their preferences at the Vietnamese and Cambodian meeting.

Round 5 Meeting Outcomes

Below is a summary of each of the six catalytic projects meeting participants were invited to review. See the full project proposals in Chapter 5.



A: PLAQUEMINES HARBOR OF REFUGE

Storm damage to commercial fishing vessels can significantly impact fishers' ability to recover after a hurricane. This project will create a harbor of refuge to provide a low-cost option for commercial fishers to shelter their vessels during disaster events and to incorporate marina amenities, wet-and dry-docking facilities, and green infrastructure.



B: BELLE CHASSE WETLAND PARK

This project will increase the water storage capacity of Planters Canal by creating a 180-acre wetland park designed to capture and hold overflow during heavy rain events. This will alleviate flooding in nearby areas and slow subsidence by letting water absorb into the ground. The park will provide recreational and educational opportunities and connect to existing neighborhoods and trails.



C: EMERGING INDUSTRY BUSINESS INCUBATOR

This business accelerator will help diversify the economy by supporting new small businesses in alternative energy, coastal restoration, ecotourism, and other local sectors. The building will house shared working space, and the accelerator program will partner entrepreneurs with mentors in their fields to help them start and grow their businesses.



D: FISHER & FARMER LOAN PROGRAM

This program will create a low-interest loan fund for those in the fishing and agriculture industries who do not have access to traditional lines of credit. Loans can be used to upgrade equipment, diversify into additional industries, or enhance product quality. Loans will be paired with technical assistance to help borrowers develop business plans and apply for the loans.



E: MENTAL HEALTH & SUBSTANCE ABUSE PROGRAM

This program will provide case management services for residents struggling with mental health and substance abuse issues. These services will help disadvantaged populations work through emotional impacts of past disaster events and future increased flood risk.

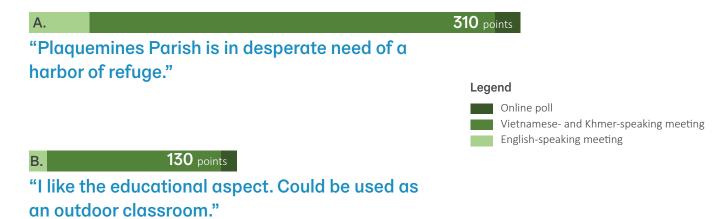


F: RED STAR YEAST BUILDING REDEVELOPMENT

This project will renovate the Red Star Yeast building in Belle Chasse into a mixed-use development with commercial and retail space on the ground floor and approximately 30 housing units above. The development will serve as a model for resilient design, integrating stormwater management features, installing renewable energy systems, and creating community spaces.

Poll Results

The poll results from the meeting, shown below, directly impacted the pilot project selection process, weighted at 20% of the overall selection score. Plaquemines Parish residents most preferred the project Plaquemines Harbor of Refuge, followed by the Fisherman & Farm Loan Program.



C. 98 points

"Could bring wealth in the community. Could grow existing businesses."



E. 109 points

"The most needed, fills a void...Could help people cope with loss in a productive way."



"Cleans up a blighted building in the center of town. Dock could be used by floating infrastructure."

—Plaquemines Parish resident comments on the catalytic projects







Resident Observations

Resident observations from Round 2 of community meetings, held in Belle Chasse, Davant, and Buras in Plaquemines Parish.

Sources: For all basemap data see References

Due to its geographic location, Plaquemines Parish is susceptible to the impacts of tropical storms and relative sea level rise. Effects of these two significant hazards include storm surge, heavy precipitation, land loss, sea level rise, and subsidence, all of which are connected and have a collective impact that increases flood risk and coastal erosion in Plaquemines Parish.

Asset

Things such as buildings and infrastructure, natural features, cultural artifacts and traditions, knowledge, social bonds, systems, and networks—whether tangible or intangible—that are deemed to be of value to an individual, organization, or community.

Risk

Exposure to the possibility of experiencing negative consequences that may arise when hazards interact with vulnerable people, property, areas, or environments.

Hazard

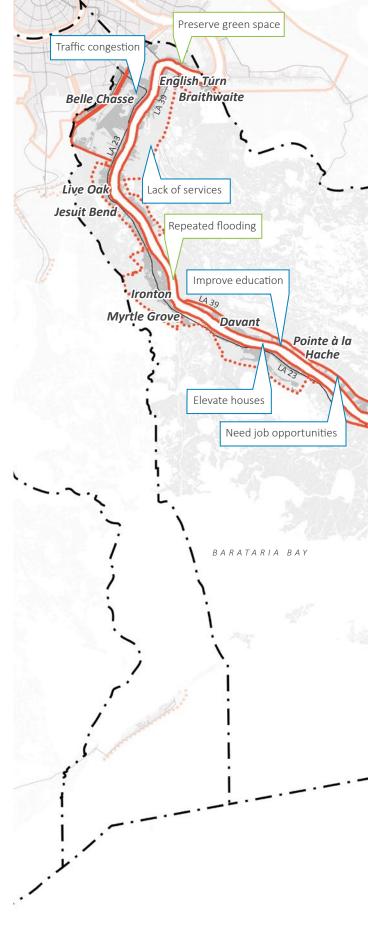
Any substance, phenomenon, or situation that has the potential to cause disruption or damage to people, their property, their services, and/or their environment.

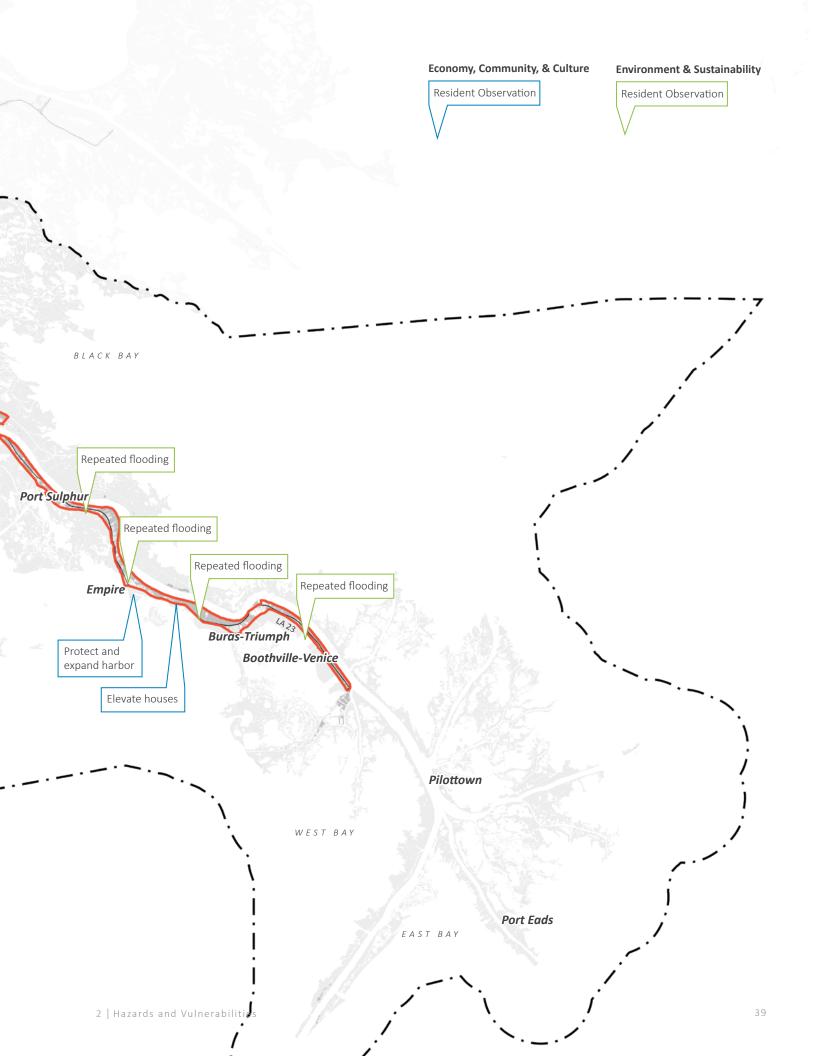
Vulnerability

Constraints of an economic, social, physical, or geographic nature that increase exposure to risk and/or reduce the ability to prepare for and cope with the impacts of disasters and disruptions.

Legend

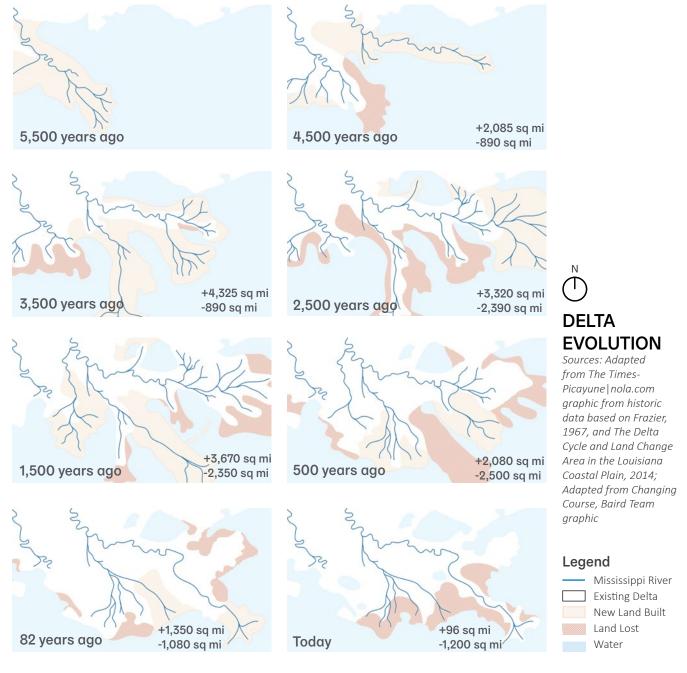


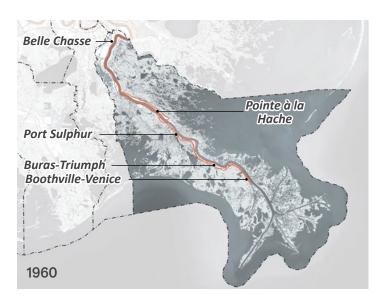


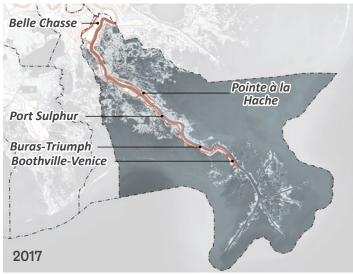


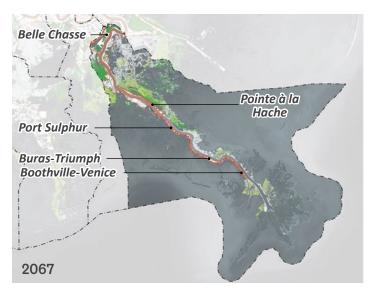
Land Loss

Plaquemines Parish's landmass was built over thousands of years by sediment from the Mississippi River and connecting distributaries. Annual flooding on the parish's five bayous brought sediment that was then deposited throughout the area as waterways overflowed their banks and discharged into marshes and estuaries. This sediment input countered the effects of coastal erosion. However, when levees were constructed along the lower Mississippi River Basin to mitigate river flooding, they choked off the sediment supply to the parish and stopped the natural land-building process.









From 2010 – 2016, Louisiana lost land at a rate equal to a football field every 100 minutes.³

In addition to building levees that have contained the sediment supply from the Mississippi River, other human activities have also contributed to subsidence and erosion. Man-made causes of subsidence and erosion include oil and gas extraction, groundwater pumping, and marsh channelization. Extraction and pumping remove fluids and gases from the ground, leaving empty space into which the surrounding soil falls, causing subsidence. The creation of navigation channels and canals through marshes has accelerated erosion rates by increasing the area of marsh exposed to wave action and saltwater.

The land in Plaquemines Parish is becoming increasingly fragile due to the absence of new sediment deposits, erosion, subsidence, and the effects of sea level rise, which further erodes land and wetlands.



LAND LOSS MAPS

Land change along the Louisiana coast from 50 years ago to today and CPRA's predicted land loss, gained, and maintained under the Medium Environmental Scenario over the next 50 years as an outcome of implementing 2017 Coastal Master Plan projects.

Sources: CPRA Land Loss Modeling Data 2017 for a Medium Scenario; For all basemap data see References

Legend

Land Lost/Open Water
Land Maintained
Land Gained
Wetlands
Land

Federal LeveeNon-Federal Levee

- - Parish Boundary

Flood Risk

Flood risk is a product of the climate, geography, and socioeconomic profile of Plaguemines Parish, and the threat is pervasive. As a coastal parish in a humid, subtropical climate, Plaquemines Parish is susceptible to tropical storms as well as the storm surge and precipitation they bring, all of which pose significant flood risk. Plaquemines Parish also has high rates of annual precipitation and must manage stormwater to reduce flood risk. Sea level rise, increasing severity and frequency of weather, and subsidence continue to erode land, reshaping Plaquemines Parish's coastline and increasing flood risk in areas previously considered safe from flooding associated with storm surge and precipitation. Poverty, limited access to jobs and training, and an aging population are socioeconomic vulnerabilities that exacerbate the magnitude of threat presented by these risks. Furthermore, though the levee system in Plaquemines Parish provides risk reduction against storm surge, levees also alter the natural hydrology of the area by lowering the water table, which contributes to subsidence. As land sinks within the levee walls, it forms what is essentially a bowl in which precipitation quickly accumulates, exacerbating flood risk from heavy rainfall within the levee system. Flood risks threaten the economies, infrastructure, populations, and the irreplaceable culture of Plaquemines Parish.

Precipitation

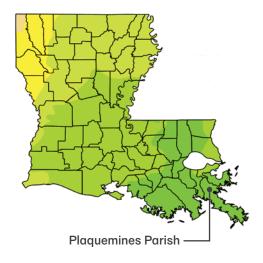
Precipitation in Plaquemines Parish primarily takes the form of rain, though hail has occurred occasionally with severe weather systems. The current precipitation rate for Plaquemines Parish is approximately 55 to 60 inches per year.⁴ In the future, more intense downpours in shorter time periods are expected to occur more frequently.⁵ As a result, flood risk from precipitation is increasing because current stormwater management infrastructure and practices were not designed for these more intense precipitation patterns.

Storm Surge

Storm surge is an increase in water height caused by strong winds, often associated with a hurricane that produces vertical circulation below the water surface and elevates the water height. When a storm approaches land and encounters shallower water, the water piles up to a greater height. Combined with sea level rise, the impacts of storm surge are felt farther inland, affecting communities that were once protected by surrounding wetlands.

"Plant trees, we need that without a doubt. They stop storm surges."

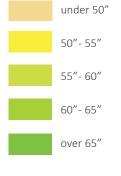
-Plaquemines Parish Resident



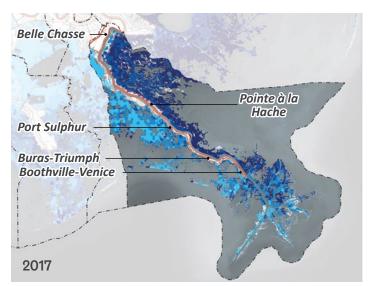
Louisiana Average Annual Rainfall Distribution

Adapted from: LSU Ag Center, "Precipitation Patterns over the Bayou State"

Annual Inches of Rainfall

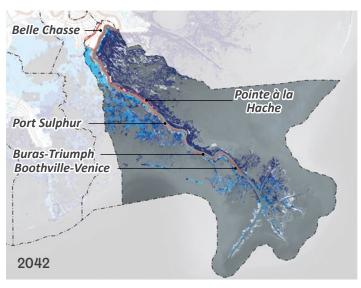


The current precipitation rate for Plaquemines Parish is approximately 55 – 60 inches a year.



Plaquemines Parish may experience up to \$300 million future economic damages due to storm surge-based flooding.⁶

CPRA's modeling data for a Medium Environmental Scenario is based on a 100-year storm with a 1% probability of forming in a given year.



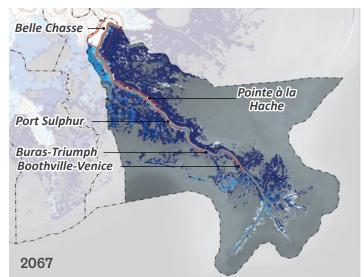
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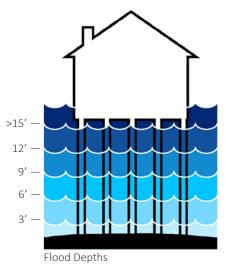
FLOOD RISK MAPS

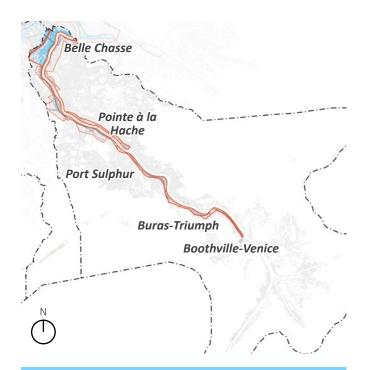
Flood depths today, 25, and 50 years from now under the Medium Environmental Scenario as an outcome of implementing the 2017 Coastal Master Plan projects.

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; For all basemap data see References









Pointe à la Hache Port Sulphur Buras-Triumph Boothville-Venice

Low Risk

Minimal storm surge flood risk projected and outside the current 100-year floodplain

Areas that currently have development opportunities to receive populations and economic activity from more flood-prone areas.

Moderate Risk

>0 – 6' projected storm surge flood depths or within the current 100-year floodplain

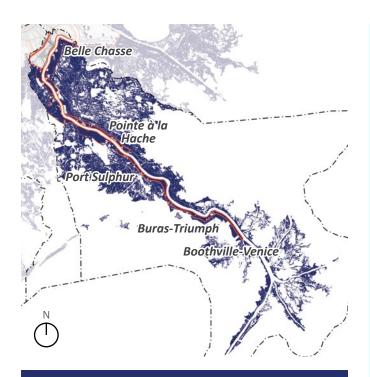
Areas conducive to maintaining current population levels and economic trends provided such communities orient future development and mitigation activities in alignment with future flood risk projections.

FLOOD RISK ZONES

Risk scenarios are based on CPRA's 50-year flood depth projections under a Medium Environmental scenario and FEMA's proposed DFIRM floodplain data.

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; FEMA Preliminary DFIRM 100-year floodplain data for Plaquemines Parish 2012; For all basemap data see References





High Risk >6' projected storm surge flood depths

Areas that can expect to experience population decline and economic losses, up to and including full community-scale resettlement, as environmental conditions deteriorate and repetitive severe flood events take place.

Legend

Land

Wetlands

Water

Federal Levee

•••••

Non-Federal Levee

. — . —

Parish Boundary

LA SAFE seeks to mitigate the threat of growing flood risk by encouraging smarter development patterns in lower-risk areas.



1000 (3



HIGH RISK

HIGH RISK



COMBINED FLOOD RISK ZONES

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; FEMA Preliminary DFIRM 100-year floodplain data for Plaquemines Parish 2012; For all basemap data see References

CPRA + NFIP FIRM

STORM SURGE



STORM SURGE

RAINFALL



The map shows storm surge for a medium scenario or a 100-year storm.



Additionally, areas within 2067 flood risk from levees and in a 100-year floodplain are shown as a moderate-risk zone, as these zones flood during heavy rainfall.

Legend

Low Risk

Minimal storm surge flood risk projected and outside the current 100-year floodplain

Moderate Risk

>0 - 6' projected storm surge flood depths or within the current 100-year floodplain

High Risk

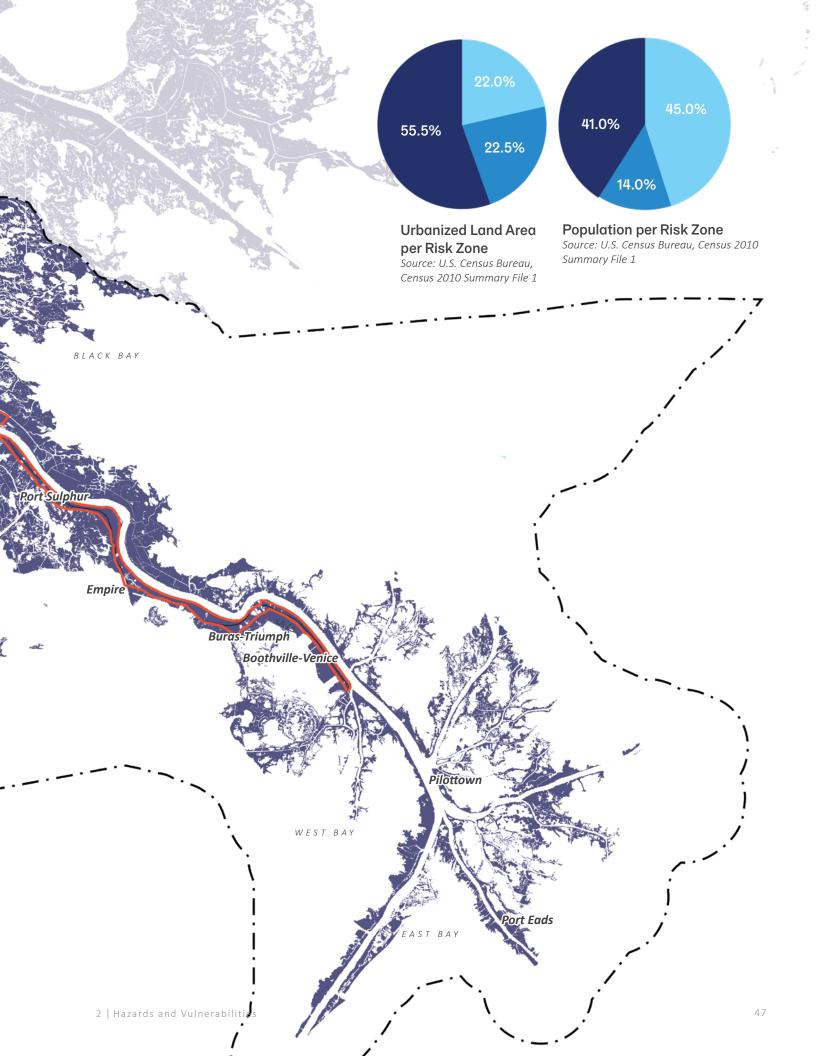
>6' projected storm surge flood depths

Federal Levee

Non-Federal Levee

Parish Boundary







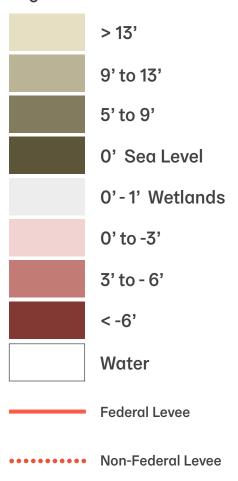
ELEVATION TODAY

Source: NOAA Digital Elevation Map 2011; For all basemap data see References

Elevation

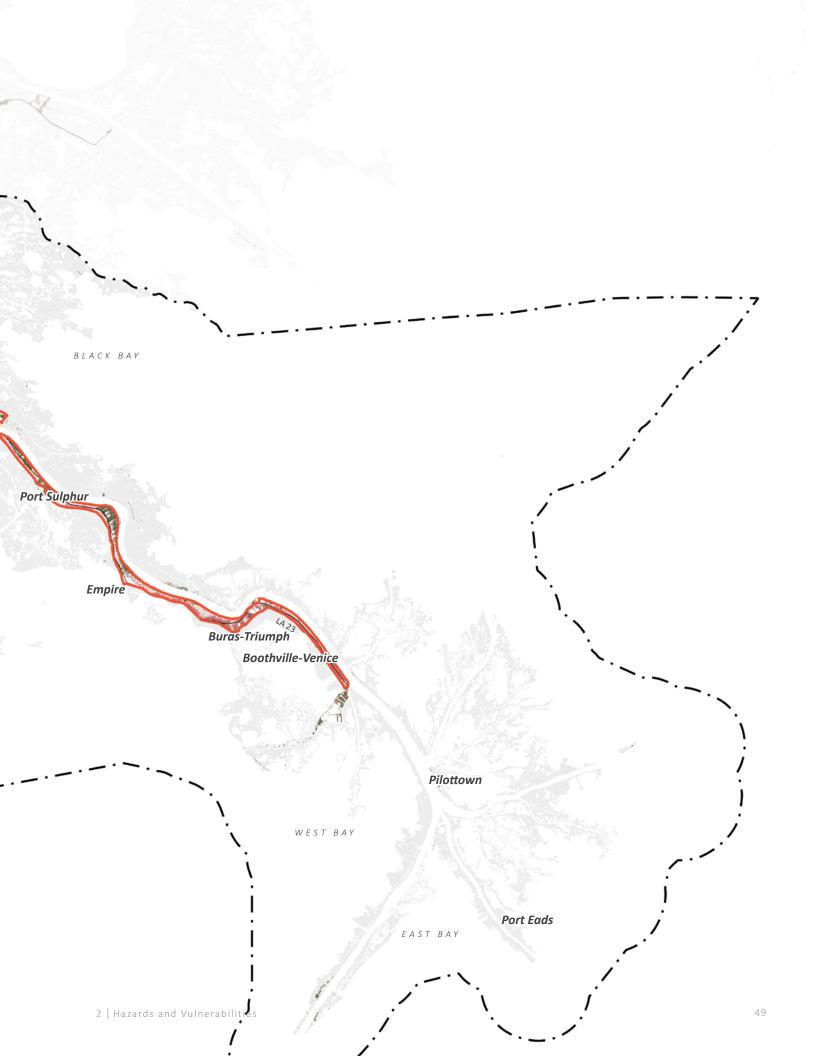
About 94% of Plaquemines Parish's land is in the FEMA-designated Special Flood Hazard Area.⁷ Many of the parish's communities are located near sea level, some even below. There is limited land available above sea level, with elevation rates higher toward the northern part of the parish. The low elevation of the southern part of the parish is a hazard that cannot be ignored. The higher land elevation in the northern part of the parish and some along the natural ridges of the Mississippi River is an asset for future land management.

Legend



Parish Boundary





Subsidence

Coastal Subsidence

Like all of the Mississippi River Delta, Plaquemines Parish is subject to subsidence, the settling of sediment that causes land to decrease in elevation—literally to sink. Rising sea levels compound the negative effects of subsidence. The combination of subsidence and sea level rise is referred to as "relative sea level rise," and Plaquemines Parish experiences some of the highest rates of relative sea level rise in the world. Long-term observations estimate the rate of relative sea level rise in the northern part of Plaquemines Parish between $0.6-2.5~{\rm cm}~(0.24-0.98~{\rm inches})$ and in the southern part at the bird-foot delta to range between $1.5-3.5~{\rm cm}~(0.59-1.38~{\rm inches})$ annually.^{8,9}

Along the Plaquemines Parish coast, the combined effects of these processes—storm surge, sea level rise, saltwater intrusion, and subsidence—expose an ever-increasing area of the parish to erosion as water and wave action reach farther inland. As saltwater pushes farther inland, it increases salinity in brackish and freshwater marshes. Saltwater intrusion causes deterioration of the marsh habitat because many species of plants cannot survive increased salinity levels. When marshes are healthy, they provide a protective buffer during storm surge events. But as marsh habitats decline, the vegetation and root structure that prevents erosion disappear, causing the marsh to convert to open water and leaving areas behind the marshes more vulnerable to storm surge flooding.



Saltwater IntrusionAs saltwater pushes farther into brackish and freshwater marshes, it causes the deterioration of the marsh habitat.

LA SAFE encourages an integrated water management approach that uses both gray and green infrastructure. These facilities reduce flooding by alleviating loads on drainage systems and slowing subsidence by recharging groundwater.

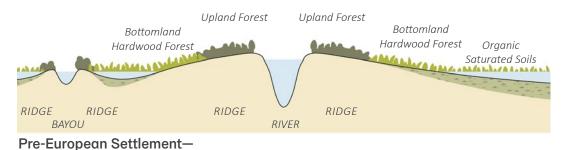
Shallow Subsidence

Shallow subsidence is the sinking of the ground that damages buildings, streets, and other infrastructure and makes the challenge of pumping stormwater out of the region more difficult. Subsidence is a result of dry soils, largely caused by current drainage practices that pump water out rather than maintaining a consistent water table. 10,11

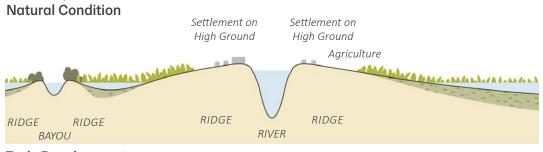
The increased flood risk and infrastructure damage caused by subsidence across the region add millions of public dollars every year in preventable expenses. ¹² Subsidence also drastically raises the cost and frequency of repairs to levees, canals, and floodwalls that have been compromised by degradation or lowered elevations.

There is an opportunity to address our water risks by expanding water management roles to include subsidence control. Stormwater management best practices hold water in the landscape as long as possible, so that pumping is a last resort. Water storage in ponds, canals, rain gardens, and bioswales maintain higher groundwater levels, allowing organic soils to remain stable.

The graphic below indicates how development patterns over time can lead to land subsidence. Uncontrolled development in low-lying areas with organic soils necessitates pumping practices which, in turn, cause soils that need water to remain stable to dry out and sink.

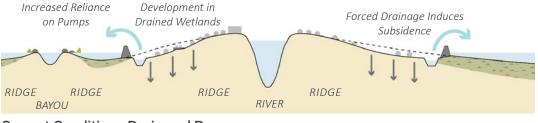


Natural waterways form naturally high ridges.



