COASTAL **TEXAS** STUDY

STUDY OVERVIEW

US Army Corps of Engineers®
Galveston District

Members of the public attend the public meetings held in December 2018

STUDY BACKGROUND

The Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, involves engineering, economic and environmental analyses on large-scale civil works projects. The Study team is comprised of the U.S. Army Corps of Engineers (USACE) and Texas General Land Office (GLO) and their engineering, environmental, and public outreach consultants.

The purpose of the Coastal Texas Study is to identify coastal storm risk management and ecosystem restoration measures that would protect the health and safety of Texas coastal communities, reduce the risk of storm damage to industries and businesses critical to the Nation's economy, and address critical coastal ecosystems in need of restoration.

The Coastal Texas Study's history began in 2007 with congressional authorization to identify and evaluate a comprehensive plan for the restoration and conservation of wetlands, barrier islands, shorelines, and related lands and features that protect critical resources, habitat, and infrastructure from the impacts of coastal storms, erosion, and subsidence. In 2015, the non-federal sponsor, the GLO, was identified and funding to initiate the study was received. At that time, three other organizations also began studying a comprehensive solution for the upper Texas Coast, specifically the Houston/Galveston Region, including:

- the Ike Dike Plan from Texas A&M University at Galveston,
- the Coastal Spine Plan by the Gulf Coast Community Protection and Restoration District (GCCPRD), and
- the Bay Park Plan from the Severe Storm Prediction Education and Evacuation from Disasters (SSPEED) Center at Rice University.

In 2018, the Study team presented their plan for the Upper Texas Coast, the Coastal Barrier Plan, for public review. In 2019, the Study team began evaluating feedback received during the public review and comment period for the Draft Integrated Feasibility Report and Environmental Impact Statement.

About the Study

Serving as an important economic and industrial hub for the United States, the Texas Gulf Coast is home to a coastal ecosystem vital to our national economy which provides valuable natural resources, abundant seafood, recreational fishing and tourism, and a rich cultural heritage. Growth of a healthy economy and preservation of natural resources along the Texas coastline is imperative to provide improved coastal protection measures thus ensuring the stability of the state of Texas and the nation for years to come. Historical and current weather events continue to challenge the vulnerabilities of the Texas coast emphasizing the need for enhanced resiliency of the coast to prevent future damage and loss.

With this in mind, the Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, was developed to identify coastal storm risk management and ecosystem restoration measures. These key measures will protect the health and safety of Texas coastal communities, reduce the risk of storm damage to industries and businesses critical to the national and local economy, and address important coastal ecosystems needing restoration.

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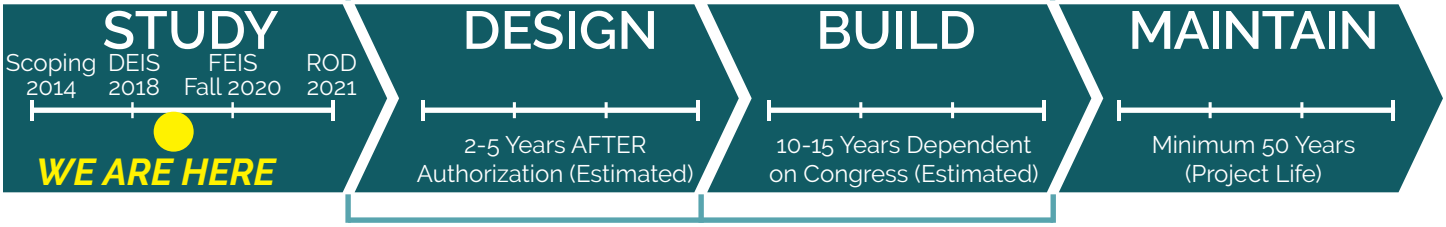
ESTIMATED PROJECT SCHEDULE

Study Complete, Request Congressional Authorization for Project(s) – 2021

Local Sponsors Maintain Projects



Congressional Appropriations for Authorized Projects