Early development was on the highest ground adjacent to natural waterways.

Early Development



Modern technologies have allowed development in low-lying wetlands. Water is pumped out lowering the groundwater level and causing soils to dry and the land to sink.

Current Condition—Drain and Pump



SOIL SUBSIDENCE POTENTIAL

The map shows varying levels of organic soils and their relative subsidence potential. This information can guide land use decisions and help determine risk mitigation standards.

Source: Web Soil Survey produced by National Cooperative Soil Survey, USDA Natural Resources Conservation Service 2015 – 2016; For all basemap data see References

As organic soils are drained of water, their contents "oxidize," or decompose and shrink. The areas with the highest percentage of organic material in their soils typically have the highest potential for subsidence. Water levels in these areas need to be maintained at higher levels to avoid subsidence-related damage to buildings and infrastructure.

Structural protection worsens subsidence unless internal water detention is prioritized.

Legend



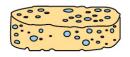
Highly Organic Soils High Subsidence Potential



High Plasticity Silt and Clay Soils Shrink and Swell Potential



Low Plasticity Silt and Clay Soils Lower Shrink and Swell Potential





Delta soils are like a sponge. Organic soils are only stable when they are full of water. When they dry out, they shrink.

Federal Levee



Land

••••••

Non-Federal Levee



Wetlands

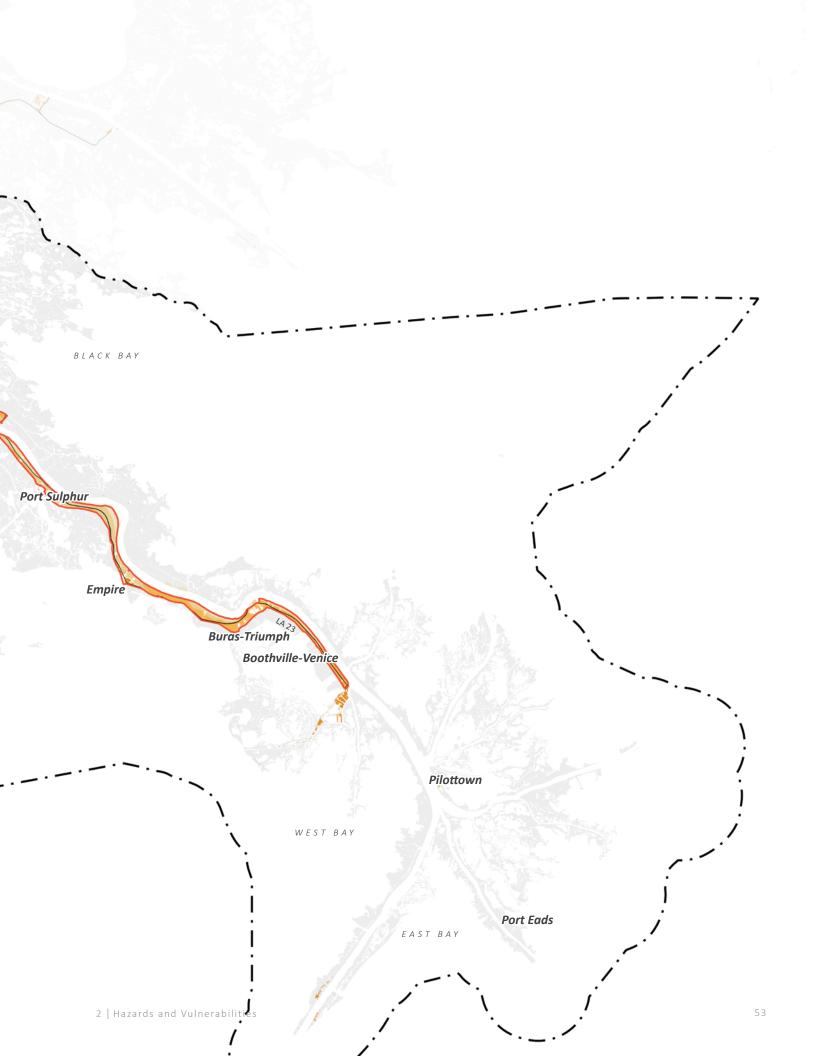
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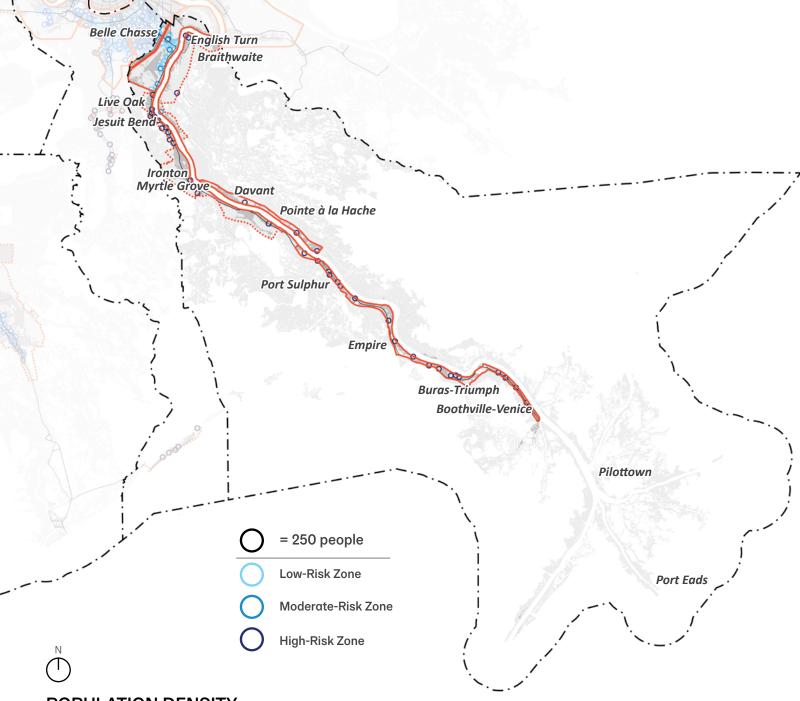
Parish Boundary



Water







POPULATION DENSITY PER RISK ZONE

The map shows population density in the three risk zones.

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; FEMA DFIRM 100-year floodplain data for Plaquemines Parish 2012; Data prepared by ESRI, sourced from U.S. Census Bureau, Census 2010 Summary File 1; For all basemap data see References

Legend

Land

Wetlands

Water

Federal Levee

Non-Federal Levee

· — · Parish Boundary

Social Vulnerability

Vulnerability is more than just exposure to hazards such as storm surge, heavy precipitation, and subsidence. Vulnerability is caused by conditions including poverty, racial or cultural marginalization, geographic isolation, illness, disability, or a variety of other afflictions. These circumstances may impede a person or community's ability to prepare for or cope with a shock or stress. For example, while a storm surge may be the physical cause of damage and harm to a community, a range of economic, cultural, social, and political factors also affect the degree to which an individual or community is negatively impacted by that event. Understanding vulnerability means understanding the amount of damage an event can potentially inflict as well as understanding the resources and strategies available to the affected population for recovery, preparation, mitigation, and adaptation. In order to effectively plan for and adapt to risks, the types and magnitude of vulnerability must be understood and taken into account.

Income and Poverty

Poverty is a key factor that increases vulnerability to environmental hazards and stresses. ^{13,14} Lower-income households have fewer resources to dedicate to preparing for and recovering from an adverse event. Their economic livelihoods are also more likely to be disrupted by an environmental shock or stress, as their jobs may offer little protection against employment disruptions. People living in poverty are also more likely to live in high-risk areas with greater degrees of exposure to those risks. They are less likely to be insured against disasters or other adverse events, and they have fewer resources available with which to protect or replace their assets. Often individuals in poverty also do not have adequate access to information about adaptation options. The lack of access to resources presents additional challenges for these families who are often unable to move to new locations, secure new jobs, or adapt to change in high-risk areas.

Estimates from the U.S. Census Bureau's 2016 American Community Survey show approximately 17.2% of the population in Plaquemines Parish living below the poverty line. ¹⁵ This rate is lower than the state of Louisiana (19.7%), ¹⁶ similar to the Gulf Coast region ¹⁷ (17.1%), ¹⁸ but higher than the United States (15.1%). ¹⁹ The percentage of individuals below poverty in Plaquemines Parish has decreased by 0.8% since the 2000 census. ²⁰ According to the U.S. Department of Housing and Urban Development, 33.6% of Plaquemines Parish households were characterized as "low-moderate income" in 2015. ²¹

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Implications for Risk

Individuals and families with lower incomes and little or no savings are more vulnerable to any number of flood or disaster-related impacts, including healthcare- or injury-related costs, direct property damage, damages to their vehicles, interruptions to transportation infrastructure or transit services, effects on employers, and interruptions to schools or childcare. Any of these can be "the last straw" that pushes a vulnerable household into economic crisis.

Homeownership and Cost of Housing

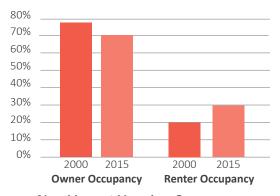
In 2016, 70% of non-vacant housing units in Plaquemines Parish were owner-occupied, ²² and 30% were renter-occupied, compared to 78.9% owner occupancy and 21.1% renter occupancy in 2000. ²³ In 2016, the median gross rent in Plaquemines Parish was \$1,000, ²⁴ compared to \$788 statewide in Louisiana. ²⁵

In 2016, approximately 42% of renters in Plaquemines Parish were rent burdened, spending at least 30% of their household income on rent. Approximately 18% of renters in Plaquemines Parish were severely rent burdened, spending at least 50% of their household income on rent. This is an increase from 2000 when 27% of renters were rent burdened and 16% were severely rent burdened. While home ownership is falling in Plaquemines Parish, those who are renting are increasingly cost-burdened. Whether they own or rent, cost-burdened households have fewer resources to dedicate to preparations and adaptation measures that would make them more resilient to future hazards.



Adequate insurance coverage is a critical hedge against the potential cost of disasters, and anyone who owns property in a hazard-prone area should invest in both a home- or property-owner's policy as well as flood insurance. In the wake of a disaster, property that is underinsured or lacks appropriate coverage places greater burdens on the owner's own financial reserves and on public sector disaster recovery efforts.

However, both homeowner's policies and flood insurance are becoming increasingly expensive and therefore increasingly difficult for households and businesses to afford. Within Louisiana, rates increased 67% from 2004 – 2015, ²⁸ and in the coastal zone, the increase was even higher at 85%. Between 2004 and 2015, homeowner's insurance premiums in Plaquemines Parish increased 80% to an average homeowners insurance premium of \$2,523. ²⁹ Rising premiums mean households have fewer resources to devote to efforts to reduce risk or to cover other expenses, resulting in increased vulnerability.



Non-Vacant Housing Occupancy Sources: U.S. Census Bureau, 2000 Census; U.S. Census Bureau, 2010 – 2015 American Community Survey 5-Year Estimates

In 2017, the cost of National Flood Insurance Program (NFIP) policies rose an average of 6%. ³⁰ Increases could be much higher but are capped at 18% for any individual policy. ³¹ Information regarding increases in 2017 flood insurance premiums in Plaquemines Parish was unavailable. While these increases are intended to bring premiums up to actuarial rates that reflect true flood risk, one unintended consequence is that some policyholders are dropping their coverage, and fewer homeowners are purchasing new policies. Nationally, there has been a 10% decrease in the number of policies since 2012 when legislative changes were made to the NFIP. ³² As of 2013, the parish had 406 repetitive loss and severe repetitive loss properties, of which more than half (232) were not insured. ³³ The rising costs of flood insurance, combined with diminishing property values in high-risk areas, drains residents' net worth and makes relocation financially impossible for many.

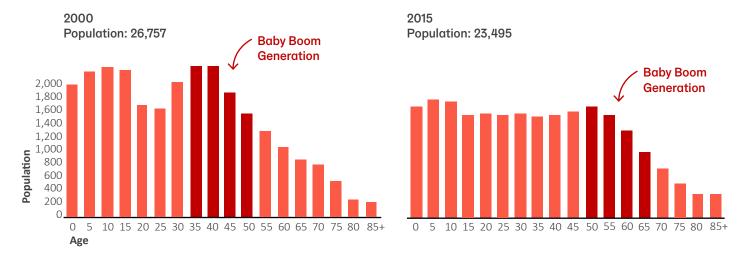
Aging Population

The physical, economic, and social vulnerabilities associated with aging—especially when layered with poverty, lack of insurance, and other factors—pose additional challenges for many older adults attempting to prepare for and recover from disasters, including floods. Since 1980, the median age of Plaquemines Parish's residents has increased by 11 years. 34,35

An aging population has unique needs that must be considered when assessing vulnerability. Older residents are more likely to have mobility issues that make evacuation in the event of a storm more difficult for them. Older residents are also more likely to be on fixed incomes, which can make rising insurance costs and recovery efforts a significant financial burden.

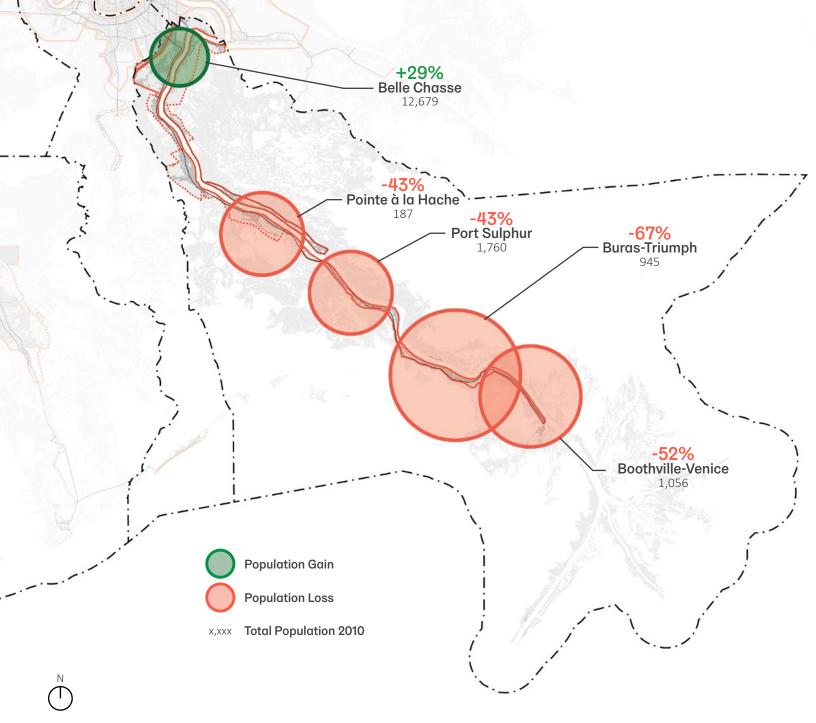
"[We need] a shuttle service for the elderly who cannot drive and need to go get medical attention."

-Plaquemines Parish Resident



Population by Age, 2000 – 2015

Sources: U.S. Census Bureau, 2000 Census; U.S. Census Bureau, 2011 – 2015 American Community Survey 5-Year Estimates



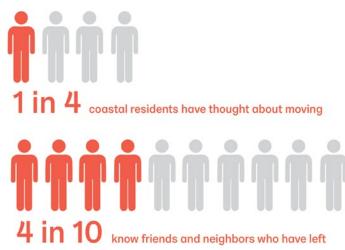
POPULATION CHANGES 2000 – 2010

Between 2000 and 2010, lower parts of the parish saw declining population while the northern part of the parish saw a population increase.

Source: Data prepared by ESRI, sourced from U.S. Census Bureau, Census 2000 Summary File 1 and Census 2010 Summary File 1; For all basemap data see References

Legend





Source: Survey by National Association of Realtors and Center for Planning Excellence, 2013

Population Movement

In 2013, the National Association of Realtors and the Center for Planning Excellence conducted a survey of Louisiana's Coastal Management Zone and found that 25% of coastal residents have thought about moving from their current home, and 40% know friends or neighbors who moved due to persistent challenges associated with living in the coastal areas, including the cost of flood insurance and potential flood damage.³⁶

Plaquemines Parish is no exception to this trend. Between 2000 and 2010, the overall parish population decreased 14%; however, the community of Belle Chasse has experienced a population increase of 29%. 37,38 According to local stakeholders, many residents, weary of repeated storm flooding, simply moved up the river to lower risk areas. The communities of Boothville-Venice, Buras-Triumph, Port Sulphur, and Pointe à la Hache each saw population declines of 52%, 67%, 43%, and 43%, 39,40 respectively, over the same time period. Overall, the most southern communities are experiencing population decreases, while the community located in the northern part of the parish where elevations are higher is growing. Higher elevations are less susceptible to flood surge risk and relocating to these areas is a way to reduce exposure to risk. However, population shifts such as these create challenges for the communities that are losing population as well as those that are gaining. Population loss makes it more difficult to fund infrastructure and sustain key services such as medical facilities, schools, and emergency services. In receiving communities, rapid population growth may overwhelm the current capacity of infrastructure and services.

"Population left, businesses had no one to serve."

-Plaquemines Parish Resident

"The only way young people would come back if there was a financial reason to come back."

-Plaquemines Parish Resident



Implications for Risk

It makes sense that individuals, families, and businesses are choosing to relocate in response to the perception or reality of increasing risk in a given location. However, these shifts in population and economic activity can result in economic and social hardships for those who are relocating as well as the communities that they left behind and those to which they moved. The goal of this LA SAFE plan is to consider these movements in a strategic framework that can mitigate rising risks where possible, allowing people to remain in place—or leverage the push and pull forces that lead to population relocation so as to maximize the positive impacts of relocation for all parties.





Natural Environment

Natural Assets

Plaguemines Parish is located in the heart of the southern Gulf Coast with the Mississippi River running through the entire parish, ending in the bird-foot delta. Plaquemines Parish is composed of coastal lands woven with waterways and wetlands. Over 70% of the parish is water and wetlands, 41 with freshwater marshes in the northern areas, brackish marshes farther south, and saltwater marshes along the Mississippi River and bird-foot delta. Most development is found on the high ground along the banks of the Mississippi River and within levee systems. The extensive wetland marshes of Plaguemines Parish and access to deep waters provide recreational, agriculture/aquaculture, and economic opportunities. However, the low topography and watery landscape of the parish also leave it heavily exposed to floods and storm surge.

"It's peaceful. I love the wildlife in my yard. I raise chickens and geese and ducks. I need the environment to do what I do economically. I like having family land. I want my kids to come back and live the same lifestyle."

"My husband takes the pirogue out and catfishes... feeds everybody."

—Plaguemines Parish Resident

-Plaquemines Parish Resident



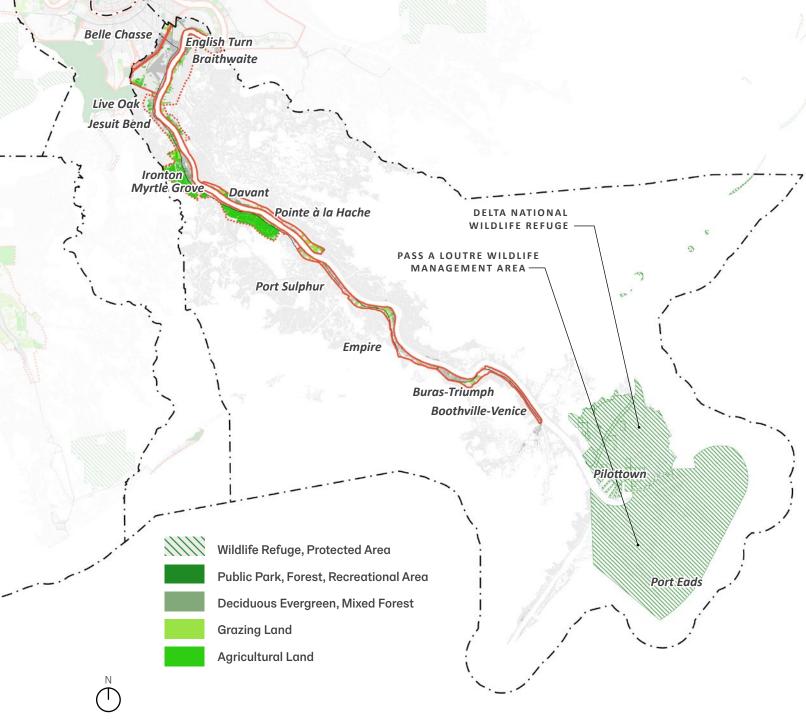




Photo Credit: Historic Plaguemines Parish/James and Alora Cosse Madere

Access to Nature

The parish's landscape provides many opportunities for access to nature for locals and visitors.



NATURAL ASSETS TODAY

Coastal Louisiana is comprised of many waterways, parks, forests, and farmland.

Sources: U.S. Census Bureau TIGER/Line 2016; U.S. Fish and Wildlife Service 2001; Louisiana Department of Wildlife and Fisheries 2006; National Land Cover Database created by Multi-Resolution Land Characteristics Consortium 2011; For all basemap data see References

Legend

Land Wetlands

Water

Federal Levee

•• Non-Federal Levee

· — · Parish Boundary

Over 70% of the parish is water and wetlands, with freshwater marshes in the northern areas, brackish marshes farther south, and saltwater marshes along the coast and delta.

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Housing and Development

In a planning context, "development" refers to the way in which residential and commercial structures, transportation facilities, stormwater management infrastructure, public amenities, and public services are designed, located, expanded, and spatially organized and networked. Planning and zoning are tools communities can use to help ensure that development results in low-risk, affordable housing stock, efficient transportation systems, access to jobs and services, and economic sustainability while preserving natural and cultural assets and supporting a high quality of life.

Historical Settlement and Development Patterns

The natural landscape has heavily influenced past and current development patterns in Plaquemines Parish. The Mississippi River's banks have always been the highest ground and the safest land to settle, which is where American Indian tribes established their communities among the bayous. These tribes were displaced with the arrival of European settlers, who in 1699 erected La Balize, a fort to guide ships near the mouth of the Mississippi River. Initially, fishers and river pilots settled in Plaquemines Parish because of the region's rich estuaries, which provide prime fishing, shrimping, and crabbing opportunities.

Beginning in the 1700s, the French arpent system was used to shape properties on high ground into long, deep parcels with a narrow frontage along navigable rivers that maximized access to both a waterway and cultivable land for the greatest number of landowners. Prime farmland supported sugarcane, citrus fruit, cotton, and indigo agriculture. Vestiges of the arpent system can still be found in the parish today.

Transportation systems were similarly responsive to the environmental context. Water-based transportation connected families and commercial interests across Plaquemines Parish and beyond. Later, roads built on the natural ridges along the Mississippi River connected the different settlements across the parish, though traveling by car along the banks of the river required people to travel longer distances to reach destinations across the river.

Throughout the 20th century, immigration helped form Plaquemines Parish communities and development patterns. Croatian immigration to the United States took place between 1900 and 1914. Louisiana Croatians settled in or near Plaquemines Parish fishing communities like Olga, Empire, Buras, and Port Sulphur. Fishing families in Louisiana often spent much of the year in camps, which were built on posts driven into the marsh. In the late 1970s, thousands of Vietnamese and Cambodian people immigrated to Louisiana, fleeing after the fall of Saigon in South Vietnam and the collapse of the Khmer Rouge regime. Many of the refugees settled in coastal areas and found work in the shrimping and fishing industry.

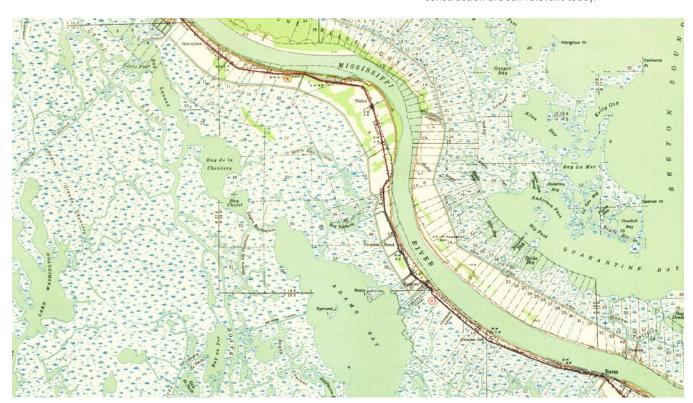
Since the early 20th century, commercial and industrial development have flourished on the banks of the Mississippi River and in the northern part of the parish. The discovery of offshore oil in the 1920s changed the economic landscape dramatically and prompted rapid industrial, commercial, and residential development in the next decades. Plaquemines Parish was established as a strategically-located hub for services related to the oil and gas industry. The parish's economy benefited greatly, and population and infrastructure investments grew significantly.

In Plaquemines Parish, the natural environment heavily influences where residents live and where major revenue sectors locate. This will create challenges in the future, as more of the parish's landscape will change from land to open water and even less land will be suitable for development.





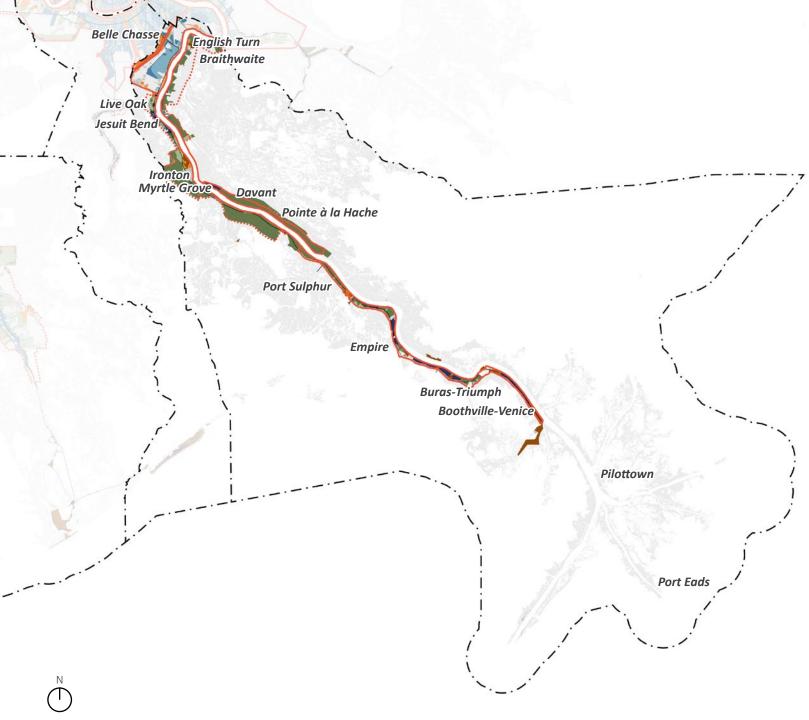
Historic Building MethodsHistoric building methods, such as elevated or floating homes, adapted to flood risk. These types of construction are still relevant today.



Plaquemines Parish, 1941

Historically, people settled on the highest ground, the natural ridges adjacent to the Mississippi River. The arpent system along the river allowed everyone access to water. Map Credit: USGS

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LAND USE PER RISK ZONE

To provide decision makers with the best data to inform future development, LA SAFE has represented projected risk onto a map of the parish's current land use.

Source: Louisiana Speaks Regional Plan and Louisiana Recovery Authority, 2007; Land Characteristics 2011; For all basemap data see References

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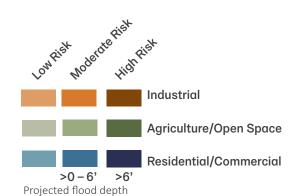
Land

Wetlands Water

Federal Levee

Non-Federal Levee

Parish Boundary



Current Development Patterns

Present-day infrastructure investments continue to be concentrated on higher ground along the banks of the Mississippi River and in the northern part of the parish. Industrial development is primarily along the east and west banks of the Mississippi River, supporting the oil and gas and shipping industries. Existing commercial and office development is concentrated in Belle Chasse, with individual shops providing goods in the southern part of the parish. However, the availability of commercial development in the southern part of the parish has been identified to be lacking.

Plaquemines Parish's area is composed of 70% water and 30% land,⁴² although land area continues to be converted into water area—most severely in the southern part of the parish and in between the bayous. In those areas already experiencing the impacts of land loss, residents and businesses with the resources to do so have been voluntarily migrating north to reduce their economic losses from repeated flooding. As a result, populations in communities such as Venice, Buras, Triumph, Port Sulphur, and Empire are shrinking, while the population is growing in Belle Chasse, which has higher ground and lower flood risk.

Another factor driving the northward migration of southern populations is the location of public assets and amenities. Over the last decade, public assets have been built, or rebuilt, in the northern part of the parish with increasing frequency, prompting residents to move north where they can more easily access these services and assets. Maintenance of public assets and services in higher-risk areas is increasingly more challenging as flood risks continue to increase, while the pool of those receiving services shrinks.

Most housing units in Plaquemines Parish have elevated, in many instances by more than 12 feet. Increased flood risk and land loss in the southern portions of the parish have also given rise to a secondary housing market. Flood-prone areas that may no longer be desirable as permanent residences are transitioning to tourist and recreational areas with camps and vacation homes. These population shifts reinforce historic growth patterns in the parish, where residents are inherently attracted to investing in areas of higher ground. However, availability of higher ground is a major constraint for development.

Implications for Risk

Development decisions made today about where to locate buildings, roads, homes, and businesses will affect the parish well into the future. The Plaquemines Parish Comprehensive Master Plan calls for future development to be more geographically concentrated to more easily provide necessary services and maintain infrastructure. ⁴³ This future development goal is also aligned with the 2017 Coastal Master Plan, which anticipates that up to an additional 55% of the parish land will be lost over the next 50 years if no actions are taken to slow down the rate of land loss. ⁴⁴ In order to maintain enough land to accommodate projected population growth and movement, Plaquemines Parish will need to continue to concentrate assets and encourage greater density in future development.

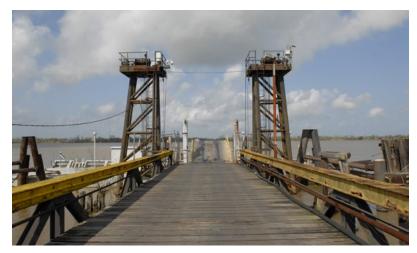
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Transportation

Local and regional transportation systems support commerce, connect people to activities, jobs, and services, and serve as an evacuation network in case of emergency. Plaquemines Parish's transportation infrastructure includes two aircraft runways, two highways, and access to the wetlands and Gulf of Mexico for waterbased transportation.

The Birdwin Airport in Port Sulphur is a privately owned airport, primarily used by single-engine airplanes. This airport has a 2,200-foot long runway. The Southern Seaplane Airport is also located in Plaquemines Parish near Belle Chasse and is operated commercially for recreational uses. This facility offers a 100 by 100 foot storage hanger and five t-Hangar spaces for both sea and landplanes.

The highway system—LA 23 and LA 39— provides regional connectivity to adjacent communities and New Orleans as well as evacuation routes for the west and east banks. There is a growing emphasis at the parish level on bike facilities and Complete Streets that accommodate multiple modes of travel, encourage active lifestyles, attract new residents, and improve quality of life. Additionally, the Mississippi River provides waterway access for commerce and trade.



Ferry Service

Ferries connect Belle Chasse to Scarsdale and Pointe à la Hache to West Pointe à la Hache currently. During the community engagement process, residents expressed a need for improved service and more connectivity across the river.

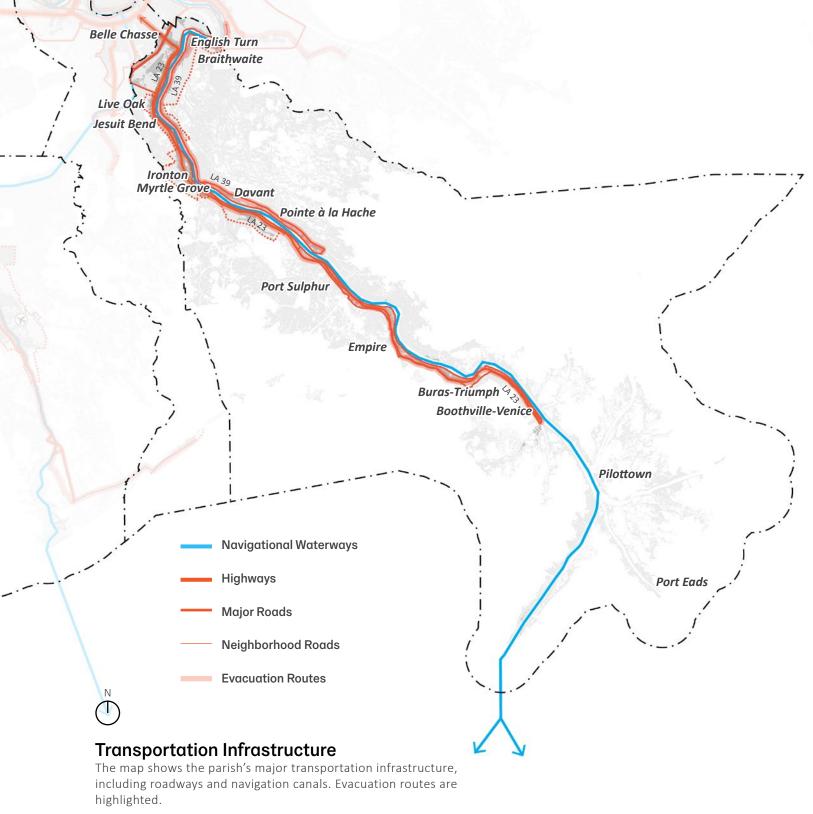


Access and Evacuation

The one-way Belle Chasse Bridge and Tunnel comprises the primary access point into the parish. The tunnel floods and is often closed, prompting temporary two-way use of the bridge.

/! Implications for Risk

Transportation infrastructure may be impacted by floods in two main ways: short-term submersion and long-term damage from water, scour, or salt. Short- or long-term loss of transportation infrastructure can have serious impacts on everything from evacuation and repopulation, disaster recovery and logistics, and economic health—both sector-specific and broad-based. Mitigation (elevation, floodproofing, and relocation) can dramatically reduce vulnerabilities of transportation infrastructure. In many cases, properly designed transportation infrastructure can double as mitigation in itself, providing retention and detention facilities, drainage, or spillway capacity. Roads can also exacerbate flood conditions by cutting off natural drainage channels, causing water to pool.

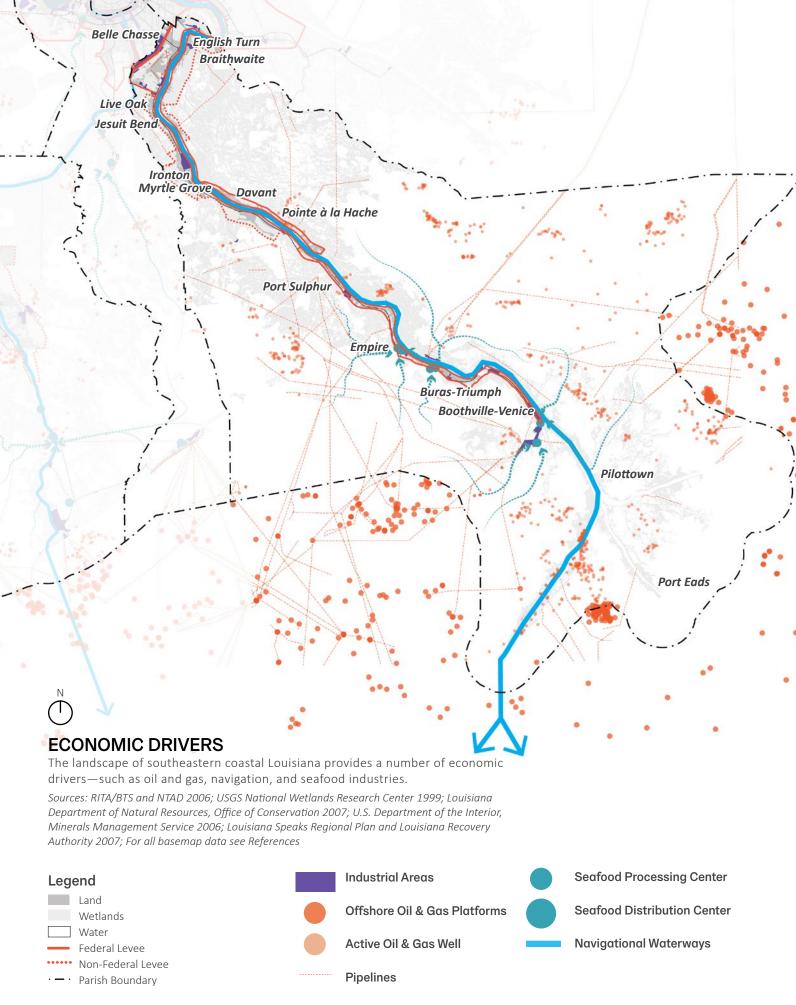


Sources: Research and Innovative Technology Administration's Bureau of Transportation Statistics (RITA/BTS) and National Transportation Atlas Databases (NTAD) 2006; OpenStreetMap 2017; For all basemap data see References

Legend

Land
Wetlands
Federal Levee
Non-Federal Levee
Parish Boundary

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Economy

Prior to the tremendous growth of the oil and gas industry that occurred from the 1920s up until the 1970s, Plaquemines Parish's economy relied heavily on agriculture and the seafood industry. Plaquemines Parish residents farmed on plantations; harvested, processed, and distributed seafood; cultivated sugarcane and citrus; and grew cotton and indigo for distribution. Although the oil and gas industry is now valued by residents as a primary revenue generator for the parish, the food manufacturing sector—especially seafood—and the navigation sector are also major employers that Plaguemines Parish can strengthen for a competitive advantage and leverage for growth.

Plaquemines Parish stakeholders identified manufacturing, energy production, and the seafood industry as areas that offer potential growth and diversification opportunities. The LA SAFE process included outreach to these industries, and the LA SAFE plans take the current and future needs of these industries into careful consideration. Common concerns that emerged include workforce development, career readiness and awareness, land-use policy, and flood risk. LA SAFE strategies presented in the regional and parish plans reflect the need to sustain core employers while also diversifying economic assets.

Art Catering Belle Chasse Primary School C&C Marine & Repair Scott Armature Naval Air Station Joint Reserve Base Rolle Chasse Chevron Oronite Belle Chasse Middle School Pointe à la Hache Courthouse United Bulk Terminals Daybrook Fisheries Buras-Triumph Boothville-Ven Fab-Con

Implications for Risk

The facilities and infrastructure that support these industries are exposed to flood hazards the same as any other component of the built environment. When such facilities or assets are damaged or shut down by hazard events, they have ripple effects on the surrounding community. These effects may take the form of hazardous material releases (airborne or waterborne), supply-chain interruptions, or economic disruptions that drag on household economies and resiliency. Over the longer term, significant impacts to key business sectors can also drive down tax revenues and thus undermine the fiscal stability of the parish, generate lawsuits and insurance claims that can adversely affect business confidence, and diminish the parish's ability to retain and attract employers.

JOB CENTERS

The majority of the parish's job centers are located along the Mississippi River. The economy is largely driven by the shipping, seafood, and oil and gas industries.

Sources: U.S. Census Bureau, Center for Economic Studies, 2014; Infogroup published under U.S. Department of Labor guidance; For all basemap data see References

Legend

Job per Census **Block Group**

- 0 50
- 50 -100
- 100 200 200 - 500
- 500 1000
- Water Wetlands
- ---- Parish Boundary

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River as a Port

Due to its position where the Mississippi River meets the Gulf of Mexico, Plaquemines Parish has a history of strong maritime industries.

Navigation

Plaquemines Parish has strong maritime industries such as navigation, shipbuilding, fabrication, and repairs. Located along the Mississippi River, Plaquemines Parish has direct access to the Gulf of Mexico and the global market. At the mouth of the Mississippi River, the Plaquemines Port offers more than 100 miles of deep-draft access to support waterborne commerce.

As the primary energy-related service driver in Plaquemines Parish, the port houses heliports and has an extensive petroleum infrastructure, including large networks of pipeline and storage facilities. The port handles nearly 55.5 million in tonnage and generates more than \$5 million in revenue.



Implications for Risk

Navigational assets may be vulnerable to direct damage from flooding. Depending on the cargo, this may include the potential for hazardous material release. Damage to port, transfer, or storage facilities may also create supply-chain interruptions locally and beyond. In some extreme cases, navigational channels may be compromised, requiring expensive dredging to repair. Finally, lasting damage to navigational assets—whether onshore facilities or boats—can result locally in loss of wages and wealth, insurance impacts, foregone taxes, and other negative economic ripple effects.

Energy

Per the parish's master plan, "the oil and gas industry grew tremendously through the mid-20th century, became a major industry in the parish by the 1970s, and suffered the oil bust of the 1980s. Since then, the industry has grown again and contributes approximately 25% of the annual severance revenue for Louisiana."45 Moreover, "the LSU Center for Energy Studies estimates that in 2006 the energy industry produced over 8,000 direct, indirect, and induced employment opportunities in Plaquemines Parish."46 Direct jobs are those provided directly by oil and gas drilling and production. Indirect jobs are those created by additional economic activity associated with drilling and production, such as support services for transport and storage. Induced jobs are those that result from the additional disposable income available as a result of oil and gas production and drilling. There are two major oil and gas operations in the parish, ConocoPhillips Alliance Refinery and the Chevron Oronite Oak Point Plant, employing more than 400 people. These operations are located on higher ground in Belle Chasse.

However, the parish's oil and gas workforce has declined recently as a result of operations shifting into deeper waters and the oil and gas market downturn. This skilled workforce is available to be retrained and transitioned to other emerging industries. Existing and future post-secondary vocational training and on-the-job training programs provided by nearby universities, colleges, and technical schools will be essential to the successful transition of these workers.



Upriver IndustryThe ConocoPhillips Alliance Refinery is located on higher ground near Belle Chasse.



Downriver IndustryThe parish has many downriver and offshore oil and gas facilities.

"How do we shift the way we think about energy policy in Louisiana?
Oil and gas industry expertise can be used to create wind
technology. We don't have to add more incentives. Just shift them."

-Plaquemines Parish Resident

/ Implications for Risk

Industrial assets may be vulnerable to direct damage from flooding, with the potential to cause hazardous material releases as well as other physical damage. Plaquemines Parish needs to ensure that the infrastructure supporting the oil and gas industry is protected from and adapted to hazards both to sustain the industry's important contributions to the local economy and to protect residents and the environment from the potentially hazardous effects of a failure or breakdown.



Louisiana Seafood

Plaquemines Parish's seafood industry is one of the leading sources of income and major employers in Louisiana. The parish annually produces millions of pounds of seafood.

Seafood Industry

The seafood industry in Plaquemines Parish provides more than an occupation; for many, the lifestyle and livelihood associated with fishing and shrimping are passed down through generations. Seafood from Plaquemines Parish supplies seafood to the national market, supports the region's rich culinary traditions, and contributes to the regional economy as a major export. The parish's seafood industry, including oysters, shrimp, menhaden, and crab, accounts for about 70% of Louisiana's commercial seafood industry.⁴⁷ The largest commercial fishing fleet in the continental U.S. can be found in Plaquemines Parish.

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Implications for Risk

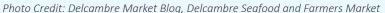
Wetlands, marshes, and commercial fishing assets—including port, transfer, storage, and refrigeration facilities as well as vehicles and boats—are vulnerable to direct damage from flooding. Damage to these facilities may create supply-chain interruptions locally and beyond. Furthermore, lasting damage to navigational assets—whether onshore facilities or boats—can result locally in loss of wages and wealth, insurance impacts, foregone taxes, and other negative economic ripple effects. Saltwater intrusion and habitat loss can also devastate species of fish and crustaceans the seafood industry depends on. Over recent years, Plaquemines Parish and other domestic producers of shrimp have faced increasing competition from imports, which contributes to the economic disruption.

Case Study: Delcambre Direct Seafood

The Delcambre Direct Seafood program revitalized Delcambre's shrimping industry in 2010. Developed by the Town of Delcambre, which straddles Iberia and Vermilion Parishes, in partnership with the LSU AgCenter and Louisiana Sea Grant, the program helped connect fishers directly to consumers and drive new customers to the local fishing industry along Louisiana's Gulf Coast. The success of the Delcambre Direct initiative convinced stakeholders that this project could benefit fishers—and consumers—along the entire coast of Louisiana. In 2012, LouisianaDirectSeafood.com, as well as satellite programs in Lafourche-Terrebonne (La Ter), Cameron, and Southshore—New Orleans, was born.

These programs allow fishers to market their catch directly to the public and sell to consumers right off the boats, providing access to internationally known oysters and all varieties of seafood. The fishers benefit from an improved ability to sell their catch to consumers at a fair price, while customers get better access to fresh seafood.

As a statewide entity, Louisiana Direct Seafood is able to build partnerships with business and industry to create new opportunities for commercial fishers to succeed. For example, the Iberia Industrial Development Foundation (IDF) partnered with Delcambre Direct to secure grant funding from the Rockefeller Foundation and Community Foundation of Acadiana to create the Louisiana Seafood Academy. The Academy provided workshops and training on multiple business issues like quality, energy efficiency, rules and regulations, and more.





"The land loss has affected us a lot. Lots of fresh water coming in. It affects everyone in this parish because 90% of us are fishermen fishing for shrimp, oysters, and crab."

-Plaquemines Parish Resident

Naval Air Station/Joint Reserve Base (NAS JRB) New Orleans

Plaquemines Parish has been home to the NAS JRB in Belle Chasse since it was commissioned on Dec. 13, 1957. The military installment has grown over time and continues to fuel the local community and contributes to the parish's identity as a community of national significance. The military site houses Navy, Air Force Reserve, and Air National Guard units. The NAS JRB plays an important role in the Plaquemines Parish community, supporting a unique population who live, work, or serve onboard the installation. On a daily basis, NAS JRB is a constant center of activity for air operations, ground operations, and a variety of family support services.

Agriculture

According to the LSU AgCenter's 2016 summary of Louisiana agriculture, ⁴⁸ the parish's top crops are citrus, fruit and nut trees, tomatoes, and floraculture and bedding plants. Many of the parish's agricultural workers are self-employed. To better capitalize on the parish's agricultural assets, Plaquemines Parish could see a greater multiplier effect from these agricultural products by pursuing value-added agribusiness manufacturing or processing opportunities. Retaining manufacturing and processing activities in the parish leads to additional economic activity in the local economy because, instead of agricultural products leaving Plaquemines Parish immediately after harvesting, they would be reused in the local community to produce additional products, thereby creating additional jobs and tax revenue. Similarly, producing more specialized, higher-value products produces additional revenue, with the potential of increasing worker salaries, increasing residents' spending power, and increasing local tax revenue.



Military

Belle Chasse is home to the Naval Air Station/Joint Reserve Base New Orleans.



Citrus

Oranges are one of the parish's top crops.



Creole Tomatoes

Plaquemines Parish crops can be found at farmers' markets throughout the region.

Photo Credit: St. Tammany Parish Flickr

\bigwedge

Implications for Risk

Agricultural assets—including buildings, vehicles, seed stocks, livestock, silage, and fields—may be vulnerable to direct damage from flooding. In particular, saltwater intrusion from surge or backwater flooding can devastate crops. Extreme temperatures, such as freezing, can damage citrus crops. Additionally, transportation, transfer, and storage facilities may be impacted by floods. Lasting damage to any of these can result in ripple effects through related sectors of the economy as well as loss of wages and other negative economic impacts.

Recreation and Tourism

Louisiana is known as the Sportman's Paradise, and Plaquemines Parish embodies that motto. Venice, located near the parish's southern tip, is often referred to as the Fishing Capital of the World. With direct access to marshes on either side of the Mississippi River and the Gulf of Mexico, recreational fishing is a major attraction for anglers from around the globe.

Fishing camps and fishing charters take advantage of the parish's wetland and coastal locations, affording access to both freshwater and saltwater fishing. For communities in the southern part of the parish, sport fishing is increasingly a great economic opportunity, with people from around the world visiting fishing camps and hiring charter boats. This economy could further include local seafood restaurants to capitalize on the growing ecotourism. Ecotourism—tourism that capitalizes on the natural beauty and resources of an environment—is an industry that can provide economic viability for those areas with high flood risks. The Wetlands Discovery Center, the Delta National Wildlife Refuge, the Breton National Wildlife Refuge as well as the Woodlands Trail and Park, which offers visitors an opportunity to see one of Southeastern Louisiana's remaining coastal hardwood forests, fuels the parish's ecotourism industry. Opportunities to hunt duck and other waterfowl abound throughout the parish. With the strong tourism industry in Orleans Parish to the north, there is the opportunity for Plaquemines Parish to grow this economic sector.



Recreational Fishing
The parish's many waterways provide recreational opportunities for locals and visitors.





Woodlands ConservancyThere are more than 10 miles of trails throughout the Woodlands Conservancy near Belle Chasse.

/ Implications for Risk

Sport fishing and other recreational assets may be vulnerable to direct damage from flooding, similar to commercial fishing. Vulnerabilities include onshore assets (port and support facilities as well as private camps), the boats themselves, and other related tourist infrastructure such as lodging, restaurants, and retail. Damage to any of these can disrupt recreational activities, which can in turn drag down local income and wealth. Moreover, because recreational and tourist spending is highly elastic, difficult economic straits or challenging local conditions can sharply reduce demand for such activities.

Economic Decline and Disruption

Changes on the coast have increased Plaquemines Parish's economic vulnerability. Even with the full implementation of the 2017 Coastal Master Plan, CPRA estimates damages in excess of \$300 million per year over the next 50 years. ⁴⁹ A portion of this damage will be to the parish's infrastructure. The oil and gas industry and shipbuilding industry all depend on parish infrastructure for access to the Gulf. Fisheries and agriculture depend on certain habitats, which are changing rapidly. Plaquemines Parish produces 70% of the state's seafood, ⁵⁰ and storms as well as restoration efforts will impact the types of seafood that will come from the parish in the future. For example, if restoration efforts cause freshwater and sediment to encroach on open water, the water's salinity will decrease in habitats where oysters are currently thriving. In the coming decades, the geography of oyster habitats may change impacting those who harvest this seafood. However, the different environment may support other marketable seafood. However, the different environment might support crawfish, giving local fishers another option. Large storms also impact smaller but growing industries such as recreation and tourism by impacting infrastructure, demolishing docks and ice houses, and damaging boats.

Trade-Offs of Economic Activity

The effects of industrial infrastructure and navigational canals have contributed to degrading Louisiana's shoreline including valuable stretches of coastline and marshland in Plaquemines Parish. As a result, vegetation and wildlife habitats were damaged and destroyed, and long-term impacts such as an accelerated rate of land loss, depletion of mangrove forests, and destruction of barrier islands and wildlife habitats are expected. Due to the parish's dependence on these habitats and their wildlife, Plaquemines Parish's economy was and will continue to be negatively impacted by natural and man-made disasters.

"We have more fisheries in the parish than anything. As our estuaries got smaller and the basin closed in, it basically collapsed our whole economy."

-Plaquemines Parish Resident



Implications for Risk

The developed areas of Plaquemines Parish face flood risk from storm surge and coastal erosion. Nearly all residential and commercial developments in the parish are on the ridges that parallel the Mississippi River. While these ridges represent the lowest flood risk areas in the parish, subsidence and sea level rise increase their flood risk, contributing to nuisance flooding and reducing the effectiveness of drainage systems. In short, nearly all land in the parish is susceptible to flood risk of some kind.



Commercial Fishing

Storms as well as restoration efforts will impact salinity levels and the types of seafood that will come from Plaquemines Parish.



Impacts of Man-Made Disasters Cleanup along the shoreline after the Deepwater Horizon oil spill in 2010.



Wetland Loss

Infrastructure and navigational canals cut through the wetlands contribute to wetland depletion.





Photo Credit: Historic Plaquemines Parish/James and Alora Cosse Madere

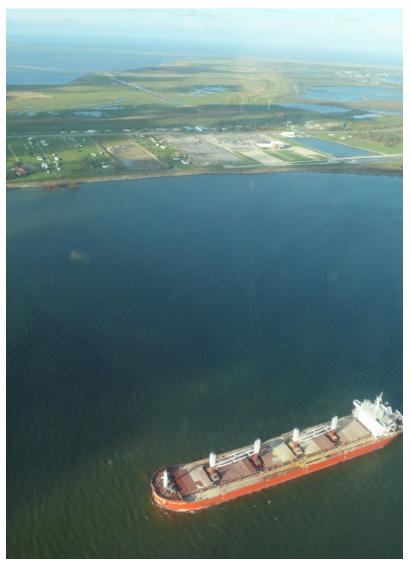
Existing Assets

Tourism, seafood, and navigation show potential for continued economic opportunity.



Opportunities for Growth

Alternative energy and coastal restoration are industries for economic growth into the future.



Economic Opportunities

Participants at Meeting 3 were polled about the types of job opportunities they would like to see expanded in Plaquemines Parish. Many residents recognized that the parish must continue to diversify its economy to reduce its heavy dependence on finite natural resources and to increase economic resilience from natural disasters. The parish has identified steps to increase the existing base economy's resiliency and attract targeted growth industries in the future. Economic development success in Plaquemines Parish requires a safe investment environment; land appropriately prepared for development consistent with the parish's development plans and regulations; adequate and efficient transportation systems; sufficient infrastructure, including water, sewer, and broadband; and workforce readiness.

The parish also recognizes the importance of its water resources, including the Gulf of Mexico and the Mississippi River. These economic assets serve as a critical link between Plaquemines Parish and many of its core industries—including oil and gas extraction, the NAS JRB, commercial and recreational fishing, coal exporting, and transportation and logistics—while also adding to the area's quality of life and unique sense of character. Water will continue to play an important role in new and old industries and to influence residents choosing to locate in Plaquemines Parish.

Three current industries—tourism, seafood, and port activities—show promise for strengthening the parish's economy. Emerging industries that may diversify the economy are the renewable energy, coastal restoration and education/job training industries.

Energy Diversification/Renewable Energy

While oil and gas continues play a dominant role in the parish's economy, there is a growing trend in favor of renewable resources. As the U.S. economy shifts away from an oil-dependent economy, it will be important that Plaquemines Parish also diversifies its economy with other employment opportunities by investing in renewable energy, including hydrokinetic energy and wind energy. Plaquemines Parish is also considering ways to incorporate solar energy as a component of its energy diversification efforts.

Coastal Restoration

The effectiveness of coastal restoration efforts will be critical to economic development in Plaquemines Parish in the long term. Restoration protects the coast from seasonal storms and minimizes risk imposed on private and public investments. Major new investments in the economy and infrastructure are unlikely to be implemented if they are not protected from future disasters. A local knowledge base relating to coastal restoration has grown out of the long-standing presence of the oil and gas industry and is bolstered by programs in and near Plaquemines Parish through Nunez Community College, Delgado Community College, Fletcher Technical Community College, and Nicholls State University. The parish should develop a plan for coastal restoration that identifies initiatives that could result in both construction and technical jobs in this industry for years to come.

Education/Job Training

Community members identified that there is a missing link between the parish's outstanding K – 12 school system and the local training/education needs available for graduating seniors. Recent graduates tend to leave the parish for employment opportunities and often do not return. The parish should work to develop programs and incentives that retain the parish's youth and attracts a young workforce. A plan to partner with regional educational facilities to build a workforce prepared for changing needs is critical.

Heritage and Culture

The last 70 miles of the mighty Mississippi River's 2,340 miles is in Plaquemines Parish. The river, along with the Gulf of Mexico and the many wetlands, have defined much of the parish's heritage and culture. This part of the Mississippi Delta is the youngest, with rich sediments being deposited as recently as the construction of the Mississippi River levees in the 20th century. The parish has some of the most fertile land in the world and numerous varieties of plant life.

The name Plaquemines is how the French Creole pronounced the Atakapa American Indians' word "piakimin," which means persimmon. The parish's earliest settlers were American Indians who lived off the land and near the water. Historical accounts of these settlers are mostly in indigenous stories passed down from generation to generation.

Eventually, the name was applied to the entire parish and to a nearby bayou. The parish's oldest European settlement was La Balize, where—by 1699—the French built and inhabited a crude fort near the mouth of the Mississippi River. The name in French meant "seamark," a tall structure of wood built as a guide for ships. One of the 19 parishes created by dividing the Territory of New Orleans, Plaquemines Parish was established on March 31, 1807.

Plaquemines Parish residents value their heritage and culture and appreciate the traditions that developed over time as generations built their lives and families amidst the local landscape and waterways. Despite disasters and other disruptions, Plaquemines Parish communities seek to prioritize historic and cultural resources, embrace the local ways of living with water, honor the social and cultural character of different communities, and celebrate their special sense of place. The humid parish has been home to people of many different cultures throughout Louisiana's history. Plaquemines Parish's culture has been heavily influenced by its people's appreciation for and dependence upon the natural environment, which has sustained inhabitants for centuries. Many residents living in the parish descend from black, French, Italian, Croatian, Vietnamese, and Cambodian people.



Historic Preservation

During the community engagement process, many residents expressed a desire to reopen historic Fort Jackson to the public.



Orange Festival
Photo Credit: Plaquemines Parish



Sport Fishing

Opportunities for tourism can be expanded. *Photo Credit: The One-Stop Outdoors Blog*

By the mid-1800s, the parish's population included more than 7,000 black people, most of whom were enslaved, and they represented a majority of the population for more than 100 years. Those who were enslaved worked on sugar plantations, cutting and stripping the canes and loading the crops onto carts hauled to sugar mills for processing. Currently, black residents live in communities and villages along the Mississippi River that were settled by their ancestors. The ancestry of these residents includes various races and ethnicities, and the people celebrate common cultural traditions in unique ways. Their social and cultural lives are interconnected and intertwined in spirituality, weddings, birthdays, funerals, sports, and youth activities. Cultural events are intergenerational and involve most of the families of the villages. The most popular cultural tradition is the seafood boil—shrimp, crawfish, and crabs. Sunday baseball and softball games bring together the whole community.

Many of the Croatian people who settled in Plaquemines Parish came from towns and villages on the Dalmatian coast along the Adriatic Sea. New Orleans was a center of Croatian immigration during the early 19th century. Louisiana Croatians settled in or near Plaquemines Parish fishing communities like Olga, Empire, Buras, and Port Sulphur. Many of the early Croatian immigrants were single men. Married men often had to leave wives and families in Europe for years at a time. Eventually, they either returned to Croatia after making enough money or brought their families to Louisiana to live.

Commercial fishing has long been the most prevalent traditional occupation among Croatian men in Plaquemines Parish, particularly oyster fishing. Croatians are credited with developing the state's commercial oyster industry, and Luke Jurisich, who settled at Bayou Creek in 1855, is often called the father of Croatian oyster fishing in Louisiana.

After the fall of South Vietnam's capital Saigon, in 1975, Vietnamese people began immigrating to Louisiana. At the end of the 20th century, approximately 500 Vietnamese people lived in Plaquemines Parish; many were self-employed, opening their own businesses, restaurants, and small grocery stores. Vietnamese residents also worked in Louisiana's fishing and shrimping industries.

At this same time, Cambodian refugees began entering the U.S., with some settling in Plaquemines Parish in coastal areas to work in the shrimping and fishing industry. In 1975, the Cambodian capital city of Phnom Penh fell to the communist Khmer Rouge. At that time, a few Cambodians managed to escape, but it was only after the régime was overthrown in 1979 did large waves of Cambodians begin immigrating to the U.S. as refugees, with some settling in Plaquemines Parish in coastal areas to work in the shrimping and fishing industry.

The confluence of these diverse populations and their strong connection to the land created a unique culture that typifies life along the Mississippi River in Plaquemines. Today, all of these cultures play an important role in local traditions, festivals, food, and music.





50-Year Vision

The Port of Plaquemines

Located at the southern-most tip of Louisiana, Plaquemines Parish was created by the Mississippi River more than 700 years ago. Connecting levee-protected Belle Chasse on the north end and increasingly vulnerable Venice on the south end, the river serves as the supply chain of vital resources to the nation and beyond. Anticipating continued land loss and increasing flood risk, LA SAFE prioritizes investments on protected low-risk areas, which includes blue and green corridors and parkways to store excess water in the landscape; a diversified economy with sustainable industries; and consolidated services around community hubs along the river's higher ground. In high-risk areas, the challenge of rising water turns into opportunities for new cultural and ecological destinations, support for the fishing industry, and improved connectivity and egress.

Renovated Water System

Inside the federal levee protection system in Belle Chasse, low-lying areas with highly organic soils, previously marshland, are most susceptible to drainage-induced subsidence and flooding.

- Engineered landscapes and blue/green corridors delay and store stormwater while providing amenities with multiple benefits to the community.
- Groundwater and subsidence are managed and measured. Reduced pumping and raised water levels limit subsidence.
- Holding water upslope, as close to the source as possible, reduces runoff in low-lying areas.
- Stormwater management is incorporated in all new development and redevelopment projects.
- Smart retrofits use permeable materials to replace impervious surfaces.
- Open canals are maintained and linear park zones along water edges allow controlled flooding while providing recreational and educational opportunities.
- Miles of new and improved waterfronts and park amenities enhance the character of the public realm and spur economic development.
- Sustainable industries diversify the economy and provide opportunities for riverside redevelopment.

Investment Prioritization

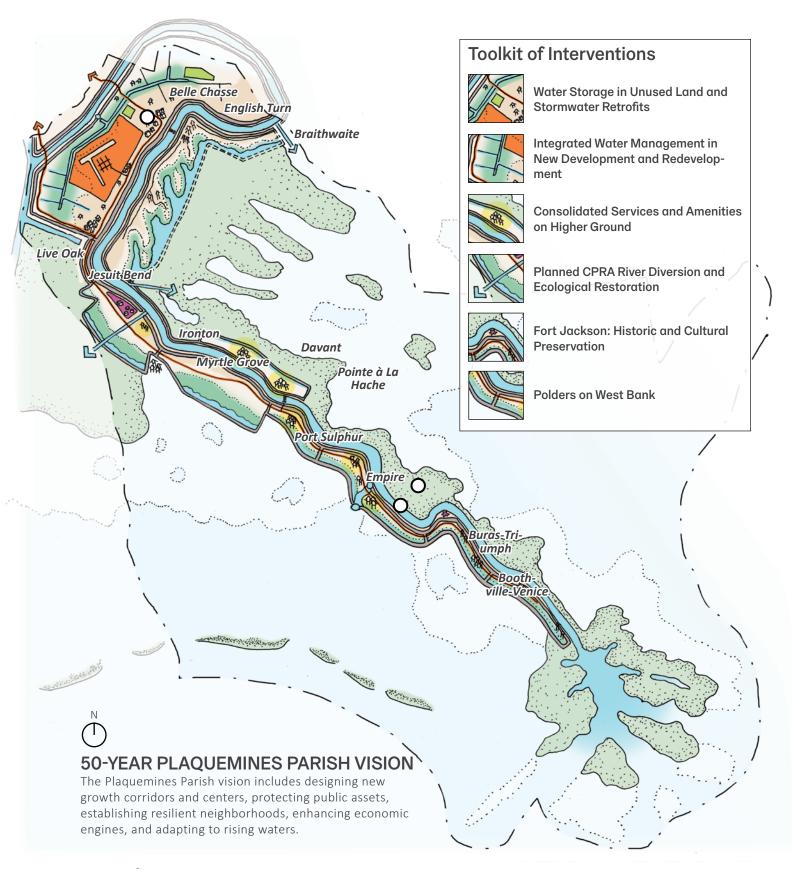
The west and east bank communities along the river prioritize new investments in protected moderaterisk zones on higher ground with stable soils.

- Moderate-risk communities along the river are compartmentalized with new polders for further protection.
- Services and amenities are consolidated around community hubs along the river's higher ground, with agriculture and floodplain management in between.
- New development in the floodplain is restricted and existing critical infrastructure elevated.
- Blue and green networks of engineered landscapes reduce flooding and subsidence where forced drainage is necessary.
- Environmental assets and natural buffers in floodplains are preserved and protected.

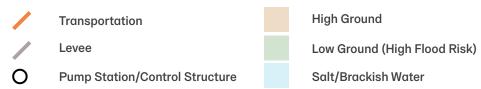
Cultural and Ecological Destination

High-risk areas turn challenges into new opportunities.

- Cultural and ecological assets are preserved.
- Connectivity of services and safe egress are maintained and improved to promote new sustainable economic development.
- Support for the fishing industry and new incentives for aquaculture, camps, and ecotourism bring new revenue to the parish.



Legend



Low Risk

Minimal storm surge flood risk projected and outside the current 100-year floodplain

Design New Growth Corridors and Urban Centers

Low-risk areas have development opportunities to receive populations and economic activity from more flood-prone environments.



Photo Credit: Google Maps Street View

Moderate Risk

>0 – 6' projected storm surge flood depths or within the current 100year floodplain

Protect Assets and Establish Resilient Neighborhoods

Areas conducive to maintaining current population levels and economic trends, provided such communities orient future development and mitigation activities in alignment with future flood risk projections.



High Risk

>6' projected storm surge flood depths

Enhance Economic Engines and Adapt to Rising Waters

Areas that can expect to experience population decline and economic losses, up to and including full community-scale resettlement, as environmental conditions deteriorate and repetitive severe flood events take place.



50-Year Vision by Risk Level

Dealing with flood hazards and managing risk have always been part of life in Plaquemines Parish, and a great deal of work has been done in recent years to help the parish and the region continue to thrive amidst a changing environment and risk profile. The 2017 Coastal Master Plan, along with Plaquemines Parish's Hazard Mitigation Plan and Comprehensive Master Plan, are guiding investments in structural and nonstructural projects designed to address land loss and coastal erosion, which is essential to the future of Louisiana's coastal communities.

LA SAFE has created an opportunity to build upon these plans and ongoing investments by putting community members and stakeholders at the forefront of the planning process. The LA SAFE team worked with them to develop a shared vision for the future of their parish and region; set priorities to inform a holistic approach to achieving resilience; and vet local, parish-wide, and regional solutions. This process enabled residents and local stakeholders to take on greater ownership of the strategies needed for their communities to successfully mitigate flood risk and adapt to future hazards. The following recommendations are the result of that community-driven process.

LA SAFE promotes new growth corridors and urban centers in low-risk areas, protects assets and establishes resilient neighborhoods in areas of moderate risk, and enhances economic engines and adapts to rising waters in high-risk areas.



LOW-RISK ZONE

Risk scenarios are based on CPRA's 50-year flood depth projections under a Medium Environmental scenario and FEMA's proposed DFIRM floodplain data.

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; FEMA Preliminary DFIRM 100-year floodplain data for Plaquemines Parish 2012; For all basemap data see References

Low Risk

Minimal storm surge flood risk projected and outside the current 100-year floodplain

Current characteristics of these areas include suburban-type, single-family residential and commercial development with infill opportunities, with limited transportation options and traditional stormwater management facilities. Primarily located on and along the natural ridges and within the levee system, the area's population is concentrating on higher ground and slowly focusing on the Belle Chasse area. Despite this higher ground and low flood risk, flood risk from storm surge is increasing in this area due to coastal erosion in the surrounding areas and heavy downpours have been flooding streets. The low-risk areas area further decreasing.

Legend

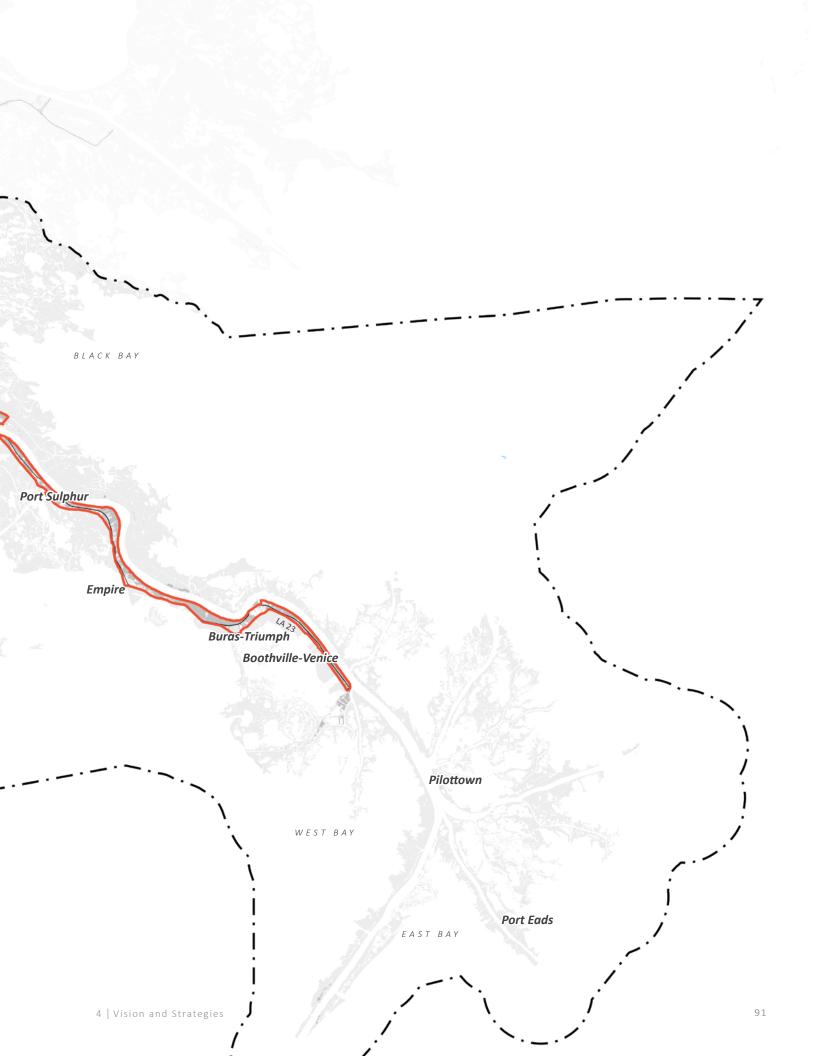


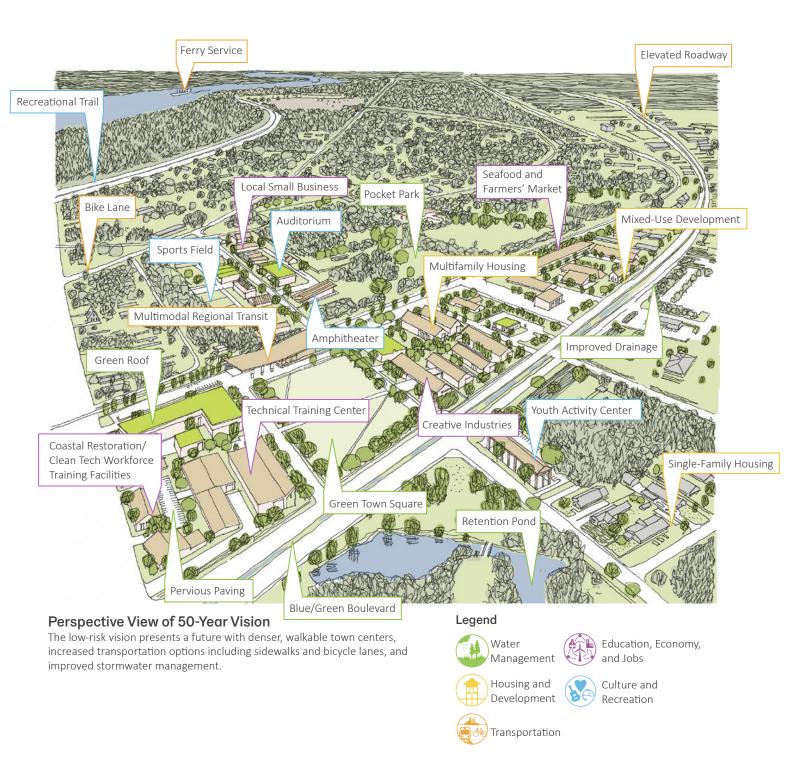
Federal Levee

Non-Federal Levee

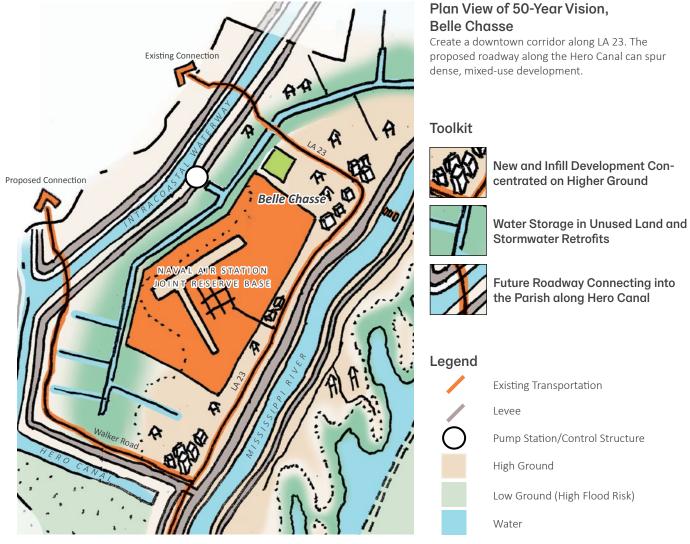
— · — · · Parish Boundary







When surveyed in Meeting 3, a total of 36% of Plaquemines Parish participants strongly agreed with this vision, and the next 29% agreed or slightly agreed. About 29% of participants disagreed or slightly or strongly disagreed.



50-Year Vision for Low-Risk Areas: Design New Growth Corridors and Urban Centers

Lower-risk areas are projected to have economic growth, population increases, and minimal flood risk. The low-risk area vision is characterized by—

- Denser residential and commercial development
- Increased transportation options
- Improved stormwater and subsidence management
- Green public spaces
- Increased job opportunity and economic diversification



MODERATE-RISK ZONE

Risk scenarios are based on CPRA's 50-year flood depth projections under a Medium Environmental scenario and FEMA's proposed DFIRM floodplain data.

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; FEMA Preliminary DFIRM 100-year floodplain data for Plaquemines Parish 2012; For all basemap data see References

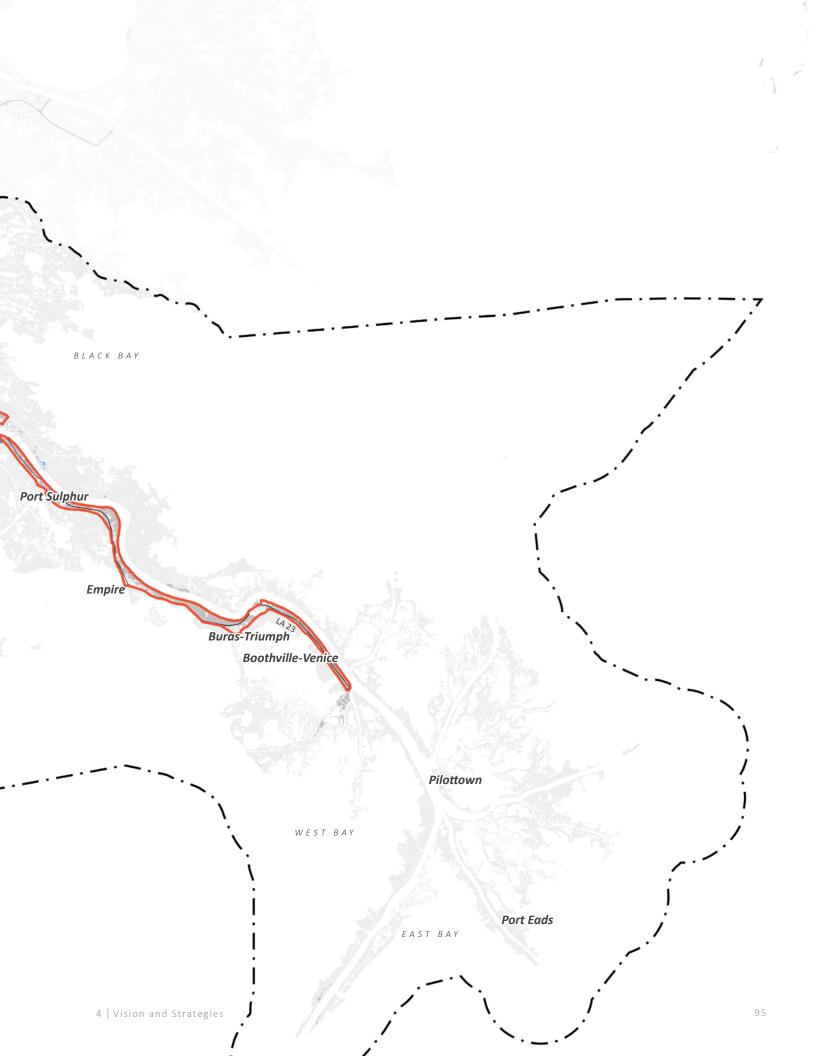
Moderate Risk

>0 – 6' projected storm surge flood depths or within the current 100-year floodplain

At this time, the area is primarily within the levee system on moderately high ground. Single-family residential and commercial development are present in this areas. Protection and restoration projects are currently underway to decrease storm surge flood risks of up to 15 feet.

Legend Land Wetlands Water Federal Levee Non-Federal Levee Parish Boundary

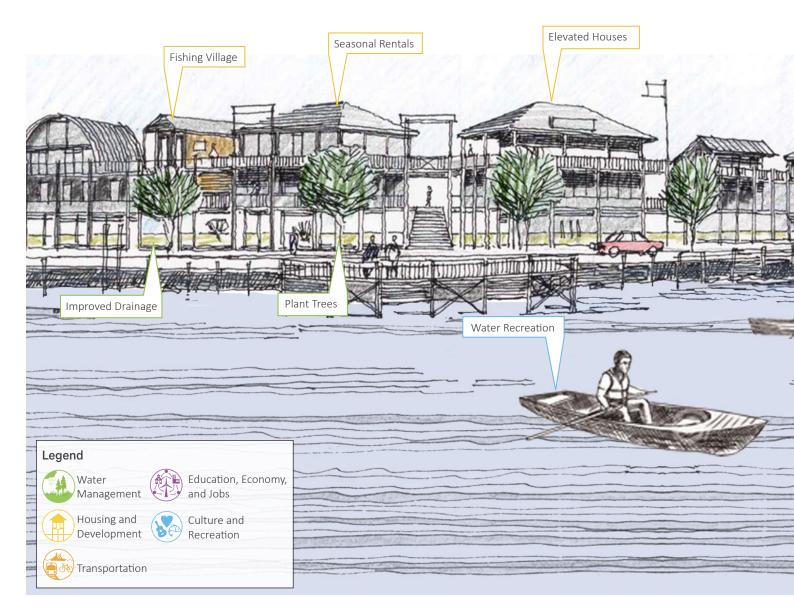




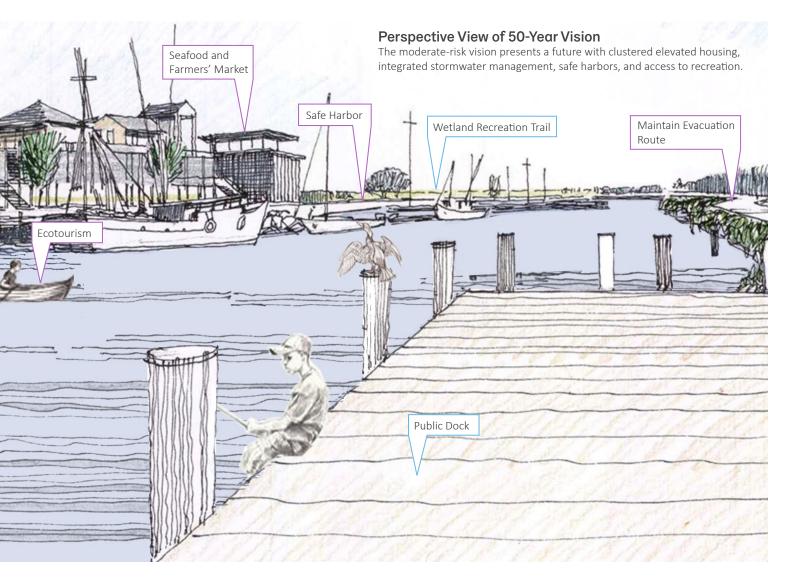
50-Year Vision for Moderate-Risk Areas: Protect Assets and Establish Resilient Neighborhoods

Moderate-risk areas are projected to have land loss in surrounding areas, moderate local flood risk, and minimal change in population. The moderate-risk area vision is characterized by—

- Improved drainage system and stormwater management
- Clustered elevated housing and amenities
- Recreational spaces
- Elevated evacuation routes
- Increased transportation options
- Economic opportunities such as ecotourism and farmers'/fish markets



When surveyed in Meeting 3, a total of 50% of Plaquemines Parish participants strongly agreed with this vision, and the next 20% agreed or slightly agreed. Less than 15% of participants disagreed or slightly or strongly disagreed.





HIGH-RISK ZONE

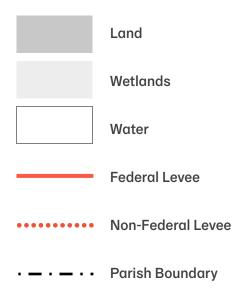
Risk scenarios are based on CPRA's 50-year flood depth projections under a Medium Environmental scenario and FEMA's proposed DFIRM floodplain data.

Sources: CPRA Flood Risk Medium Scenario Modeling Data 2017; FEMA Preliminary DFIRM 100-year floodplain data for Plaquemines Parish 2012; For all basemap data see References

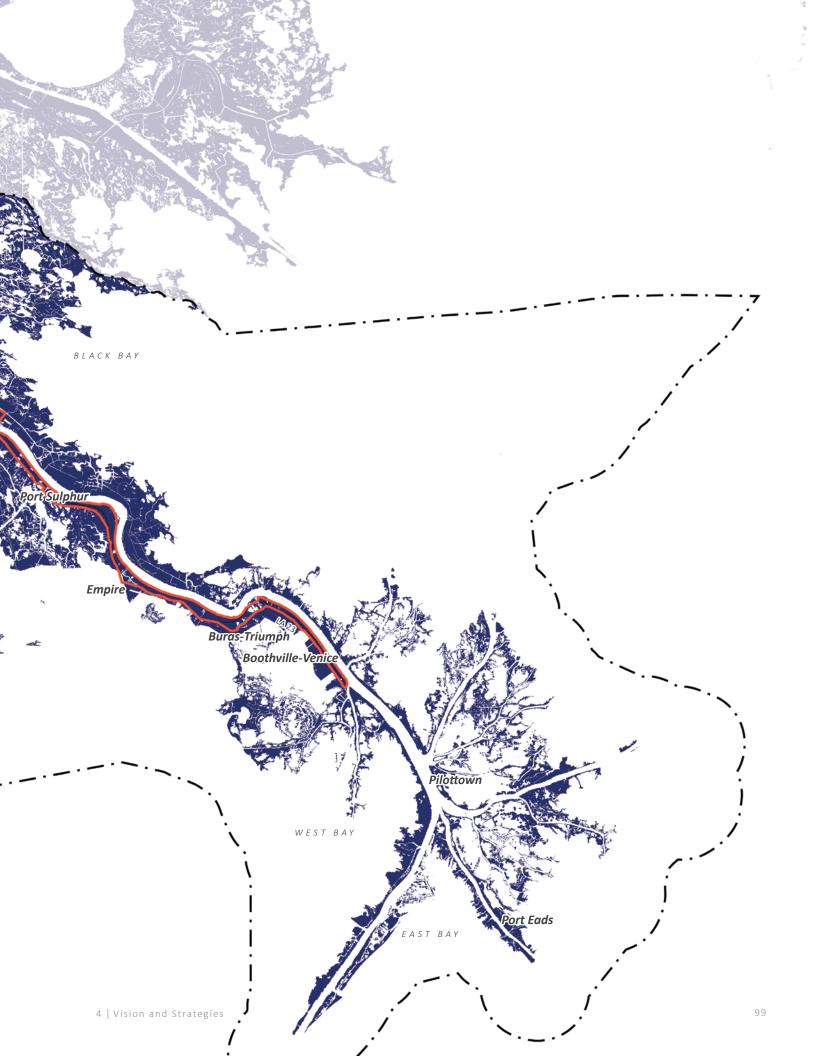
High Risk >6' projected storm surge flood depths

Most of these ares currently experience a high level of flood risk. As seas continue to rise and the Louisiana coastline continues to be negatively impacted, these areas will experience unsustainable levels of flood risk. Land loss and coastal erosion are evident, and parish and state investments toward infrastructure improvements have significantly slowed. In many areas, new or substantially improved homes are required to elevate 12 feet or higher due to FEMA, state, or local regulations. These residents are primarily working in the oil and gas and seafood industries or ancillary support industries. Many homes have transitioned to seasonal fishing camps, and fewer people live there permanently. Commercial development has effectively ceased.

Legend







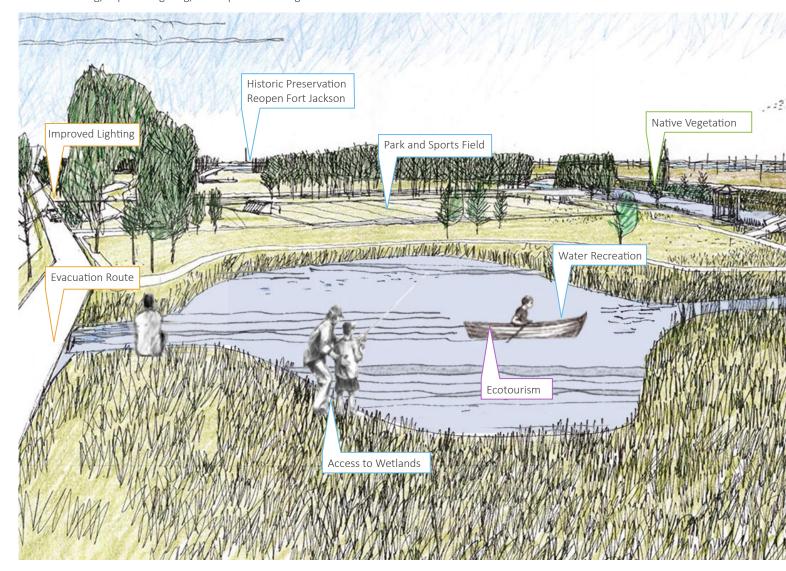
50-Year Vision for High-Risk Areas: Enhance Economic Engines and Adapt to Rising Waters

High-risk areas are projected to have land loss, high flood risk, and a decline in population. The high-risk area vision is characterized by—

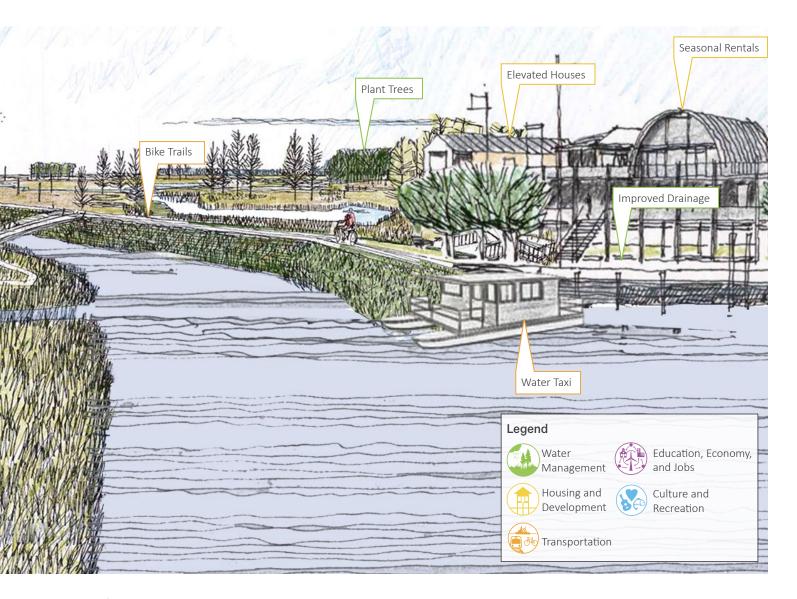
- Improved drainage and restoration of habitats
- Elevated homes and public recreational amenities
- Elevated evacuation routes
- Promotion of new industries such as aquaculture, coastal restoration, renewable energy, and ecotourism
- No permanent primary residences outside the levee system
- Historic preservation of existing landmarks, such as Fort Jackson

Perspective View of 50-Year Vision

The high-risk vision presents a future with greater access to wetlands, ecotourism, elevated housing, improved lighting, and improved drainage.



When surveyed, a total of 53% of Plaquemines Parish participants strongly agreed with this vision, and the next 19% agreed or slightly agreed. About 18% of participants disagreed or slightly or strongly disagreed.



Adaptation Goals and Strategies

This section includes background on each goal followed by a description of the strategy and specific actions needed to implement the strategy. Through the LA SAFE engagement process, parish residents, leaders, and stakeholders provided input to create these goals.



Goal 1: Manage Flooding and Subsidence

Implement water management strategies that are based on natural systems and address all scales, which include regional, parish, and community programs as well as initiatives targeted to individual property owners.

- Strategy 1: Retain and detain stormwater
- Strategy 2: Reduce impervious surfaces
- Strategy 3: Reduce the impact of storm surge
- Strategy 4: Review and update stormwater policies and programs to adhere to the recommendations found in these three strategies



Goal 2: Direct Growth to Low-Risk Areas

Create safe, inclusive, and vibrant communities with amenities that attract and retain residents of all ages.

- Strategy 1: Encourage housing and commercial development on higher ground
- Strategy 2: Create a downtown Belle Chasse with amenities that will attract and retain youth in the parish
- Strategy 3: Plan for clustered, concentrated communities with multiple lines of defense features



Goal 3: Improve Mobility Throughout the Parish and Region

Support a resilient transportation system that includes multiple modes and promotes the creation of walkable communities.

- Strategy 1: Expand and diversify transportation options between the coast and areas of higher ground
- Strategy 2: Adopt and implement a Complete Streets program in Belle Chasse



Goal 4: Strengthen and Diversify Local Economies

Integrate risk and adaptation practices into all levels of government and educational systems. Build a robust economy that diversifies the parish's economic base, supports residents' entrepreneurial spirit, and trains and retrains parish workers in emerging industries.

Strategy 1: Support local fisheries

Strategy 2: Expand public access to parish waterways

Strategy 3: Enhance job training and education

Strategy 4: Provide business incubation and adaptation assistance

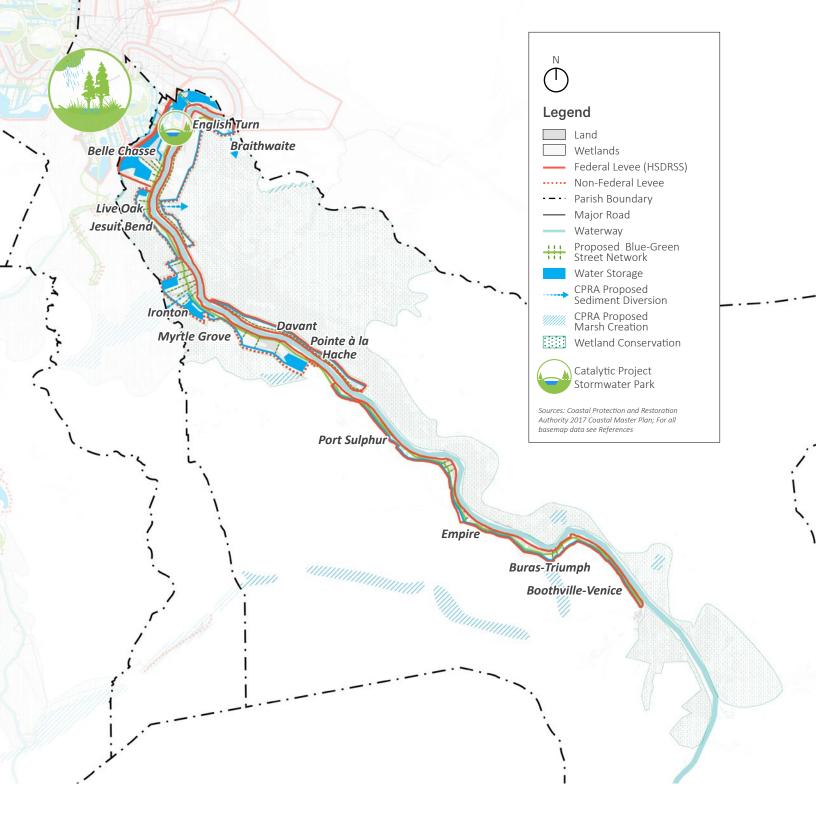


Goal 5: Protect and Promote Historic and Cultural Assets

Retain the parish's culture and values as growth and development occurs. Leverage the parish's historic assets to improve the local economy. Incorporate diverse recreation opportunities, while mitigating flood risks to promote a healthy environment that allows residents to experience the parish's natural beauty.

Strategy 1: Ensure public and community assets provide recreational and educational opportunities

Strategy 2: Enhance public access to Plaquemines Parish's waterways for recreation



In Plaquemines Parish, like other parishes and communities across the state and nation, stormwater management best practices need to complement and support resilient development and redevelopment. Many green infrastructure site-design practices can reduce the cost of infrastructure while maintaining or even increasing the value of the property.

GOAL 1 Manage Flooding and Subsidence

Strategy 1 Retain and detain stormwater

Action A: Promote the use of shared detention areas to adjacent property owners.

Action B: Identify and use retention areas throughout the parish.

Action C: Implement an "Adopt-a-Ditch (or Bayou)" or "Maintain the Drain" program.

Action D: Minimize water conveyance across ridges; hold water in the basins by enforcing a strong

retention standard for stormwater.

Action E: Establish a groundwater management unit of the parish to monitor water tables and

provide standards limiting impacts of subsidence.

Strategy 2 Reduce impervious surfaces

Action A: Incorporate green infrastructure into development designs and drainage

updates.

Action B: Incorporate green streets infrastructure and water management into road

design.

Action C: Discourage elevated fill and incentivize pier-and-beam foundations for

structures.

Strategy 3 Reduce the impact of storm surge

Action A: Sufficiently elevate structures in moderate- and high-risk areas.

Action B: Conserve and restore wetlands.

Action C: Prioritize levee maintenance to areas with concentrated assets.

Strategy 4 Review and update stormwater policies and programs to adhere to the recommendations found in these three strategies

Action A: Conduct an audit of all parish plans, regulations, and policies relevant to stormwater regulation and amend development codes to achieve consistency with stormwater

management best practices.

Action B: Develop a stormwater management plan.

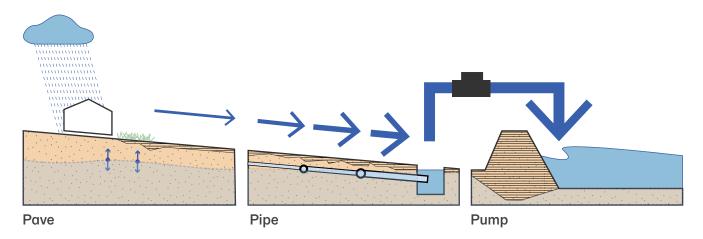
Action C: Continue to develop and update stormwater utilities that create fee-based services to

help pay for green infrastructure flood risk reduction projects.

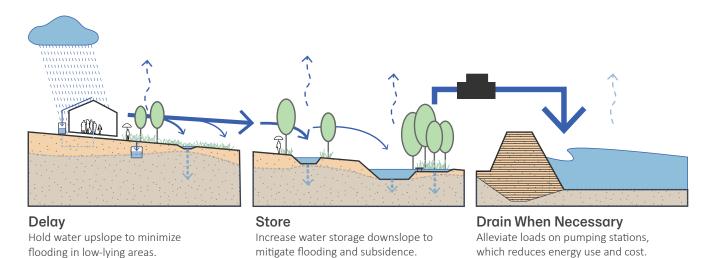
Action D: Provide incentives for private developers to handle stormwater on site.



Existing System



Proposed System: Delay and Store Runoff



Retain

the holding of stormwater permanently in basins, ponds, and cisterns. Retention basins allow stormwater to infiltrate the ground and for the collected stormwater to be repurposed for other uses such as irrigation.

Detain

the holding of stormwater temporarily in a swale, detention basin, or other features. Detention reduces peak discharge by allowing the slower and more controlled release of runoff and does not allow for the permanent pooling of water.



Water Storage
Detention areas can be landscaped and become shared assets by adjacent properties.

Action A: Promote the use of shared detention areas to adjacent property owners.

For developments greater than one acre in size, the stormwater detention volume should be increased to allow agreements for adjacent development to channel stormwater runoff into this closed system. The parish should adopt a framework for these agreements to encourage developers and adjacent property owners to identify opportunities to share detention facilities. In addition, commonly-held detention areas need to be inspected regularly to ensure that channels into the detention and retention areas are clear of debris.

Steps needed:

- Allow shared detention areas in development codes.
- Identify potential sites for shared detention areas, including new development sites near existing development sites or near sites currently being planned for development.
- Identify a fee structure, including any incentives for installation of green infrastructure.
- Work with the development community and Louisiana Home Builders Association to provide information on the benefits of shared detention areas and to promote their use.
- The Drainage Department should develop and enforce a Storm
 Drainage Design Manual to include guidelines for shared detention
 areas.
- Outline maintenance standards and responsibilities to ensure proper functioning of detention areas.

Action B: Identify and use retention areas throughout the parish.

To reduce the demand on forced drainage during storm events, the parish should continue to identify strategically-located undeveloped areas that can serve as retention areas for stormwater in low- and moderate-risk areas. When not needed for retaining stormwater, the retention areas could also be sites for publicly accessible cultural- and nature-based education and recreation. For example, the proposed Belle Chasse Wetland Park could be designed to slow down the flow of stormwater and provide multiple ecosystem benefits, including stormwater management, water cleansing, and recovery of native habitats, as well as creating a public space for education and recreation.

Steps needed:

- Map high flood risk areas (on a parcel level), undeveloped and natural areas, and local hydrology and drainage patterns.
- Identify existing parks that can be redesigned to temporarily hold stormwater during rain events.
- Identify focus areas where undeveloped and natural areas can be used by developed areas to temporarily store runoff.
- Ensure that the stormwater management area remains undeveloped and continues its retention function.
- Develop a Storm Drainage Design Manual to ensure that stormwater quality and quantity are appropriate for the receiving ecosystem.

Wetland Park

Wetland parks can hold vast quantities of stormwater during heavy rains while providing valuable open space and recreational amenities.





Bayous

Maintaining bayous and other waterways is important to ensure adequate drainage capacity.

Action C: Implement an "Adopt-a-Ditch (or Bayou)" or "Maintain the Drain" program.

Similar to the "Adopt-a-Bayou" program, which was established by the Legislature in 2007 (RS 30:2548), Plaquemines Parish—in partnership with neighborhood associations, nonprofits, academic institutions, and others—should expand their existing programs for the removal of litter and other obstructive features that may hinder local stormwater conveyance. This program could also target private properties or neighborhood associations to maintain nearby culverts, inlets, outlets, and other drainage infrastructure and further increase awareness and public participation in stormwater management.

Steps needed:

- Identify areas of greatest need for maintenance to ensure stormwater management conveyance.
- Identify and coordinate with potential partners such as property owners, homeowner associations, businesses, and nonprofits to begin the engagement process.
- Develop program material, including program parameters, responsibilities, and acceptable practices. Include the intended outcomes and benefits of the program.
- Raise awareness of the program through marketing and recognition of the entities involved.

Action D: Minimize water conveyance across ridges; hold water in the basins by enforcing a strong retention standard for stormwater.

To reduce costs of pumping water from inside the levee systems and the associated impacts to the water table, the parish should adopt regulations to increase incentives to retain stormwater in place.

Steps needed:

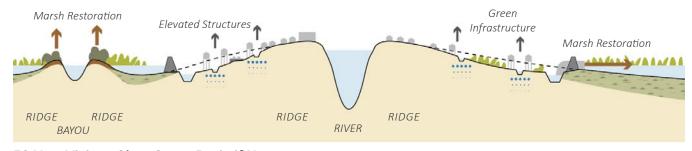
- Enforce stormwater management requirements to minimize the volume of runoff discharged from developed sites.
- Review stormwater fee structure to ensure that incentives result in desired stormwater retention.
- Implement and enforce non-compliance fees.
- Apply fees toward building and maintaining green infrastructure that benefits the same community where the fee is collected.
- Create "water credits" to encourage developers to exceed stormwater management requirements.
- Establish a Stormwater Management Authority to manage fees
 and "water credits" and a Stormwater Advisory Committee to
 review stormwater management projects and provide advice on fee
 allocations.

Action E: Establish a groundwater management unit of the parish to monitor water tables and provide standards limiting impacts of subsidence.

Monitoring water tables and activities that draw down the water tables will allow the parish to create standards limiting impacts and raising the water table where possible in subsidence-prone soils.

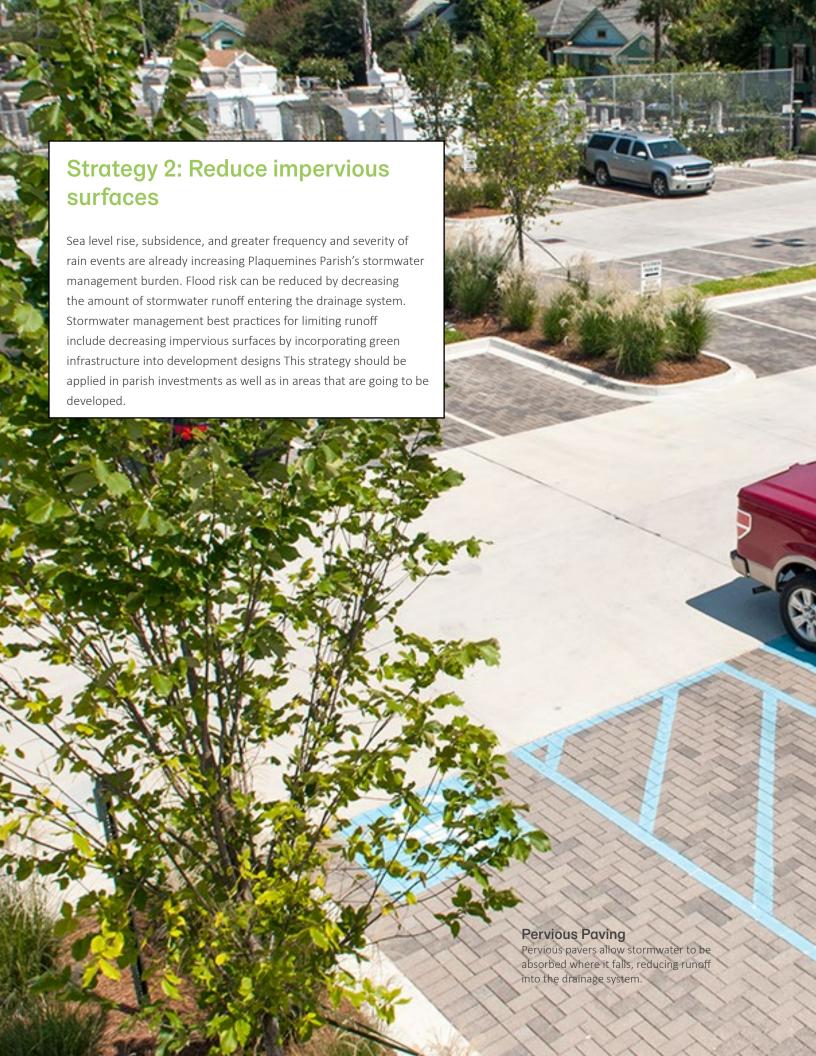
Steps needed:

- Employ green infrastructure practices to mitigate flooding, combat subsidence, and comply with MS4 requirements.
- Install a groundwater monitoring network and employ real-time controls to manage surface water levels for subsidence control.
- Monitor and record stormwater and groundwater quantity and quality, as well as land subsidence, to ensure objectives are being met
- Establish close collaboration with other local and state entities that manage groundwater within the perimeter defense system.



50-Year Vision—Slow, Store, Drain if Necessary

The natural hydrology is emulated with green infrastructure. The raised water table mitigates subsidence and elevated structures reduce risk.



Action A: Incorporate green infrastructure into development designs and drainage updates.

To reduce the demand on the drainage system, the parish should consider requiring the incorporation of green infrastructure into all development as a means to handle stormwater runoff and control erosion.

Steps needed:

- Include a list of best practices to reduce impervious hard surfaces in the Stormwater Pollution Prevention Plan for all phases of development.
- Update ordinances to require property owners (including those below one acre) to manage stormwater on site and reduce runoff from their property.
- Update ordinances to reduce parking requirements; establish a maximum impervious surface for developments.
- Provide incentives/rewards for voluntary reduction of impervious surfaces.
- Encourage the use of pervious material where practicable.
- Update ordinances to increase erosion controls during and after site development.
- Require integration of green infrastructure techniques into site design.
- Develop a stormwater impact fee to incentivize the use of green infrastructure.
- Work with neighborhood associations and other stakeholders to promote use of green infrastructure.

Green Infrastructure

Stormwater management is integrated into the landscape design. A rain garden captures stormwater runoff.



Action B: Incorporate green streets infrastructure and water management into road design.

Green streets improve water quality and help reduce runoff into the stormwater system through integration of stormwater treatment techniques that use natural filtration processes and landscaping into street design. Plaquemines Parish should review its right-of-way, drainage patterns, and green infrastructure opportunities and incorporate green street concepts into the parish's roadway conceptual planning, design, engineering, and development process.

Steps needed:

- Review right-of-way, drainage patterns, and green infrastructure opportunities.
- Incorporate green street concepts into the parish's roadway conceptual planning, design, engineering, and development process.
- Incorporate green street infrastructure into right-of-way acquisition and roadway design decisions.
- Coordinate across departments to leverage ongoing capital improvements to include green infrastructure that will improve water quality, improve drainage, and control erosion.
- Prepare operation and maintenance plans.

Green Streets

Stormwater is directed into curbside bioswales through curb cuts to reduce street flooding and infiltrate soils.



Action C: Discourage elevated fill and incentivize pierand-beam foundations for structures.

Reducing the amount of fill used to meet elevation requirements will reduce flood risk. Any slope of fill increases runoff velocity, which can lead to soil erosion, scouring, stormwater quality impairments, and alterations in local hydrology and the hydrology of borrow pits. To prevent future unintended consequences from the use of fill, the parish should work with home builders and realtor associations to identify and implement development best practices and incentivize use of the least amount of fill or no fill to meet elevation requirements.

Steps needed:

- Work with the Louisiana Home Builders Association, the Louisiana Realtors, and other stakeholders to identify barriers and opportunities to discourage elevating homes on fill.
- Work with state agencies and local departments to document benefits and trade-offs of limiting the fill option.
- Work with the Louisiana Assessors' Association to discuss how elevations are assessed and the potential differences among types of elevations.
- Review local code of ordinances for opportunities to further encourage pier-and-beam construction that properly accommodates water flow during flood events and discourage slab-and-grade and fill.
- Provide property owners with clear and current information regarding best practices and options for elevating homes and businesses.
 FEMA, the LSU AgCenter, and the American Society of Civil Engineers have numerous publications available that provide useful technical information.
- Combine wind fortification and weatherization programs with home elevations to account for multiple risk factors.
- Require elevation via pier-and-beam construction in order to be eligible to receive parish and state resources for elevation modifications.

Elevated Structures

Structures elevated with pier-and-beam construction allow the water to flow underneath without harming the structure or neighboring structures.





Photo Credit: Google Maps

Strategy 3: Reduce the impact of storm surge Considering a future with increasing flood risk, it is important to employ what is known as a multiple lines of defense approach. Decreasing direct economic damage to existing structures can be achieved through elevation. Addressing land loss and erosion, flood risk, and habitat loss through restoration of wetlands is a major opportunity for Plaquemines Parish to also provide recreational and educational benefits. Wetlands as Natural Defense Plaquemines Parish's wetlands can provide recreational and educational benefits, as well as protect communities against the impacts of storm surge. emines Parish Adaptation Strategy

Action A: Sufficiently elevate structures in moderate- and high-risk areas.

Storm surge can cause significant economic damage to infrastructure and residential and commercial structures. As these structures are built and redeveloped, they should be elevated to a height that ensures minimal damage from storm surge.

Steps needed:

- Review state flood risk disclosure requirements and update requirements that flood risk is disclosed during property transactions and that these requirements are enforced.
- Adopt a two-foot freeboard standard.
- Identify professionals and funding for the parish to develop their own flood map to show updated flood risk that takes into account parishlevel flood-risk mitigation measures that have been taken and other features not reflected in the FEMA maps.

Action B: Conserve and restore wetlands.

Natural habitats such as wetlands and forests have been shown to attenuate storm surge. In addition to the levee protection system, the parish can further reduce storm surge impacts by restoring and creating marshlands inside the levees. This will serve to advance implementation of the Multiple Lines of Defense Strategy⁵¹ the state has incorporated into its coastal protection and restoration effort.

Steps needed:

- Coordinate with U.S. Army Corps of Engineers (USACE) and CPRA to leverage ongoing protection and restoration efforts.
- Identify target areas and prioritize restoration projects that will
 provide the most benefit to ecosystems and communities over the
 long term.

Action C: Prioritize levee maintenance to areas with concentrated assets.

Maintaining 100 miles of levees on the west bank will be an increasingly large burden over time. As land loss accelerates in southern portions of the parish, maintenance funding will shift to prioritize levee maintenance in areas of low and moderate risk. By shifting maintenance and reinforcing existing communities, concentrations of population and services can be protected while allowing storm surge through the levee system at designated locations.

Steps needed:

- Develop a long-term levee maintenance program.
- Identify communities and services in high-risk areas that need additional adaptation strategies.
- Plan to build up polders along the levees to protect communities and support services.



Action A: Conduct an audit of all parish plans, regulations, and policies relevant to stormwater regulation and amend development codes to achieve consistency with stormwater management best practices.

To ensure all aspects of the Code of Ordinances are consistently supportive of stormwater management best practices, Plaquemines Parish should conduct an audit of the entire code, address any unintended consequences of current codes, and remove barriers to as well as encourage use of stormwater management best practices.

Steps needed:

- Meet with parish departments to identify how stormwater management relates to their work and mission, including any needs or barriers staff have observed, how the code is implemented "on the ground," and any unintended consequences.
- Conduct an audit of the entire code and remove barriers to and encourage use of stormwater management best practices, and address any unintended consequences of current codes.
- Review results of the code audit with parish departments and the development community.
- Develop code amendments, as identified in the code audit, using best practices to address conflicts and needed updates.
- Develop a mechanism to ensure that agencies and departments collaborate on implementing the revised codes and provide input/ sign-off in the permitting process.
- Prepare and adopt amendments to city codes as needed.

"[The borrow pits have retention capacity]...everything here is flat, so everything is forced drainage. [W]e can develop a protocol where you pump [the water] down...I think it would be a multi-use [area] where it could be a recreational park with wet and dry ponds. You can grade it because you have thousands of acres of land here...You can incorporate it into the fabric where people can enjoy it. Charge admission so you can maintain it, or [levy] recreational taxes."

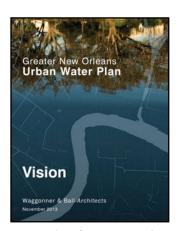
-Plaquemines Parish Official

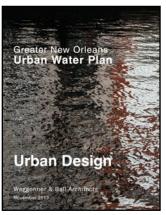
Action B: Develop a stormwater management plan.

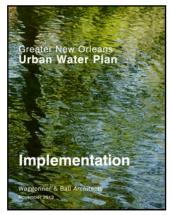
To address watershed-related flood risk throughout the parish, develop a parish-wide stormwater management plan and partner with regional organizations and other parishes to prepare a regional stormwater management plan to serve as a guiding document for water management decisions. The plans should address floodplain management within the watershed, provide short- and long-term goals for managing water quantity and quality, and provide guidance on how to protect the watershed and its inhabitants.

Steps needed:

- Develop a comprehensive parish stormwater management plan.
- Work with regional planning associations to develop a watershedbased stormwater management plan and policies that apply across jurisdictional lines, especially those upstream of the parish.
- Assess current and planned programs and projects to ensure consistency with the 2017 Coastal Master Plan.
- Develop strategies to consider current and future flood risk in prioritizing allocation of resources.









Example of a Regional Framework: Greater New Orleans Urban Water Plan

Though every region will have unique needs and priorities, The Greater New Orleans Urban Water Plan provides one example of a regional framework designed to guide resilient and sustainable development at multiple scales. The plan works in tandem with the existing levee system and Louisiana's 2012 Coastal Master Plan, while also shifting the paradigm from conventional water management toward a sustainable, resilient system that values water as an asset.

See full reports here: $\underline{\text{http://livingwithwater.com/}}$

Image Credit: Greater New Orleans Urban Water Plan, Waggonner & Ball



Policy Example: City of New Orleans Comprehensive Zoning Ordinance (CZO)

The Greater New Orleans Foundation Headquarters, built to comply with the new CZO, features a courtyard with multiple water management systems including rain gardens, underground cisterns, permeable paving, native plantings, and a permeable asphalt parking lot.

Photo Credit: Waggonner & Ball; Photo by Alise O'Brien

Action C: Continue to develop and update stormwater utilities that create fee-based services to help pay for green infrastructure flood risk reduction projects. The impacts of population shifts—more development, fewer pervious surfaces, and more polluted runoff in low-risk areas—are causing stormwater management programs to become increasingly expensive. To offset these costs and leverage infrastructure projects, local jurisdictions can develop a stormwater fee that supports stormwater management projects and practices that reduce flood risk. As capital improvements are made, the stormwater fee can also provide funding for incorporating green infrastructure features into other projects.

Steps needed:

- Require that all publicly funded capital projects capture and store at least 1.25 inches of rainfall in the first hour of a rain event.
- Encourage the use of captured stormwater for graywater use and establish safety guidelines for use of graywater.
- Continue to design new and retrofitted recreation areas with ample drainage and storage space, and use those recreation areas as a secondary tier of defense against neighborhood flooding.
- Develop a five-year benchmark for "Greened Acres" and offer competitive grant programs for the development of green infrastructure projects on private property.

Action D: Provide incentives for private developers to handle stormwater on site.

Handling stormwater on site reduces the amount of runoff entering the drainage system. The parish should develop incentive programs to encourage property owners to implement site-level features such as a rain barrels, rain gardens, bioswales, and replace impervious surfaces like concrete with pervious materials such as gravel or permeable pavers. Incentives in the form of tax credits, stormwater fee discounts, and rebates can be used to offset the costs of implementation and reward measures taken to increase the amount of stormwater that can be handled on site.

Steps needed:

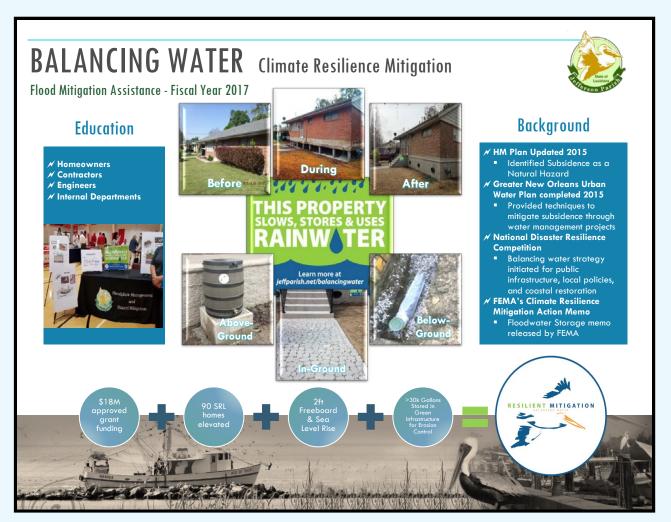
- Incentivize investment in stormwater best practices on private property through grant and low-interest loan programs, tax rebates, and stormwater fees.
- Provide outreach, education, and technical assistance to the public, planners, contractors, and local governments on best management practices for stormwater management, green infrastructure, and the current status of local stormwater management systems.

Economic Incentives

The Front Yard Initiative is an incentive program of The Urban Conservancy to encourage the removal of excessive paving. The program reimburses eligible homeowners per square foot of paving removed, up to 500 square feet. *Image Credits: Front Yard Initiative*



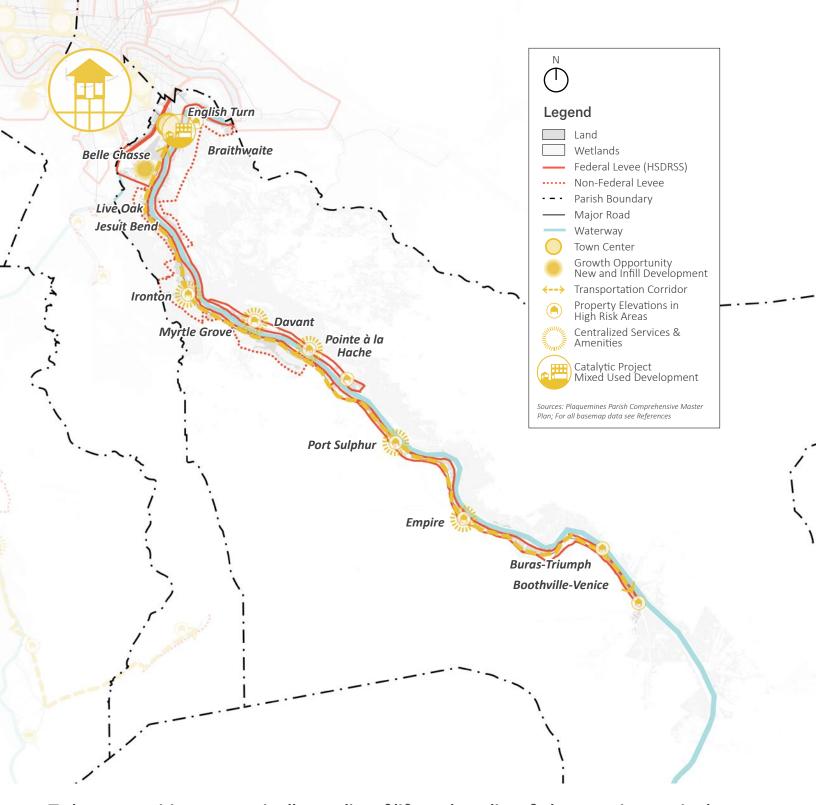




Above: Jefferson Parish is implementing the Balancing Water Program. Image Credit: Jefferson Parish, Department of Floodplain Management & Hazard Mitigation

Case Study: Jefferson Parish, LA

Jefferson Parish, through FEMA's Flood Mitigation Assistance Program, is elevating residential structures that have flooded using pier-and-beam foundations rather than fill. This nationally-competitive grant program provides funds annually for flood hazard mitigation projects and plan development, prioritizing repetitive flood claims, severe repetitive loss, and NFIP properties. In addition to elevating structures, this program also funds soil stabilization, erosion control, and hydrological restoration projects, which can be implemented using green infrastructure. Using these funds, Jefferson Parish is elevating numerous flooded properties and also installing green infrastructure features that assist with stormwater quality, erosion control, and aquifer storage. In addition, Jefferson Parish is reaching out to and educating residents on the importance of managing stormwater on site through its Balancing Water Program, funded through the National Disaster Resilience Competition (NDRC).



To be competitive economically, quality of life and quality of place are increasingly important. This is particularly true as the parish works to retain a young and diverse labor force. Careful planning along with strategic investments can serve to reinforce a desirable development pattern, fully leverage the area's assets, and create a more memorable and livable place. It is critical that communities and assets to the south remain connected to Belle Chasse, the state, and the nation. This can be achieved by focusing on development in the Belle Chasse area and ensuring that the Mississippi River and its economic assets are maintained.

GOAL 2 Direct Growth to Low-Risk Areas

Strategy 1 Encourage housing and commercial development on higher ground

Action A: Prepare areas of higher ground for increased concentrations of development.

Action B: Develop a housing incentive program to encourage development on higher ground.

Consider reusing unused properties.

Strategy 2 Create a downtown Belle Chasse with amenities that will attract and retain youth in the parish

Action A: Improve streetscape and public realm amenities within Belle Chasse.

Action B: Create more opportunities for street life and active uses.

Action C: Develop a comprehensive open space plan.

Action D: Build upon existing wayfinding and public art programs to incorporate art and culture

into the district's signage and public spaces.

Strategy 3 Plan for clustered, concentrated communities with multiple lines of defense features

Action A: Create community centers that can be sustained over the long term.

Action B: Study current community assets and future needs.

Action C: Evaluate and adapt corridor transportation infrastructure.

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Action A: Prepare areas of higher ground for increased concentrations of development.

To accommodate parish residents who wish to move away from areas of increased flood risk in the southern part of the parish and to maximize economic opportunities, the northern part of the parish, including the Belle Chasse area, should increase available housing stock and provide opportunities for commercial investments. Applying best practices for local water management, transportation, and site and building design, Plaquemines Parish has an opportunity to provide a high quality of life reflective of the culture and traditions of its residents.

Steps needed:

- Follow land use recommendations in the Plaquemines Parish Comprehensive Master Plan.
- Update ordinances to allow for higher-density and mixed-use developments; incorporate requirements for minimum building elevation and on-site stormwater management.
- As part of the corridor planning process, evaluate zoning practices to ensure that growth can be accommodated and is appropriately placed.
- Consider and evaluate incentives for locating residential and commercial development on higher ground.
- Together with property owners, residents, and developers, create building design guidelines to ensure that building typology fits within the desired context and character of the community.
- Ensure that housing and commercial development coordinates with and integrates transportation and stormwater management practices.
- Require bonding of new commercial developments in high-risk areas to ensure demolition at the end of their useful life or upon long-term vacancy.

Terrabella: Covington, LA

Located in Covington, LA, Terrabella is a dense, walkable, mixed-use development. The model uses smart-growth techniques, providing opportunities for more sustainable growth.

Photo Credits: Google Maps Street View







Naturally High Ridges
The highest ground is along the natural ridges formed by the Mississippi River.

Action B: Develop a housing incentive program to encourage development on higher ground.

People who want or need to move to areas of higher ground often do not have the resources to relocate and purchase homes in new communities. Stressed with living in a high-risk area with degraded property values, they may have limited funds for moving, closing costs, and down payments. A housing relocation fund could be established for three to five years to assist people moving from the highest-risk areas, or areas with repetitive losses, to areas of higher ground. One-time grants for moving costs, down payments, or closing costs would provide an incentive and the assistance needed to move away from high-risk areas.

Steps needed:

- Initiate funding programs through public funding and nonprofits to pay closing costs, partial down payments, moving costs, and other related expenses.
- Identify additional sources of funding or develop a partial repayment program to maintain this fund over the long term.
- Expand existing housing repair and maintenance programs to rehab and redevelop substandard housing, focusing on low-risk areas.
- Provide pre- and post-purchase housing education and counseling programs.
- Implement policies intended to prevent future permanent resident development in these areas.

Action C: Consider repurposing unused properties.

To encourage and concentrate development and redevelopment in existing communities, abandoned buildings should be repurposed to meet the needs of the community. Plaquemines Parish and other entities should work with property owners, residents, and others to identify opportunities for redevelopment and develop policies or incentives that encourage adaptive reuse of existing buildings. In Plaquemines Parish, the Red Star Yeast building in Belle Chasse is available to be repurposed in support of this goal. By using a mixed-use redevelopment approach, the building could accommodate both residential and commercial developments while preserving green space for recreation and stormwater management. Both housing and businesses should accommodate the needs of an aging population.

Steps needed:

- Identify the commercial and public infrastructure needs of the community.
- Inventory abandoned public and private buildings, such as schools, post offices, big box stores, and others.
- Work with property owners, residents, and others to identify opportunities for redevelopment.
- Develop policies or incentives that encourage adaptive reuse of existing buildings.

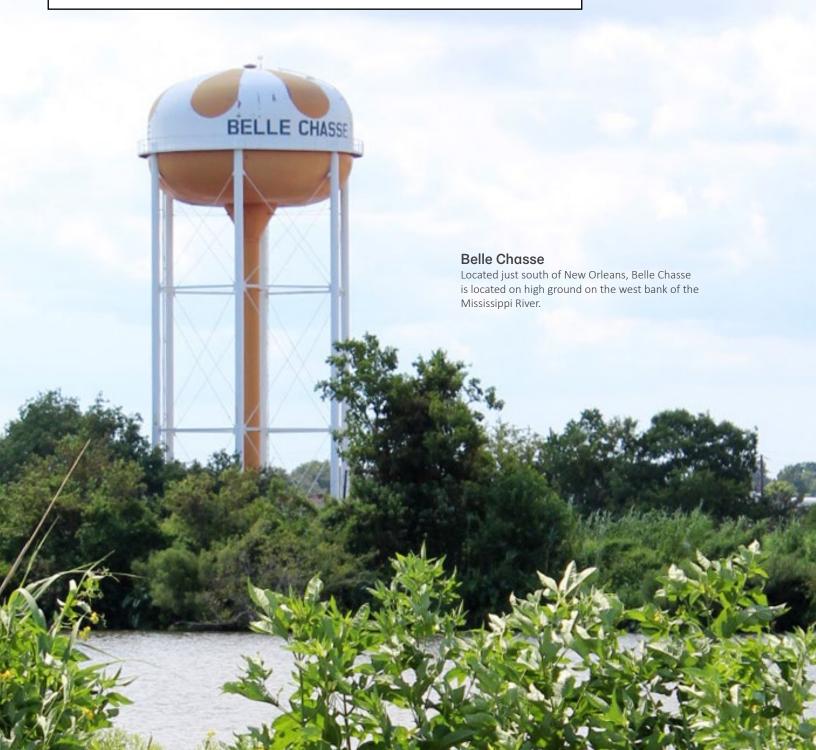


Red Star Yeast Building

Located on high ground in Belle Chasse, the former Red Star Yeast plant can be repurposed into a mixed-use development.

Strategy 2: Create a downtown Belle Chasse with amenities that will attract and retain youth in the parish

Though the parish seat is Pointe à la Hache, Belle Chasse currently houses the Plaquemines Parish's Courthouse and the Parish Government offices. Belle Chasse also houses civic and social centers. Here, a crawfish festival, the Orange Festival and Golf Tournament, and the Plaquemines Parish Seafood Festival, and the United Way's Annual Plaquemines Parish Jambalya Cookoff are held. Belle Chasse is a receiving community for people moving from the southern part of the parish, and investments in Belle Chasse should focus on placemaking. Creating a downtown Belle Chasse that is recognizable as a hub for civic, social, and business activities can build resilience in a low- and moderate-flood risk area that is protected from storm surge by levees.



Action A: Improve streetscape and public realm amenities within Belle Chasse.

Accommodate bike and pedestrian traffic, plant native trees to provide shade, and develop a palette of street furnishings and other elements that celebrate the culture of Plaquemines Parish and make Belle Chasse a destination.

Steps needed:

- Inventory and categorize downtown street types and desired amenities.
- Develop guidelines that outline a palette of street furnishings, plant materials, surface treatments, and lighting for each street type.
- Evaluate existing zoning regulations to eliminate potential conflicts with desired improvements and require public realm upgrades as part of the redevelopment process.
- Develop an implementation plan and capital improvement program to prioritize and guide investment in public realm improvements.
- Develop and fund a maintenance program for public realm amenities.
- Identify and invest in a pilot project to catalyze investment.

Streetscape Improvements: Atlanta, GA

The first of more than 480 Renew Atlanta infrastructure bond projects, Lynhurst Drive was completed in 2017 to address public safety and aging infrastructure. The 2.2-mile stretch was resurfaced. The Department of Public Works installed wider sidewalks and LED pedestrian lights, upgraded street furniture, constructed ADA ramps and culverts, and planted 200 trees to line the street.







Active Streetscapes

In addition to festivals and special events, the streetscape can promote active uses through pop-up and mobile amenities and uses.

Action B: Create more opportunities for street life and active uses.

Encourage active, innovative uses along the Mississippi River, Intracoastal Canal, Planters Canal, and other frontages—which may involve temporary occupation of underutilized or vacant lots and structures—for pop-up retail venues and services, such as mobile cafes, food trucks, libraries, or markets. Main Street can be enlivened by increasing shopping and restaurant options and encouraging outdoor seating where feasible.

Steps needed:

- Review existing zoning regulations, and amend requirements if
 necessary, to accommodate active uses on ground floors. Establish
 design standards that support pedestrian activity both along the
 street and along the natural and man-made waterways, while
 maintaining the historic integrity of buildings.
- Encourage and coordinate pop-up activities to temporarily occupy vacant storefronts as part of festivals and events.
- Ensure that regulations allow and encourage sidewalk cafes along busy streets and pristine waterways.
- Investigate historic tax credits for improving historic structures and restoring facades as well as other economic incentives to rehabilitate and occupy buildings in a way that contributes to the pedestrian experience of downtown.
- Identify and invest in a pilot project to catalyze investment.

Action C: Develop a comprehensive open space plan.

Preserve the existing natural areas for habitat conservation, recreational opportunities, and stormwater management.

Steps needed:

- Inventory existing open space assets within the Belle Chasse area and identify strategic opportunities for using existing open space for flood risk reduction and recreational as well as educational opportunities.
- Develop guidelines for open space development based upon a hierarchy of open space amenities, such as plazas, parks, pocket parks, and passive open space.
- Work with the Louisiana Department of Culture, Recreation, and Tourism and Plaquemines Parish Recreation Department to identify programming opportunities for open space to encourage and attract visitors and provide activities for residents and business owners.
- Develop and fund a maintenance program for open space, including coordinating volunteer efforts.
- Create a capital improvement program for open space that identifies funding needs and priorities for open space development as well as coordinate it with capital investments and developments.
- Identify and invest in a pilot project to catalyze investment.



Martha's Vineyard Land Bank Commission

Established in 1986, the commission reserves open land to be set aside for public use.

Image Credit: Martha's Vineyard Magazine

Action D: Build upon existing wayfinding and public art programs to incorporate art and culture into the district signage and public places.

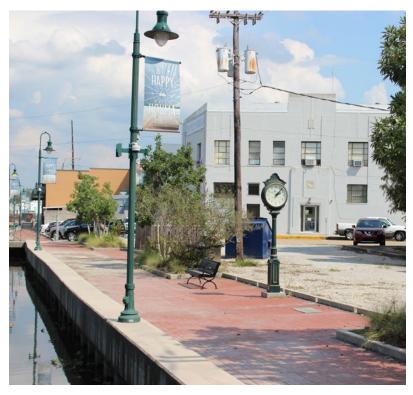
A downtown target area should be defined in order to prepare a comprehensive downtown implementation plan that addresses open space and public realm amenities as well as identifies incentives to attract development and funding sources. Within the target area, pilot implementation projects can catalyze investments.

Steps needed:

- Identify boundaries of downtown target area.
- Use the 2012 Plaquemines Parish Comprehensive Master Plan as a foundation to establish goals, objectives, and guiding principles.
- Prepare a comprehensive downtown implementation plan addressing open space, public realm amenities, incentives to attract development, and funding sources.
- Continue existing wayfinding program and use temporary signage and banners to promote events and activities downtown.
- Identify and invest in a pilot project to catalyze investment.

Street Signage and Wayfinding

Well-designed lighting, signage, and street furniture enhance safety, wayfinding, and neighborhood identity, such the signage used in downtown Houma.

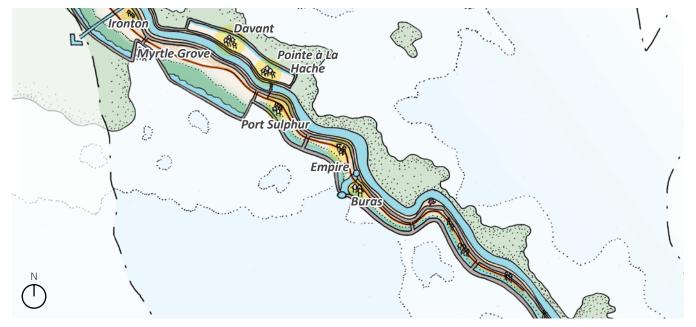




Strategy 3: Plan for clustered, concentrated communities with multiple lines of defense features

A significant portion of Plaquemines Parish is at high flood risk now and in the future. As sea level rise and coastal erosion will further increase flood risk, the parish should strategically and wisely prioritize areas that should be protected and existing protection systems maintained. Long term, communities like Venice, Ironton, Pointe à la Hache, Port Sulphur, and others identified by the community could become island-type communities that support an active maritime commerce and fishing industry while maintaining and celebrating their culture and heritage.





Connectivity of Services and Amenities

Communities along the Mississippi River can offer consolidated services and amenities in strategic locations.

Action A: Create community centers that can be sustained over the long term.

Thoughtful planning can help create a series of communities that are strategically located—and protected—to support port activities and the fishing industry as well as maintain a way of life typical for Plaquemines Parish. Taking a holistic approach to the corridor will allow for the prioritization of appropriate locations and coordination of key investments and improvements, including levee maintenance.

Steps needed:

- Conduct a risk and lands analysis and determine ability of communities along the Mississippi River to withstand projected sea level rise and coastal erosion.
- Determine feasible land use and development patterns to reinforce a series of villages along the Mississippi River.
- Develop market projections and evaluate various scenarios around projected existing industry and workforce needs.
- Evaluate transportation systems and other infrastructure needed to support the communities and activities.
- Develop a prioritized capital improvement program to ensure that needs can be met.



Community Assets

Communities, such as Empire pictured above, should be further studied to identify community assets and future needs.

Action B: Study current community assets and future needs.

In Plaquemines Parish, existing communities are located along LA 23 and LA 39. These communities include Venice, Port Sulphur, Pointe à la Hache, and Carlisle, all of which are projected to have moderate flood risk over the next 50 years. As these communities may transition to become more island- or peninsula-like, needs and opportunities for residential and commercial development may change. To better guide transitions, those communities should be further studied for housing and commercial needs and opportunities.

Steps needed:

- Prepare small area plans for each community to identify potential land uses, needed infrastructure improvements and/or changes, and economic opportunities.
- Conduct a buildable lands analysis and determine land use needs.
- Determine desired land use and community character to develop a variety of housing types and commercial activity centers that are suitable for the area.
- Develop market projections and evaluate various community scenarios.
- Evaluate transportation systems and other infrastructure to support community needs.
- Develop a prioritized capital improvement program to ensure that needs can be met.

Action C: Evaluate and adapt corridor transportation infrastructure.

As the landscape along the Mississippi River changes and demands adaptation of existing communities, transportation changes will become more water-based in the southern reaches of Plaquemines Parish. To get in front of those changes, the parish must work with partners and external stakeholders—such as residents, Plaquemines Parish government, the New Orleans Regional Planning Commission, and the Louisiana Department of Transportation and Development (DOTD)—to identify what these changes are and how transportation needs will be met. Solutions to improve mobility in the corridor require interlocal cooperation and investments in water-based transportation (i.e. ferry service, etc.) to ensure connectivity along and across the corridor.

Steps needed:

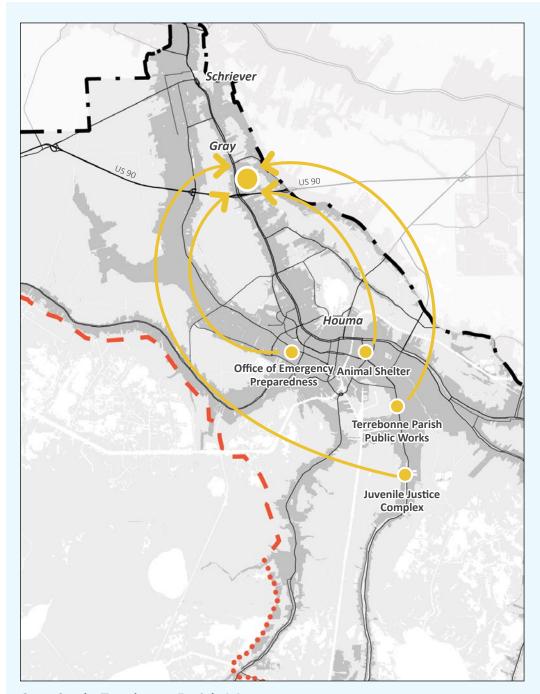
- Ensure that all regional transportation modeling reflects anticipated and desired changes in the corridor.
- Update the transportation needs inventory to reflect and accommodate changes in transportation modes.
- Coordinate policies at the parish level and provide guidance for transportation infrastructure investment and improvements to ensure consistency and eliminate conflicts.
- Work with DOTD to develop prioritize and approaches to addressing the changes and plan for transitioning transportation modes.
- Work with DOTD and the parish to determine how infrastructure in existing communities will be maintained over time.

Airline Highway

Example from St. John the Baptist Parish illustrating a Complete Street with green infrastructure and shared pedestrian and bicycle paths.

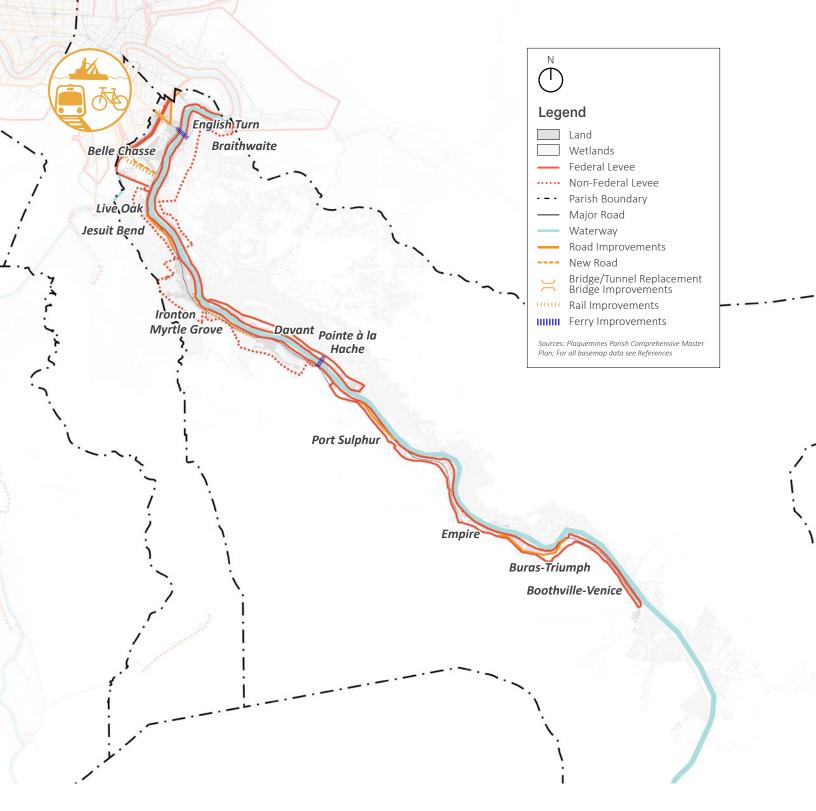
Map Insert Credit: St. John the Baptist Parish





Case Study: Terrebonne Parish, LA

Terrebonne Parish has begun investing in the northern part of the parish on higher ground to reduce flood risk to critical assets. A portion of the public works division, the animal shelter, and the Office of Emergency Preparedness are now located north of US 90 as well as the Juvenile Justice Complex, which relocated from Ashland to north Terrebonne Parish. A new safe room will be built on the new campus, along with various infrastructure investments.



As people in coastal industries—including agriculture, aquaculture, oil and gas support, boating, boat manufacturing, and maintenance—are forced to move north to higher land, they will have longer commute distances to their work on the coast. Travel times and costs to work will increase, causing additional stress on residents' financial stability. Alternative ways to live and get to work along the coast will be needed to sustain the coastal economy and the livelihood of people who live off of the land and water.

GOAL 3 Improve Mobility Throughout the Parish and Region

Strategy 1 Expand and diversify transportation options between the coast and areas of higher ground

Action A: Augment the New Orleans Metropolitan Area Guide to Transportation Planning to review transportation options between the coast and northern parish areas and to diversify parish transportation options.

Action B: Provide regional transportation between Plaquemines Parish and surrounding parishes.

Action C: Increase connectivity between neighborhoods and communities, including non-motorized transportation options.

Action D: Plan for safe and efficient evacuation routes when planning and designing new roadways, as applicable.

Strategy 2 Adopt and implement a Complete Streets program in Belle Chasse

Action A: Design and construct roadways and intersections to enable safe access for all users.

Action B: Incorporate stormwater management into roadway design.

Action C: Set appropriate design standards for rural and urban areas.

Action D: Evaluate capital improvements and coordinate design.



To adapt to the anticipated change in lifestyle and travel demands, Plaquemines Parish coastal workers and fishers will have to find new options that make the trip economically viable and safe as travel in the southern part of the parish becomes more risky.

Connectivity to Coastal Communities

Residents expressed a need for improved transportation services to connect east bank and lower west bank communities to northern parts of the parish and to neighboring parishes.

Photo Credit: courthouses.co/John Deacon

Action A: Augment the New Orleans Metropolitan Area Guide to Transportation Planning to review transportation options between the coast and northern parish areas and to diversify parish transportation options.

As investments in public infrastructure in the southern part of the parish decline, support of alternative modes of transportation should be considered, such as ensuring that a ferry connects communities along the Mississippi River and a route exists for smaller boats that may be used to reach commercial fishing boats.

Steps needed:

- Consider using portions of the Mississippi River for short-distance traffic circulation using water taxis or ferries; connect these transportation modes to communities along the east bank and west bank.
- Explore water taxis as a transportation option.
- Explore floating services, medical facilities, schools, and groceries to serve people in coastal areas.
- Prioritize transportation projects that promote multimodal transportation, access to public and commercial facilities, and provide environmental and economic benefits.
- Use the CPRA Master Plan's 50-year projections to identify key transportation and evacuation routes vulnerable to current or future flooding and prioritize their retrofit in the Statewide Transportation Plan.

Channel Cat Water Taxi: Moline, IL and Davenport, IA

Part of the MetroLINK public transportation service, the Channel Cat Water Taxi provides water transportation service on the Mississippi River in the Quad Cities region between Illinois and Iowa. *Photo Credit: cincooldesigns/Wikimedia Commons/CC BY 2.0*



Action B: Provide regional transportation between Plaquemines Parish and surrounding parishes.

Explore a shuttle, or enhanced public transportation, to run along US 90 and LA 23, connecting out-of-parish workers to jobs and parish residents to neighboring parishes. This would work especially well if growth and development are focused in the Belle Chasse and English Turn areas.

Steps needed:

- Expand and improve bus service with routes connecting major employment hubs in coordination with the Regional Transit Authority.
- Increase cross-parish transportation options by connecting communities through water taxis on navigable bayous and canals.
- Provide shuttle service along LA 23 and LA 39 to connect Plaquemines, Orleans, and St. Bernard Parishes.

Good Earth Transit

Good Earth Transit provides bus routes in downtown Thibodaux and connects Thibodaux to Houma.

Photo Credit: Google Maps Street View





Rail to Trail

The Tammany Trace in St. Tammany Parish provides residents and visitors a 31-mile protected pedestrian and bicycle trail, connecting five communities. The project has also spurred development alongside the trail. *Photo Credit: St. Tammany Parish Flickr*

Action C: Increase connectivity between neighborhoods and communities, including non-motorized transportation options.

Plaquemines Parish should plan and implement an expanded, parish-wide system with both on- and off-road segments. This system should emphasize connecting neighborhoods to public spaces and amenities as well as to other parts of the region. This could include participating in the Rail-to-Trails program enabling the parish to retrofit the existing but abandoned rail line in Belle Chasse for recreational trails.

Steps needed:

- Plan and implement an expanded, parish-wide system with both onand off-road segments to accommodate walking and biking.
- Emphasize connecting neighborhoods to public spaces and amenities, such as Cypress Park and Woodlands Conservancy Trail Area, as well as to other parts of the region.

Action D: Plan for safe and efficient evacuation routes when planning and designing new roadways, as applicable.

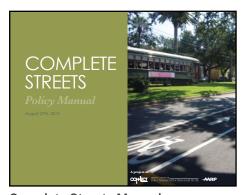
Plaquemines Parish's transportation plan should establish major road improvements to include building roads on pilings to preserve existing hydrology and evacuation routes.

Steps needed:

- Coordinate with DOTD to identify upgrades and new infrastructure that is needed
- Require DOTD to model the impacts of new transportation projects on hydrological processes.
- Request that all DOTD projects include flood risk mitigation and cause minimal impact on surrounding areas.



Action A: Design and construct roadways and intersections to enable safe access for all users.



Complete Streets Manual

See full report here:

https://www.cpex.org/complete-streets-manual/

Regardless of age, ability, or mode of transportation, streets must be safe for everyone. In many cases, this requires retrofitting existing streets to better accommodate users of modes other than cars. This changing approach to street design and construction must be guided by an overarching policy that defines priorities and outlines appropriate techniques to achieve them—for instance, using traffic calming techniques to reduce speeds in areas of high pedestrian activity to improve safety; defining streetscape elements in a manner that provides federally compliant ADA access; and designing intersections to minimize conflicts among pedestrians, cyclists, vehicles, and transit to improve multimodal safety.

Steps needed:

- Using models of existing Complete Streets manuals, customize a
 Complete Streets manual for Plaquemines Parish that provides street
 crossing best practices, technical details relating to street design,
 and information regarding where and how to apply these techniques
 throughout the parish.
- Evaluate the parish's current guidance and manuals relating to street and intersection design for criteria to improve safety and comfort for pedestrians and bicyclists and ensure ADA accessibility; amend as necessary.

Complete Street

A Complete Street is a street that is for everyone. It is designed and operated to allow all types of users—including but not limited to pedestrians, bicyclists, motorists, and transit users of all ages and abilities—to safely use and traverse the right-of-way.

Image Credit: Complete Streets Policy Manual



Action B: Incorporate stormwater management into roadway design.

Green streets are street right-of-ways that use stormwater management techniques that filter stormwater to reduce pollutants and reduce the quantity of water conveyed into the storm sewer system in lieu of conventional stormwater management. Incorporating stormwater management facilities throughout street right-of-ways should be part of an integrated strategy to deal with stormwater runoff throughout Plaquemines Parish and help reduce the burden on structural flood control devices.

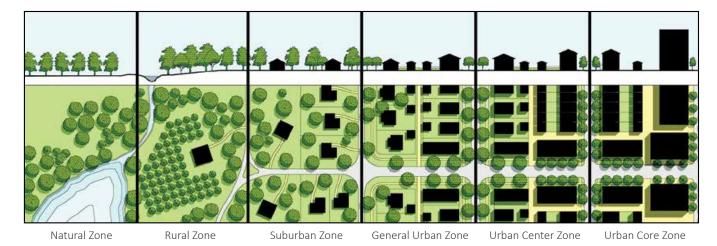
Steps needed:

- Evaluate current guidance and manuals relating to paving and drainage for barriers to implementing green streets.
- Update codes to reflect goals for implementing green streets and stormwater management, including green infrastructure.

Green Street Infrastructure

Pervious paving, subsurface storage, rain gardens, and water-loving plants reduce localized street flooding by providing pockets of space to which stormwater can flow. The water, filtered by this system, infiltrates the ground and is absorbed by plants.





Context of South Louisiana

Development patterns vary depending on context. Image Credit: Louisiana Speaks Pattern Book

Action C: Set appropriate design standards for rural and urban areas.

Plaquemines Parish contains a variety of different types of places, from urban areas in Belle Chasse to more rural locations along the east and west banks of the Mississippi River. Respecting this varied character throughout the parish requires a tailored approach to designing roadways that is consistent with the character of a place while also addressing safety, connectivity, and convenience for everyone using the road. A palette of design standards that reflects the rich array of contexts will assist in developing street designs that better respond to and connect with the surrounding context. Design standards must also provide solutions to address differing priorities that must be addressed when there is limited right-of-way available.

Steps needed:

- Prepare corridor plans for areas targeted for Complete Streets to establish design priorities for capital projects.
- Create design standards for the range of street types identified in the area plan that are consistent with guidance provided in an adopted Complete Streets manual.

Action D: Evaluate capital improvements and coordinate design.

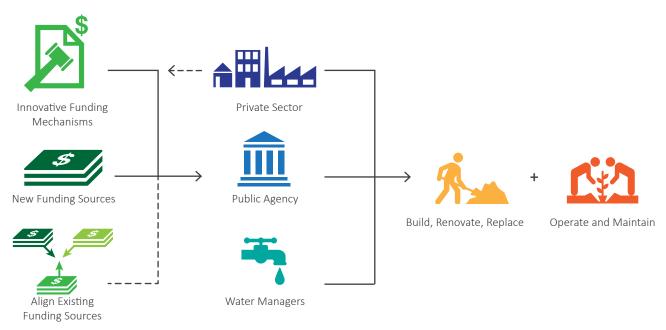
A number of subsurface utilities must be coordinated with one another as well as with above ground amenities in order to avoid conflicts. The amount of right-of-way available can often determine how easy or complex this task will be. Coordination must occur at the early stages of a project, beginning with project selection, to ensure that needs can be met, design can be coordinated, and construction can take place efficiently. This level of coordination requires a clearly articulated process that defines roles and responsibilities of everyone involved in street design and construction.

Steps needed:

- Create a coordinated capital improvement program for all department and utility projects to leverage infrastructure investments and minimize conflicting projects.
- Outline a design process that requires all departments to work together to select projects, evaluate design alternatives, and coordinate throughout the construction and project delivery process.
- Coordinate with all utility providers during project selection, design, and construction of street projects.

Financing Diagram

The diagram shows how various funding sources can be leveraged to execute new projects. Image Credit: Edited from Greater New Orleans Urban Water Plan





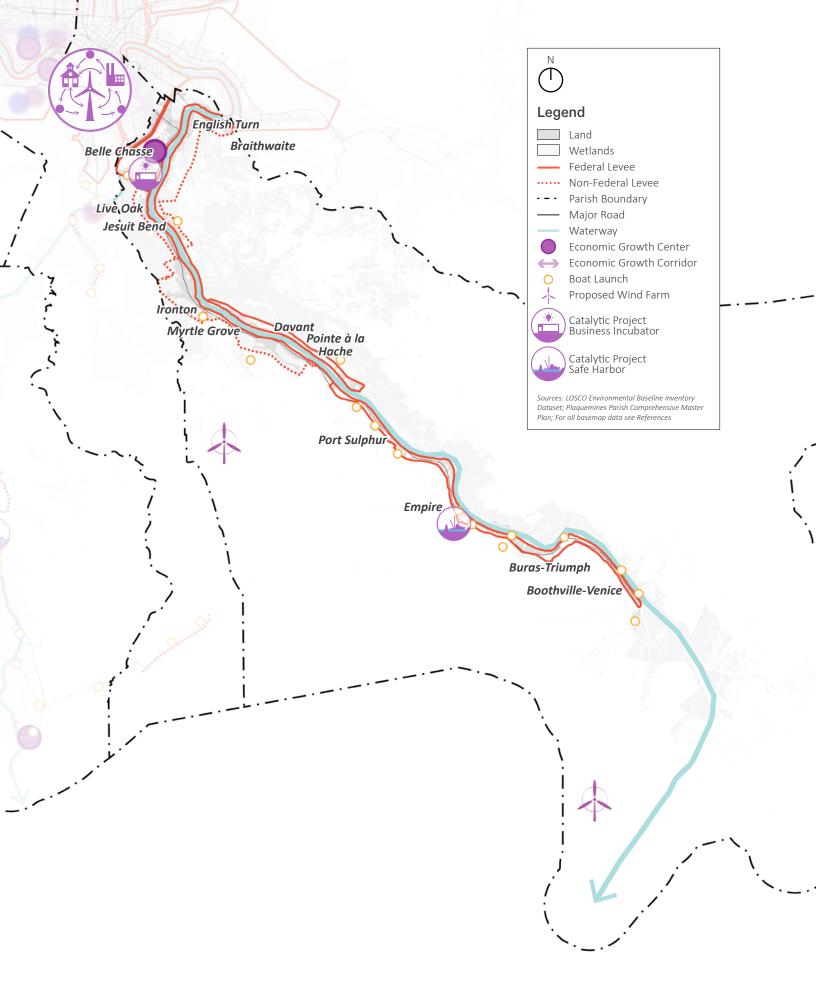
Grant Ave. biorention cells, curb cuts, and ADA-compliant sidewalk upgrades. Photo Credit: Google Maps Street View



Flower Avenue Green Street Project. Image Credit: City of Takoma Park

Case Study: City of Takoma Park, MD

Through private and public funds, the City of Takoma Park is transforming a heavily-used road with little runoff management into a street that has reduced the runoff of polluted water into the nearby creek system while promoting safe pedestrian, bicycle, and vehicular use. The one-mile section will feature stormwater curb extension, bioretention cells, and bioretention swales to address stormwater management needs. The retrofit also includes wider, ADA-compliant sidewalks.



GOAL 4 Strengthen and Diversify Local Economies

Strategy 1 Support local fisheries

Action A: Connect producers with consumers.

Action B: Provide and upgrade facilities to help commercial fishers adapt to change.

Strategy 2 Expand public access to parish waterways

Action A: Enhance the Venice Marina and other strategic river access points.

Action B: Develop public boat launches and boating facilities.

Action C: Increase availability of harbor of refuge sites.

Strategy 3 Enhance job training and education

Action A: Develop demand-driven training programs for growing Plaquemines Parish industries

with educational partners.

Action B: Work with community and technical colleges to develop workforce training and

certification programs as a workforce generator for coastal restoration jobs.

Action C: Create apprenticeship, paid internship programs, and "earn-and-learn"

programs for high school and college students and expand skills training in

coastal careers.

Strategy 4 Provide business incubation and adaptation assistance

Action A: Create a business incubation center.

Action B: Provide adaptation services for businesses confronting environmental changes.

 $4 \mid$ Vision and Strategies 15

Strategy 1: Support local fisheries To ensure that the commercial fishing/seafood industry remains viable, the parish should work with stakeholders to diversify economic opportunities for those working in the seafood industry. Specifically, the parish can support facilities and activities that connect the producers with consumers, ensure transportation and access to commercial fishing vessels, support marketing efforts, promote the employment of local workforce for restoration projects, and develop off-season employment and training opportunities. MISSHONGII **Fishing Industry** The seafood industry is one of Plaquemines Parish's major economic drivers.

Action A: Connect producers with consumers.



Image Credit: Louisiana Seafood Direct

Seafood Market

Southshore Direct Seafood can market seafood directly to consumers as well as local grocery stores and restaurants.

Photo Credit: St. Tammany Parish Flickr

Building on the success of the Louisiana Direct Seafood Program, fishers should work with the LSU AgCenter and Louisiana Sea Grant to explore how to expand the Southshore Direct Seafood Program—which currently serves individual consumers—can target regional grocery stores and restaurants to buy from local fishers. New and updated marinas should be designed to accommodate fish and seafood markets and commercial kitchens that enable fishers to add value to seafood and fish catches and sell their products directly. The proposed Plaquemines Harbor of Refuge project will include marina amenities and harbor of refuge wetand dry-docking facilities for boats during extreme weather events. This project could be expanded to create a monthly seafood, vegetable, and fruit market. The Harbor of Refuge could also be the central point from which boats depart to bring goods to communities along the river and waterways.

Steps needed:

- Implement a broad and vigorous fisheries marketing campaign.
- Expand the program's reach beyond individual consumers, targeting regional grocery stores and restaurants to buy from local fishers.
- Coordinate with new/updated marinas so that they are designed to accommodate fish and seafood markets and commercial kitchens that enable fishers to add value to seafood and fish catches and sell their products directly.
- Identify potential for "floating market" to connect producer to consumer at consumer site.



Action B: Provide and upgrade facilities to help commercial fishers adapt to change.

As commercial fishers and their families have to move north to live in safer communities that provide the education, goods, and services they need, they will also need new types of support facilities in the southern areas where their jobs remain. They will need secure spaces to store supplies and gear, boat storage and safe harbor areas, and bathing and shower facilities to use prior to traveling northward to their homes. There are currently five public boat harbors in Plaquemines Parish to provide affordable places for commercial fishers to maintain their boats that could be enhanced.

The only harbor offering dry dock and lift services for marine repairs is located in Empire, and more may be needed so that additional private docks are not necessary.

Steps needed:

- Provide parking and gear storage spaces for fishers to use near their boat storage areas.
- Provide groceries, ice houses, and processing plants.
- Provide resources, such as insurance, marketing assistance, and business plans, to help fishers expand into ecotourism during nonfishing seasons.
- Establish public spaces to store traps and other gear.
- Understand how changing environmental conditions and proposed coastal restoration projects will affect Louisiana fisheries and work with affected fisheries to provide alternative opportunities or support.
- Assist the fishing industry with technical assistance and flexible loan programs that help improve product quality, reputation, and distribution to local markets.
- Promote Louisiana's seafood industry with targeted advertising campaigns and events.
- Provide research and technical assistance for adopting sustainable fisheries and aquaculture practices in Louisiana.



Action A: Enhance the Venice Marina and other strategic River access points. The Venice Marina has the potential to expand its services to include dry boat storage, refreshments, bait, boat cleaning and maintenance service, lodging, and other tourism-related amenities. As tourists use the marina to begin and end their charter trips, shops and restaurants could further provide tourists with services. From here, charter bus services could provide access to numerous other sites of interest such as swamp tours, New Orleans, and other destinations.

Steps needed:

- Research local examples of enhanced marinas.
- Prepare a plan that specifies upgrades to the marina and improvements to the surrounding area in order to create a welcoming environment that attracts people and investment.
- Provide safe boating storage.
- Create a branding strategy for the marina.

Venice Marina

The Houma Marina features boat slips and supplies, lodging, a convenience store, and a restaurant. The marina can be expanded to feature more services and amenities.



Action B: Develop public boat launches and boating facilities.

Public boat launches provide affordable places for commercial fishers to maintain their boats. They also provide access to water to residents and visitors and support boat tours and other tourism activities. Increasing the number of public boat launches could attract more weekend tourism in Plaquemines Parish, which can contribute to the local service industry economy such as lodging, dining, and short-term boat storage.

Steps needed:

- Provide services to residents and attract tourists by installing and upgrading boat launches, enhancing existing marinas, and encouraging development of supportive facilities and activities.
- Develop a Boat Launch Advisory Committee to determine need as well as inventory existing facilities and services and assess quality and maintenance needs.
- Identify improvements needed to existing facilities.
- Identify areas in the parish that need boat launches and supporting facilities.

Action C: Increase availability of harbor of refuge sites.

Plaquemines Parish should consider diversifying the types of and increasing the number of harbors of refuge to ensure that boats will be protected from storms and that adjacent properties are protected from boats during storms.

Steps needed:

- Identify locations in the parish to develop safe harbors for public use.
- Create a harbor of refuge specifically for commercial fishing vessels. Include boat docks, a picnic pavilion, and seafood market.
- Coordinate with property owners to acquire or rent long-term property to establish safe harbor areas.
- Identify funding partners, including parish, DOTD, industry, and nonprofits.



Action A: Develop demanddriven training programs for growing Plaquemines Parish industries with educational partners. Plaquemines Parish should support higher education programs that develop and provide industry-based training and works with local high schools to extend pipelines to younger talent. Through such programs, Plaquemines Parish can continue training skilled labor for its traditional maritime and energy jobs as well as create pathways to opportunities in emerging fields such as aircraft operations, coastal restoration, and renewable energy. Programming and curriculums at high schools, two-year colleges, and four-year universities must be guided by industry needs and shaped to directly meet their current and long-term hiring needs.

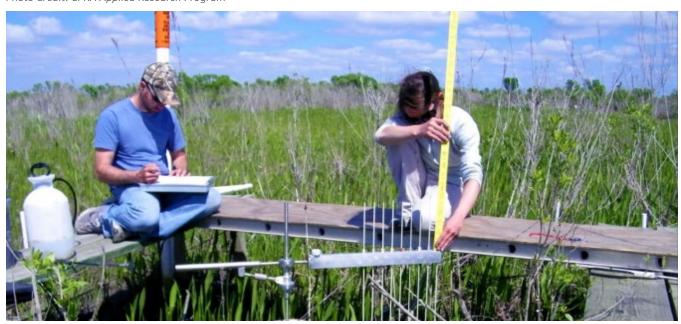
Action B: Work with community and technical colleges to develop workforce training and certification programs as a workforce generator for coastal restoration jobs.

Recognizing the job growth in water management and coastal restoration in Southeast Louisiana, the parish should work with the technical and community colleges serving Plaquemines Parish—including Nunez Community College and Delgado Community College—to begin offering programs designed to build the workforce needed for coastal restoration projects. To that end, the higher educational centers must be supported in their efforts to connect with the coastal restoration industry and government agencies to ensure that the local workforce meets future industry demands.

Coastal Restoration Job Training

Plaquemines Parish can become a leader in job training in water management and coastal restoration fields.

Photo Credit: CPRA Applied Research Program



Action C: Create apprenticeship, paid internship programs, and "earn-and-learn" programs for high school and college students and expand skills training in coastal careers. Community colleges across Southeast Louisiana often offer internships to provide students with on-the-job training, entry into the local workforce, and means to sustain themselves through completion of their programs. Many industries cite the need for this kind of experience in addition to Jump Start credentials to demonstrate an entry-level candidate's job readiness. To augment existing programs and provide greater financial stability for students seeking career preparation, apprenticeship and paid internship programs should be facilitated between schools and industry partners.

Steps needed:

- Develop real-time research and data that accurately reflects job growth, wage levels, and skills needed for industry drivers. This information must be updated regularly to reflect incoming economic development projects and market shifts and made easily accessible to educators at all levels.
- Create systems for demand-driven employer engagement with educational providers. Two-year schools and high schools must have direct and ready access to employers in order to provide workforceready graduates.
- Facilitate apprenticeships and/or paid internship programs between industry and education partners. Apprenticeship programs often require facilitation between employers and high schools or higher education institutions. For high school students, issues of transportation, insurance, and liability are common barriers to overcome. In the case of two-year colleges or other higher education providers, trainings must typically be customized for the employer's needs, and schedules must be arranged to accommodate a work/ study balance. In order to streamline these processes and ensure success, appointed facilitators of such programs must be in place.
- Develop a coastal specialization certification pathway open to students seeking either Jump Start or TOPS diplomas.
- Enhance coordination between K-12 education, community colleges, four-year universities, and industry to ensure students are receiving the training that meets the needs of local employers.
- Support an eventual transition to an apprenticeship-based model for training new employees in coastal careers.
- Use a combination of regulations, financial incentives, technical assistance, outreach, and education to build Louisiana's expertise in coastal and stormwater management.
- Offer retraining programs in coastal careers.
- Market and promote Louisiana expertise in the fields of coastal restoration, adaptation, and water management.

Strategy 4: Provide business incubation and adaptation assistance Plaquemines Parish benefits from a strong tradition of familyowned businesses that can be cultivated and supported to strengthen the local economy. Creating community assets that support local businesses, family-owned operations, and young talent that is already in the parish—to weather both the challenges of the environment and natural business growth—will ensure that a strong, diverse business and industry presence will continue to thrive in the parish. **Business Incubator** Incubators provide rental workstations and conference rooms to help start-ups. Photo Credit: Ewan Oglethorpe

Action A: Create a business incubation center.

While a key component of economic development is business attraction, business retention efforts are equally critical. To maximize the parish's economic prosperity, businesses must have resources to help them come online and grow; assistance to innovate and explore research and development opportunities; and support to weather the challenges of major market downturns. These centers can also facilitate the development of businesses that will provide off-season jobs for fishers. These centers can also facilitate the development of job and businesses to provide jobs seasonally and during offseason for fishers.

Action B: Provide adaptation services for businesses confronting environmental changes.

Working with businesses to create adaptation strategies and provide adaptation services is beyond the typical role of many small business incubators, but that is an innovative approach Plaquemines Parish could adopt to support its business community. Farmers and fishers will have to contend with changing environmental conditions, and an incubator could provide technical assistance to help them adapt their practices as well as provide outreach about and guidance on how to apply for loans with accessible interest rates.

Steps needed:

- Create a board and identify incubator sponsors.
- Develop a business plan for the incubator.
- Enlist the support of local businesses.
- Develop a governance structure.
- Identify partners to support business activities.

Business Incubator

Incubators can offer training programs for starting new businesses as well as offer space and amenities for small business owners. *Photo Credit: The Blue House*





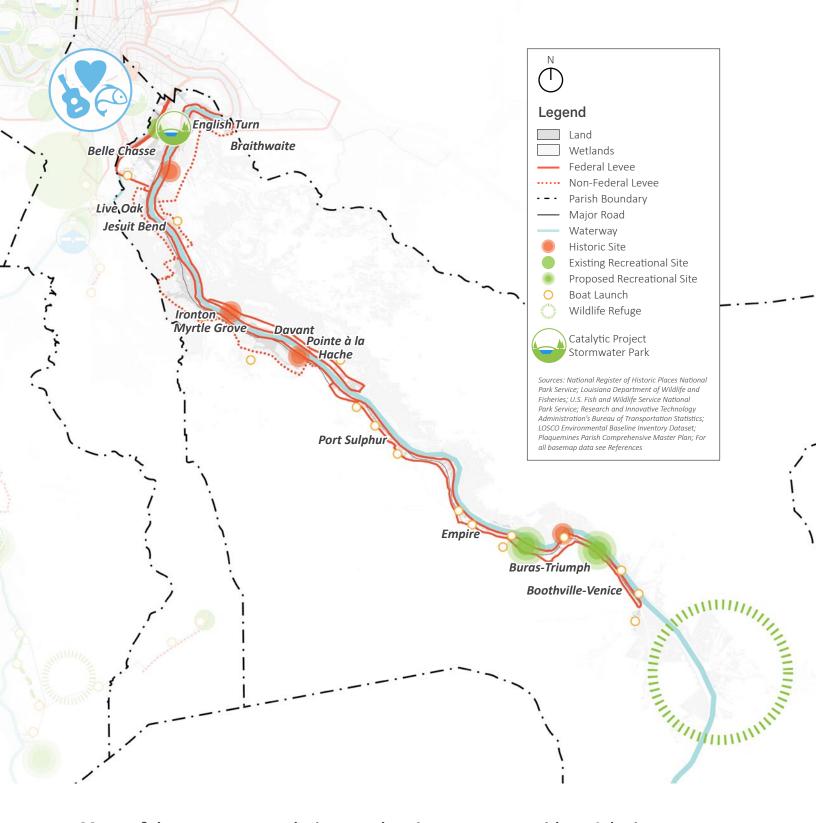


Above: AJ & Sheron Fabre Market. Photo Credit: Town of Jean Lafitte/Paul Christiansen

Left: Jules Nunez Seafood Pavilion. Photo Credit: Town of Jean Lafitte/Paul Christiansen

Case Study: Jean Lafitte Fisheries Market

In 2017, the Town of Jean Lafitte opened a seafood pavilion and market to host special events and serve as a monthly vending outlet for local commercial fishers, artists, and craft retailers. The Jules Nunez Seafood Pavilion and AJ & Sheron Fabre Market is a large, covered venue featuring a 60-foot counter with beer and soda taps, ice machines and refrigerators, and a stage for live bands for special events. To underline and preserve the local identity, the venue is decorated with reproductions of signs from local retailers of a century ago, including the Bridge Side Inn, the Isadore Fisher General Store, and Victor Kerner's Grocery, which was run by Mayor Tim Kerner's great-grandfather. The attached deck is partially built over the waterway and seats up to 175 people. Two smaller pavilions provide space for up to eight commercial fishers to sell their catch directly.



Many of these recommendations and actions answer residents' desires to support, enjoy, and capitalize on local arts, music, and food and maintain their strong connections to the land, water, and natural environment. By developing and expanding opportunities for recreational fishing, bird watching, and kayaking in higher-risk areas of the parish and providing traditional parks and open spaces in the low-risk areas, residents and visitors alike can experience the parish's natural beauty.

GOAL 5 Protect and promote historic and cultural assets

Strategy 1 Ensure public and community assets provide recreational and educational opportunities

Action A: Incorporate trails, observation decks, and boardwalks into landscape designs.

Action B: Design stormwater management facilities on vacant and abandoned lots and public lands as recreational assets.

Action C: Use abandoned properties and/or public properties for shared community space.

Provide educational signage at key locations to learn about the culture and natural

Action D: assets of the area.

Revitalize Fort Jackson and Fort St. Philip to highlighting local culture and history.

Strategy 2 Enhance public access to Plaquemines Parish's waterways for recreation

Action A: Increase the number of public boat launches and docks.

Action B: Develop facilities and services around water-based recreation.



Action A: Incorporate trails, observation decks, and boardwalks into landscape designs.

The proposed Belle Chasse Wetland Park project will restore and enhance habitats that support birds, wildlife, and vegetation native to Plaquemines Parish. By incorporating connected trails and boardwalks, these areas will become accessible to visitors for birding, exploring the parish's wetlands, and learning about the habitats that have contributed to Plaquemines Parish's rich recreational culture.

Steps needed:

- Identify strategic access points for trails and boardwalks.
- Identify connectors, trailhead locations, and trail destinations, such as public facilities.
- Work with Audubon Louisiana-National Audubon Society, Louisiana
 Department of Wildlife and Fisheries, Plaquemines Parish Recreation
 Department, and other entities to ensure trails and observation
 decks provide recreational opportunities and support restoration and rehabilitation efforts of the area.

Access to Nature

Boardwalks and pathways allow recreational access to nature and wildlife viewing.



Action B: Design stormwater management facilities on vacant and abandoned lots and public lands as recreational assets. Reduce flooding by using vacant and abandoned lots as well as public land, such as right-of-ways, for stormwater management and recreational facilities. Plaquemines Parish should develop a program to turn this abandoned land into water features and landscaped areas with swales, water gardens, permeable paths and sidewalks, and other amenities. This enables properties to be recreational and open community assets while also holding floodwaters when needed.

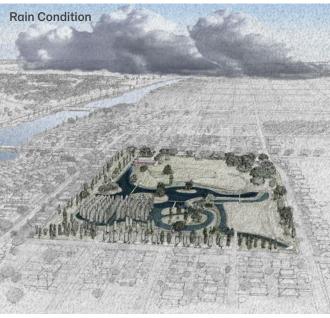
Steps needed:

- Review existing Plaquemines Parish regulations for neighborhood retention areas.
- Research best practices, using New Orleans and other cities that are creating multi-use retention facilities as sources.
- Update ordinances to require private properties that provide retention areas to design and build them as recreational or open space areas.
- Identify property and funding for potential multi-use facilities.
- Work with Plaquemines Parish Recreation Department to create multi-use retention areas.

Space for Water

The Mirabeau Water Garden, currently in design for the City of New Orleans, is a 25-acre empty lot that will become a model of sustainable water management in the region by reducing flooding and limiting subsidence in the neighborhood. The public park will also become a destination for recreation and environmental education. *Image Credit: Waggonner & Ball*









Community Garden

The Signature Community Garden, established in 2014, is located at the Belle Chasse YMCA.

Action C: Use abandoned properties and/or public properties for shared community space.

Most parish residents must drive extended distances to reach grocery stores. To avoid long travel times, increase availability of fresh food, and provide educational opportunities for children, vacant properties could be converted into community space for gardening and keeping livestock for the community. Local schools could incorporate gardening and farming lessons into their curricula.

Steps needed:

- Identify a strategic location, or several, for community spaces.
- Work with the LSU AgCenter, Master Gardeners, and schools to augment their curricula to include gardening and farming.
- Work with residents to maintain and cultivate the land.

"We like how the community is so close together. Staying together keeps the community strong."

-Plaquemines Parish Resident



Signage

Signage at the Woodlands Conservancy provides information to visitors about this cypress tree.

Action D: Provide educational signage at key locations to learn about the culture and natural assets of the area.

Building on the recreational opportunities that provide access to the proposed Belle Chasse Wetland Park and other parks, educational opportunities should be developed and installed. Signs, maps, and brochures can convey important natural and cultural facts to visitors and engage them more deeply in the experience of the park.

Steps needed:

- Identify the key elements to feature on signage and brochures.
- Include facts about the stormwater management function of the site; the natural environment and its habitats, such as the species of birds and other wildlife and vegetation common in the area; and other relevant information.
- Work with Louisiana Department of Culture, Recreation, and Tourism,
 Plaquemines Parish Recreation Department, Barataria-Terrebonne
 National Estuary Program, and other stakeholders to develop the
 content and maps for trail and park users.
- Place signage at key locations.
- Promote use of trails and key educational sites through geocaching and outdoor classroom activities.

Action E: Revitalize Fort Jackson and Fort St. Philip to highlight local culture and history.

"We live in a place that still practices our history. We somehow hold on to our historical traditions."

-Plaquemines Parish Resident

Fort Jackson and Fort St. Philip are national historic landmarks due to their decisive role in the American Civil War. Revitalizing these sites with educational features highlighting their role and history can spur economic activities as well as preserve important parts of U.S. history. A rigorous state, regional, and local cultural and historic marketing campaign will attract tourists and visitors to Plaquemines Parish to experience the parish's assets.

Steps needed:

- Use apps, augmented reality, and other new technologies to help visitors discover Louisiana's culture and history.
- Participate in a state-sponsored "stay-cation" marketing campaign aimed at Louisiana residents to promote local tourism.
- Promote use of the state's Percent for Art program to include all
 capital expenditures from public funds and allow the program to
 fund cultural assets such as space for music, festivals, or traditional
 cooking, in addition to visual arts.
- Colocate cultural events and programs near existing transportation corridors and community centers to make them more accessible to a wider range of people.

Historic Forts Along the Mississippi River

Both Fort Jackson, left, and Fort St. Philip, right, are currently closed to the public. Revitalization could spur economic activity and provide a recreational and educational destination for parish residents and visitors.







Action A: Increase the number of public boat launches and docks.

Plaquemines Parish currently has numerous private boat launches and five public boat docks. Additional boat launches at strategic locations will increase access to water-based recreation opportunities. The location and design of the new docks and launches should fit within the character of the area and minimize disturbance to the natural environment and hydrology. Green infrastructure and renewable energy to meet stormwater management goals and utility needs should be part of the design.

Steps needed:

- Develop a Boat Launch Advisory Committee to identify areas in the parish that need boat launches and supporting facilities.
- Work with property owners to purchase or lease properties suitable for launching boats.

Action B: Develop facilities and services around water-based recreation.

As new boat launches are built, the parish should also consider providing RV support, shelters, bathroom facilities, and fish cleaning stations. Services around the boat launches, along with boat rental facilities, would support economic diversification opportunities consistent with the parish's culture and identity.

Steps needed:

- Provide services to residents and attract tourists by encouraging development of supportive facilities and activities around existing and new boat launches.
- Promote areas outside the levee systems as a sportsman's paradise, including tax incentives for recreational businesses operating in these areas.
- Partner with nonprofits or philanthropic organizations to expand access to outdoor recreational opportunities for Louisiana youth.
- Work with nonprofit and philanthropic partners to expand weekend or summer camp opportunities for coastal education and combined culture and history camps.



5 Realizing the Vision



Planning to Action

Residents constantly think about the risks associated with living in St. John the Baptist Parish and how they can live harmoniously with the water around them. Throughout the LA SAFE initiative, residents and stakeholders discussed their needs and possible solutions for adapting to future changes to their environment and risk profiles. The top strategies for each adaptation goal are described in Chapter 4: Vision and Strategies.

Based on resident and stakeholder input, the Louisiana Office of Community Development identified six catalytic projects that implement numerous adaptation strategies. Ideas gathered from meeting participants in Rounds 1 through 4 contributed to each project's development. Residents and stakeholders reviewed the resulting six strategies and provided feedback on their preferences, which were factored into funding decisions. LA SAFE identified one or two projects in each parish to provide funding assistance.

Strategy Evaluation Criteria

Evaluation of catalytic projects eligible for LA SAFE funding is based on the following criteria—

1. Public Preference

The results of the preference polling at the fifth round of meetings paired with the responses from an online survey, which allowed residents to indicate their preferences if they were unable to attend a Round 5 meeting.

2. Leverage Funds

The level of matching funds from other sources available to implement the project.

3. LMI Benefit

Projects that predominantly benefit a low-to-moderate income population.

4. Public Benefit (Quantitative)

The level of benefit to the public that can be measured. For example, the number of units created in a housing proposal or the amount of water stored in a stormwater management proposal.

5. Public Benefit (Qualitative)

The degree to which the project addresses future flood risk in a unique way and/or improves quality of life for residents.

6. CRS Score

Awarded to projects that gain points in FEMA's Community Rating System (CRS), which lowers flood insurance rates.

The table on the opposite page summarizes the six catalytic projects considered for LA SAFE funding and how they address the parish's goals. Detailed descriptions of each of the six projects follow the table.

Pilot Projects	LA SAFE Goals				
	Water Management	Housing and Development	Transportation	Education, Economy, and Jobs	Culture and Recreation
Plaquemines Harbor of Refuge	Reduces potential flooding in surrounding areas by expanding detention capacity on site through pervious paving, bioswales, and rain gardens.	Enhances quality of life in surrounding area, providing facility for local markets and venue for local vendors.	Provides safe harboring and storage capacity for vessels operating in local waterways; protects seafood industry supply chain.	Grows the direct seafood to consumer market and provides fishers and farmers with a permanent location to sell and market goods.	Enhances arts and festival opportunities in the parish and creates ecotourism opportunities.
Belle Chasse Wetland Park	On-site retention capacity and stormwater management interventions slow water flow as it moves into the drainage system.	Creates a park and natural walking amenities to the benefit of adjacent neighborhoods and developments.	Reduces the potential for street flooding and danger to nearby motorists by detaining stormwater runoff; increases neighborhood connectivity to nature.	Creates a community asset and educational tool for nearby school to highlight the benefit of stormwater management.	Provides green space, walking paths, and natural habitat.
Emerging Industry Business Incubator	Incentivizes the development of new firms and emergent technologies in coastal restoration.	The development of this incubator will use smart building strategies that respond to the environment and mitigate stormwater on site.		The accelerator promotes small business development and economic diversity, creating jobs in growing industrial sectors.	Ecotourism and the growth of small local businesses provide the opportunity to share and strengthen local culture.
Fisher and Farmer Loan Program			Loans can be used to retrofit vessels to travel farther distances and protect the seafood industry's supply chain.	Loan program would bolster economic resilience for vulnerable yet vital industries and provide adaptation support as environmental conditions change.	Loans could be used by boat owners to diversify their business activities into charter or tour businesses. Supporting citrus helps support the Orange Festival.
Mental Health and Substance Abuse Program			Mental health and substance abuse treatment is associated with improved performances and productivity at work and school. It reduces the number of absences and helps increase the local workforce.		Treating drug abuse and mental illness reduces negative impacts from disaster-related trauma and anxiety about future risk. These benefits are also correlated with a decline in instances of violent crimes, suicide, and improvements to community health and well-being.
Red Star Yeast Building Redevelopment	Incorporates green infrastructure to manage all stormwater on site.	Provides quality, affordable housing and commercial development.	Proximity to the Belle Chasse ferry adds to the amenities accessible to commuters and pedestrians.	Opportunities for jobs on the commercial space's ground floor.	Includes public amenities, such as community gathering and market space, pavilion, walking and biking paths.

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Plaquemines Harbor of Refuge

Economic resilience is a cornerstone of LA SAFE. One major concern for Plaquemines Parish is supporting its commercial seafood industry, and that will involve protecting vital equipment during hurricanes. With access to some of the best commercial and recreational fishing areas, the Plaquemines Harbor of Refuge will provide a shelter for vessels during disaster events. This will protect the seafood industry, the leading employer and economic driver in the parish, which produces millions of pounds of shrimp, oysters, crabs, and fish annually.

The Plaquemines Harbor of Refuge will provide a safe harboring and storage site with capacity for vessels operating in local waterways, protecting the seafood industry supply chain. The project has the potential to grow the direct seafood to consumer market by providing fishers and farmers with a permanent location to sell and market their goods. Expanded detention capacity on site—through pervious paving, bioswales, and rain gardens—can reduce potential flooding in surrounding areas. The area will also enhance the arts and festival opportunities in the parish and create ecotourism opportunities by providing the space and facilities.

Planned for construction in Empire, the facility's potential partners include Louisiana Sea Grant and Plaquemines Parish.



Statistics

Project Area Approximately 11 acres

LA SAFE Investment Up to \$6 million

Estimated Project Cost \$6 – \$14.8 million

Partners Plaquemines Parish; Louisiana Sea Grant





Prototype Plan View

- 1 Harbor of Refuge and boat docks
- 2 Picnic pavilion (optional)
- Raised convenience store and restrooms (optional)
- 4 Seafood market (optional)
- 5 Permeable parking and bioswales
- 6 Tree plantings and bioswales

Belle Chasse Wetland Park

Belle Chasse in Plaquemines Parish is at low to moderate flood risk. Increased development and changing weather patterns will likely increase this risk, and additional stormwater management is needed. To mitigate flood risk, the Belle Chasse Wetland Park is designed to divert and temporarily store runoff during heavy rain events and reduce subsidence potential in the surrounding area. The design provides vehicular access from Avenue A to the east, from Oslon Drive to the southwest, and by bike or on foot from the neighborhood to the north along Good News Ave. While primarily designed to manage runoff, the park will also provide recreational and educational amenities, such as terraced picnic areas, pathway networks with educational signage in a forested wetland, a linear park with multi-use pathways, and open lawn areas. A phased approach to this project would further provide boardwalk networks with educational signage and a nature and conference center. The wetland park project area is 90 acres and partially located in a floodplain that is approximately three feet below sea level. The implementing entity could be Plaquemines Parish, with neighborhood associations, the levee board, and NGOs also involved in reducing flood risk and preserving habitat.



Precedent image of linear park with pathways along canal



Precedent image of boardwalks and seating areas in a wetland park



Precedent image of water storage area that doubles as terraced gathering space; *Image Credit: Payton Chung\Flickr\CC by SA 2.0*





Precedent image of wetland park; Photo Credit: Matthias Süßen\Wikimedia Commons\CC by SA 3.0



Phase I

- 1 Terraced picnic and recreational areas that double as stormwater storage
- Pathway network with educational signage in forested wetland
- 3 Linear park with multi-use pathway
- Pedestrian/bike bridge to connect neighborhood to wetland park
- 6 Permeable parking and bioswales
- 6 Open lawn area

Phase II

- Additional permeable parking and bioswales
- 6 Additional open lawn area
- Constructed wetlands for water storage
- Boardwalk network with educational signage in forested wetland

Future Vision

- 9 Future nature and conference center
- Existing retention pond—future potential to convert to fishing pond
- Future expansion of path network to integrate into existing park pathways
- 12 Future recreational pavilion

Emerging Industry Business Incubator

The Emerging Industry Business Incubator will help launch new businesses, diversifying the economy with industries that will strengthen the region in the future. The incubator program provides entrepreneurs with access to career counselors and mentors in their fields to help guide them through the program as they start their businesses. The incubator provides a coworking space with access to shared office equipment, collaborative working spaces, private meeting rooms, a technology center, a fabrication space, and a communal kitchen.

The facility has the following potential partners: New Orleans-based Propeller, Greater New Orleans Inc., Plaquemines Association of Business and Industry (PABI), Delgado Community College, and Plaquemines Parish Government.



Photo Credit: NHD - Info\Wikimedia Commons\CC by SA 2.0

Alternative Energy Wind and Solar



Photo Credit: Louisiana GOHSEP\Flickr\CC by SA 2.0

Coastal Restoration

Statistics			
Location	To be determined		
LA SAFE Investment	Up to \$4 million		
Estimated Project Cost	\$2 million for accelerator program development \$2 million for facility construction or renovation		
Potential Partners	Propeller; Greater New Orleans, Inc.; Plaquemines Association of Business and Industry (PABI); Delgado Community College; Plaquemines Parish		

Photo Credits: (A) Victor Grigas\Wikimedia
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Valley\Flickr\CC by SA 3.0





Hospitality



Photo Credit: National Park Service

Ecotourism

This proposed project is modeled after Propeller, a business incubator in New Orleans that offers a training program for starting new businesses as well as office space and amenities for small business owners. The Plaquemines Parish incubator would support businesses that address alternative energy, coastal restoration, hospitality, and ecotourism.







B Collaborative work stations



Private meeting rooms



Technology center and fabrication space



One-on-one mentoring and career counseling

Fisher and Farmer Loan Program

A major challenge identified by Plaquemines Parish residents is the increased instability of the seafood industry, due in large part to loss of habitat. Although there is a strong desire and need to diversify the parish's economy, many of those impacted by the changes in the seafood industry require support and assistance to do so.

The Fisher and Farmer Loan Program will provide technical assistance and loans of up to \$50,000 to residents in the fishing or citrus farming industries who do not have access to traditional lines of credit. Fishers may use these loans to improve or repair boats and equipment, diversify into charter service or tourism, implement recognized best practices, or invest in product quality enhancement equipment. Likewise, citrus farmers in low-lying areas who require expensive water management to maintain expected crop yields may qualify for loans and technical assistance to convert dry agriculture operations to more sustainable land uses. Loans would be low-interest, and borrowers may be eligible for flexible repayment options based on seasonal income.



Fisher Loans



Citrus Farming Transition Loans and Technical Assistance

Statistics	
Location	Parish-wide
LA SAFE Investment	Up to \$3 million
Estimated Project Cost	\$3 million
Potential Partners	Community Development Financial Institution (CDFI); Coastal Communities Consulting (CCC); local credit union or local nonprofit





Implementing a program to support Louisiana's fishers and their families is a goal that was expressed by LA SAFE participants across the coast. Fishers struggle with changes to the ecosystem, increasing risk to their equipment, and competition from cheap, imported seafood. They often need boat repairs and upgrades prior to the fishing season. Due to the industry's seasonal nature, conventional loans do not always meet their needs. This program would provide low-interest loans with flexible repayment schedules that match the fishing season. By supporting fishers, this program also supports the Louisiana seafood industry as a whole, a cornerstone of Louisiana's economy and culture.





Photo Credit: St. Tammany Parish Flickr

Changing coastal conditions will likely lead to different future habitats. Farmers seeking assistance to convert their operations to crops suited to a wet environment can benefit from this program. For example, citrus farms in increasingly wet regions could convert to combined rice and crawfish farms, providing income and stormwater management. This program will provide loans and technical assistance to farmers who want to adapt their crops to a changing environment.

Mental Health and Substance Abuse Program

Areas projected to be subject to high future flood risk are, in many cases, currently experiencing significant environmental, cultural, economic, and social challenges. Severe, repetitive flooding events in recent years have devastated many low-lying communities along Louisiana's coast, especially in Plaguemines Parish. As these events have occurred, populations have already started moving upland, disrupting community cultural connections and the coast's broader social fabric. These impacts, compounded with unfavorable future projections, have taken a significant emotional toll. The proposed program will provide case management services for residents struggling with mental health and substance abuse challenges. Treating drug abuse and mental illness can potentially reduce instances of violent crimes and suicide as well as provide improvements to community health and well-being. The Mental Health and Substance Abuse Program's services will offer help to those disadvantaged populations living in at-risk, low-lying communities and assist them through the emotional impacts of past disaster events and future increased flood risk. The program will be in Plaguemines Parish in partnership with Plaguemines C.A.R.E. Centers, Plaguemanians in Action Coalition, Metropolitan Human Service District, and Plaquemines Medical Center Drug Free Coalition.

Statistics	
Location	Parish-wide
LA SAFE Investment	Up to \$6 million
Estimated Project Cost	Up to \$6 million
Potential Partners	Plaquemines C.A.R.E. Centers; Plaquemanians in Action Coalition; Metropolitan Human Service District; Plaquemines Medical Center Drug Free Coalition





Photo Credit: Leslie Prest\Google Maps



Substance Abuse Center for Adolescents and Adults

- Assessments
- Education
- Counseling
- Intensive IOP Programs

Behavioral Health and Wellness Center

- Individual counseling
- Family counseling
- Group counseling
- Anger management
- Mind/body skills training
- Play therapy
- Child psychiatry
- Disaster counseling



Photo Credit: Plaquemines C.A.R.E. Centers

Red Star Yeast Building Redevelopment

Plaquemines Parish residents identified population loss and a lack of housing opportunities as challenges. Available housing stock has declined in quantity and quality; property values in some areas are decreasing; and the shrinking tax base has become a burden on current residents. As a result, the available building stock will not meet the needs of the parish's changing demographics and does not support the community's desire to grow and diversify jobs, retail, and services. In addition, current housing types do not address the residents' expressed wish to reduce the community's footprint in a manner that will allow them to be closely connected to jobs and amenities while also reducing flood risk and increasing the parish's tax base.

Low flood risk areas are well-positioned to receive population and economic growth. Medium-density, affordable, residential and mixed-use developments should be prioritized to meet the parish residents' needs. The Red Star Yeast building in Belle Chasse has been identified as a potential location for mixed-use, medium-density redevelopment to provide the needed services and housing. A mixed-use development project in this area will incorporate ground-floor commercial space for neighborhood amenities like restaurants or cafes providing opportunities for on-site jobs. The residential portion of the first phase building, supported by LA SAFE, will consist of 30 housing units, with units being available at 20%, 30%, and 50% of area median income. Landscaping and shared green space will feature green infrastructure to slow stormwater runoff. The location of this mixed-use development will provide convenient access to existing transportation networks to connect housing to jobs.





Restaurant and outdoor dining





Mixed-Use Buildings Photo Credit: AgnosticPreachersKid\ Wikimedia Commons\CC by SA 3.0

Mixed-use buildings in lowrisk areas attract local businesses like coffee shops, restaurants, and retail stores to neighborhoods. Multistory buildings accommodate more people while preserving green space for recreation and stormwater management. In turn, more residents are likely to patronize businesses within walking distance.



Approximately 30 housing units



Ground floor commercial space; Photo Credits, Left: AnnO611\Wikimedia Commons\CC by SA 4.0; Right: Potash Markets, YoChicago





Wind-Resistant Design; Photo Credit: Bill Bradley\ Wikimedia Commons\CC by SA 3.0



Solar Power



Permeable Paving; Photo Credit; Lombroso\ Wikimedia Commons\CC by SA 3.0



Community & Market Space



Stormwater Park & Recreation Paths; Image Credit: USFWS Midwest\
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Implementation Plan

During the Round 5 meetings, residents evaluated and marked their preferences among six catalytic project proposals. The six proposals reflect the vision and input gathered throughout the engagement process and targeted opportunities that Plaquemines Parish residents identified throughout the LA SAFE process.

Following the Round 5 meetings, a selection committee whose membership includes officials from the Louisiana Office of Community Development reviewed each of the projects and used a point system to rank their potential for funding and implementation, taking into account public preference, leveraged funds available, LMI benefit, public benefit (quantitative and qualitative), and CRS score.

The projects selected via this process for Plaquemines Parish, **Plaquemines Harbor of Refuge** and **Mental Health and Substance Abuse Program**, are described below.

Plaquemines Harbor of Refuge

The Plaquemines Harbor of Refuge project is primarily a Resilient Infrastructure project located in Empire, LA. Plaquemines Parish is a sportsman's paradise with some of the world's best commercial and recreational fishing. The seafood industry is one of the leading employers in Louisiana, producing millions of pounds of shrimp, oysters, crabs, and fish annually. However, as flood risk increases and land loss continues to occur, this industry's viability faces a significant threat—specifically as it relates to vital equipment and infrastructure. This proposal would create a harbor of refuge for vessels to shelter in place during disaster events. The parish-operated harbor would incorporate marina amenities and wet-and dry-docking facilities as well as green infrastructure to help manage stormwater.

During Round 1 of LA SAFE meetings, the project team hosted parish residents at the YMCA in Port Sulphur. At this meeting, attendees made numerous comments about the opportunities and challenges facing the seafood industry, local businesses, and the economy at large. Attendees referenced these topics a combined 77 times during this first meeting. In the Round 2 meetings, attendees again stressed the need to improve the parish's economic viability, especially as it is relates to the seafood industry. Attendees also expressed the need to expand current harboring capabilities. On tabletop maps, attendees marked potential locations for a new harbor of refuge. Through this activity, Empire was identified as a location with existing infrastructure that is not sufficient to meet the current need.

In the Round 3 and 4 meetings, the project team continued to work collaboratively with residents as well as parish leadership to develop a project based on the ideas presented by residents in previous rounds. Through additional outreach to partners such as Louisiana Sea Grant and Coastal Communities Consulting, it became increasingly apparent that the parish needed more harboring capacity throughout the year in addition to during disaster events. The project enjoys the support of both parish officials and residents, and it aligns with information gathered throughout the public engagement efforts of LA SAFE. The community affirmed its support for this project in person and online in the final round of meetings, when residents collectively chose this project as their number one preference.

Mental Health and Substance Abuse Program

The Mental Health and Substance Abuse Program for Plaquemines Parish is a Public Services/
Education program as outlined in the LA SAFE guidelines. Areas projected to experience high
future flooding risk are, in many cases, currently experiencing significant environmental, cultural,
economic, and social challenges. Severe, repetitive flooding events in recent years have devastated
many low-lying communities along Louisiana's coast, especially in Plaquemines Parish. As these
events have occurred, populations have already started moving upland, disrupting community
cohesion and the coast's broader social fabric. These impacts, compounded with unfavorable future
projections, have taken a significant emotional toll. This program will provide case management
services for residents struggling with mental health and substance abuse issues. These services will
help disadvantaged populations living in at-risk communities work through the emotional impacts of
past disaster events and future increased flood risk.

Plaquemines Community C.A.R.E. is an existing program that provides an array of mental health and substance abuse services to parish residents. The LA SAFE contribution will help maintain the existing programs and expand their services and reach.

During Round 1 of LA SAFE meetings, the project team hosted parish residents at the YMCA in Port Sulphur. The data gathered during this meeting clearly revealed residents' anxiety about flood risk in addition to stresses over the current and future condition of the places they call home. In the Round 2 meetings, in which the project team met with smaller groups of residents in more localized public settings, substance abuse and the need for mental health services were first raised as major public health challenges in the parish.

During and after the Round 3 meetings, residents' desire for programs to help those dealing with substance abuse and mental health issues became apparent. In Round 3, the project team used an anonymous polling software to ask attendees direct questions related to an array of different topics such as flooding, land use, building regulations, and mental health and substance abuse. The results of the anonymous polls indicated to the project team that mental health and substance abuse are both sensitive topics and relevant issues. When asked to give project, program, and policy suggestions in Round 3, residents recommended investing in programs that expand mental health services. Although this project did not emerge as the top preference in Round 5's public polling, it does have firm support from parish leadership, a Louisiana legislator representing Plaquemines Parish, and an established partner already providing these services in the community and eager to expand to meet growing need.

It is anticipated that funding for these projects will become available mid-2018, and project completion is anticipated by September 2022.

Priority Implementation Table

The Plaquemines Parish Adaptation Strategy has been specifically outlined in previous sections of this document. Implementing the vision will require an effective partnership among private businesses and stakeholders; federal, state and local public entities; nonprofits; and members of the community. This Implementation Table provides a road map for the parish and other stakeholders to follow that prioritizes those relationships based on a series of action items over the near term (1 to 10 years), medium term (11 to 25 years), and long term (over 25 years). Based on the issues identified by the extensive public input and on the concepts forwarded in this strategy, action items have been organized into the following key goals:

Goal 1: Manage Flooding and Subsidence

Goal 2: Direct Growth to Low-Risk Areas

Goal 3: Improve Mobility Throughout the Parish and Region

Goal 4: Strengthen and Diversify Local Economies

Goal 5: Protect and Promote Historic and Cultural Assets

Strategy	Action	Risk Zone	limeline
Stormwater Manag	gement		
Retain and detain stormwater	Promote the use of shared detention areas to adjacent property owners.	Low Moderate	Near Term* (1 – 2 years)
	Identify and use retention areas throughout the parish.	Low Moderate High	Ongoing (1 – 50 years)
	Develop an "Adopt-a-Ditch (or Bayou)" or "Maintain the Drain" program.	Low Moderate	Near Term (1 – 10 years)
	Minimize water conveyance across ridges; hold water in the basins by enforcing a strong retention standard for stormwater.	Low Moderate High	Ongoing (1 – 50 years)
	Establish a groundwater management unit of the parish to monitor water tables and provide standards limiting the impacts of subsidence.	Low Moderate High	Near Term* (1 – 2 years)
Reduce impervious surfaces	Incorporate green infrastructure into development designs and drainage updates.	Low Moderate	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Incorporate green streets infrastructure and water management into road design.	Low Moderate High	Near Term (1 – 10 years)
	Discourage elevated fill and incentivize pier-and-beam foundations for structures.	Low Moderate	Ongoing (1 – 50 years)
Review and update stormwater policies and programs	Conduct an audit of all parish plans, regulations, and policies relevant to stormwater regulation and amend development codes to achieve consistency with stormwater management best practices.	Low Moderate High	Near Term* (1 – 2 years) Medium Term (11 – 25 years)
	Develop a stormwater management plan.	Low Moderate High	Near Term* (1 – 2 years)
	Continue to develop and update stormwater utilities that create fee-based services to help pay for green infrastructure flood risk reduction projects.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Provide incentives for private developers to handle stormwater on site.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)

Stormwater Management				
Review and update stormwater policies and programs	Sufficiently elevate structures in moderate- and high-risk areas.	Moderate High	Near Term* (1 – 2 years) Medium Term (11 – 25 years)	
	Conserve and restore wetlands.	Low Moderate High	Ongoing (1 – 50 years)	
	Prioritize levee maintenance to areas with concentrated assets.	Moderate High	Medium Term (11 – 25 years) Long Term (26 – 50 years)	

Housing and Development			
Encourage housing and commercial development on higher ground	Prepare areas of higher ground for increased concentrations of development.	Low	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Develop a housing incentive program to encourage development on higher ground.	Low	Near Term* (1 – 2 years) Medium Term (11 – 25 years)
	Consider repurposing unused properties.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)
Create a downtown Belle Chasse	Improve streetscape and public realm amenities within Belle Chasse.	Low Moderate	Near Term (1 – 10 years)
	Create more opportunities for street life and active uses.	Low	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Develop a comprehensive open space plan.	Low Moderate High	Near Term (1 – 10 years)
	Build upon existing wayfinding and public art programs to incorporate art and culture into the district signage and public places.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)
Plan for clustered, concentrated communities with multiple lines of defense	Create community centers that can be sustained over the long term.	Low Moderate	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Study current community assets and future needs.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Evaluate and adopt corridor transportation infrastructure.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)

Strategy	ACTION	RISK ZOTIE	rimeiine
Transportation			
Expand and diversify transportation options between the coast and areas of higher ground	Augment the New Orleans Metropolitan Area Guide to Transportation Planning to review transportation options between the coast and northern parish areas and to diversify transportation options.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Provide regional transportation between Plaquemines Parish and surrounding parishes.	Low Moderate	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Increase connectivity between neighborhoods and communities, including non-motorized transportation options.	Low Moderate	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Plan for safe and efficient evacuation routes when planning and designing new roadways, as applicable.	Low Moderate	Near Term (1 – 10 years) Medium Term (11 – 25 years) Long Term (26 – 50 years)
Adopt and implement a Complete Streets program in Belle Chasse	Design and construct roadways and intersections to enable safe access for all users.	Low Moderate	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Incorporate stormwater management into roadway design.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)
	Set appropriate design standards for rural and urban areas.	Low Moderate	Near Term (1 – 10 years)
	Evaluate capital improvements and coordinate design.	Low Moderate	Near Term* (1 – 2 years) Medium Term (11 – 25 years)

Strategy	ACTION	NISK ZOTIE	Timeline		
Education, Economy	Education, Economy, and Jobs				
Support local fisheries	Connect producers with consumers.	Low Moderate High	Near Term* (1 – 2 years) Medium Term (11 – 25 years)		
	Provide and upgrade facilities to help commercial fishers adapt to change.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)		
Expand public access to parish waterways	Enhance the Venice Marina and other strategic River access points.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)		
	Develop public boat launches and boating facilities.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)		
	Increase availability of harbor of refuge sites.	Low Moderate	Near Term (1 – 10 years) Medium Term (11 – 25 years)		
Enhance job training and education	Develop demand-driven training programs for growing Plaquemines Parish industries with educational partners.	Low Moderate High	Near Term* (1 – 2 years) Medium Term (11 – 25 years) Long Term (26 – 50 years)		
	Work with community and technical colleges to develop workforce training and certification programs as a workforce generator for coastal restoration jobs.	Low Moderate High	Ongoing* (1 – 2 years)		
	Create apprenticeship, paid internship programs, and "earnand-learn" programs for high school and college students and expand skills training in coastal careers.	Low Moderate High	Ongoing* (1 – 2 years)		
Provide business incubation and adaptation assistance	Create a business incubation center.	Low	Near Term (1 – 10 years) Medium Term (11 – 25 years)		
	Provide adaptation services for businesses and confronting environmental changes.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)		

Strategy	Action	RISK Zone	rimeline	
Culture and Recreation				
Ensure public and community assets provide recreational and educational opportunities	Incorporate trails, observation decks, and boardwalks into landscape designs.	Low Moderate High	Ongoing (1 – 50 years)	
	Design stormwater management facilities on vacant and abandoned lots and public lands as recreational assets.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)	
	Use abandoned properties and/ or public properties for shared community spaces.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)	
	Provide educational signage at key locations to learn about the culture and natural assets of the area.	Low Moderate High	Near Term (1 – 10 years)	
	Revitilize Fort Jackson and Fort St. Philip to highlight local culture and history.	Low Moderate High	Near Term (1 – 10 years) Medium Term (11 – 25 years)	
Enhance public access to Plaquemines Parish's waterways for recreation	Increase the number of public boat launches and docks.	Low Moderate High	Near Term (1 – 10 years)	
	Develop facilities and services around water-based recreation.	Low Moderate High	Near Term (1 – 10 years)	



Catalytic Project Implementation

On April 20, 2018, Governor John Bel Edwards announced the 10 projects across six parishes selected for development.

"We believe LA SAFE represents a crucial step forward in cementing Louisiana's place on the cutting edge in resilience-building activities.

Although our Coastal Master Plan is the country's preeminent effort to reduce future land loss and coastal flood risk, LA SAFE has taken the next step in illuminating a path forward for how our communities develop future housing, economic, social, and transportation needs to withstand future disasters and adapt to environmental changes over time. In an age of heightened risk, now is the time to start addressing the needs of our communities."

-Governor John Bel Edwards

Call to Action

Plaquemines Parish has a culture deeply rooted in fishing, farming, and navigation along the Mississippi River. The parish's oil and gas support economy is focused along the banks of the Mississippi River where multiple ports and facilities are located. Due to its proximity to the Gulf of Mexico, Plaquemines Parish residents have always lived with the risk of flooding. Responding to annual storm threats is a way of life, and dealing with these challenges has brought the community closer together. This has made Plaquemines Parish's leaders and residents experts at weathering storms and bouncing back from hurricanes, damaging winds, and other natural events. However, these hazards have lately been exacerbated by both natural and man-made disasters, including climate change and oil spills. The result is that the parish's wetlands are transforming into open water at an alarming rate, bringing the Gulf of Mexico closer than ever and making the parish more vulnerable to storm and tidal surge. It also is changing the habitat for the catch fishers depend on.

Outdated stormwater management is contributing to flood risk, as drainage capacities are now easily overwhelmed by simple downpours. The threat of flooding has intensified the need for timely flood risk reduction measures and adaptation strategies—not only to secure a bright and viable future but also to preserve the parish's history, culture, and very existence. As flood risk continues to increase locally and globally, different strategies are needed to ensure Plaquemines Parish will adapt to an ever-changing environment.

Through funding from the National Disaster Resilience Competition, LA SAFE was conceived to address flood hazards in Plaquemines Parish and five other parishes and to provide adaptation strategies that will strengthen each parish's approach to flood resilience. Throughout this plan's development, residents, stakeholders, and experts took into account the existing and potential threats facing the parish. They considered the complex aspects of flood hazards such as historical occurrence, causes, and exacerbating factors. Risks include overland, riverine, and backwater flooding as well as storm surge, shoreline erosion, relative sea level rise, and climate change. The Adaptation Strategy is built on the parish's planning, regulatory, and emergency management capabilities, which are very strong but severely limited in resources.

Through the LA SAFE process, Plaquemines Parish residents and stakeholders developed a variety of strategies that will enable their communities to chart a new path in known territory—one that will allow the rich and deeply rooted traditions to persevere, economies to diversify, and communities to make informed and wise development decisions. The adaptation strategies identified and prioritized through this project aim to propel Plaquemines Parish toward a future where flood risk is mitigated by—

- ensuring that no one is left behind in the highest-risk areas;
- building on existing assets and repurposing buildings to accommodate a smaller, more concentrated community footprint that will be easier to protect from flood risk;
- providing economic opportunities and safe properties for those in the moderate-risk areas; and
- using natural functions of our wetlands and bayous to manage water.

The adaptation strategies were developed by the people of Plaquemines Parish for the people of Plaquemines Parish. Implementation of the strategies through deep involvement of the parish's leadership and residents will continue to improve Plaquemines Parish's ability to reduce impacts from hazards and bounce back after natural and man-made disasters, allowing residents to live in the rich cultural and natural environment that residents love to call home.

Unless otherwise noted, all photos and drawings were produced by the LA SAFE project team.

Additional Map Sources

These additional sources were used to create the maps throughout the Plaquemines Parish Adaptation Strategy—

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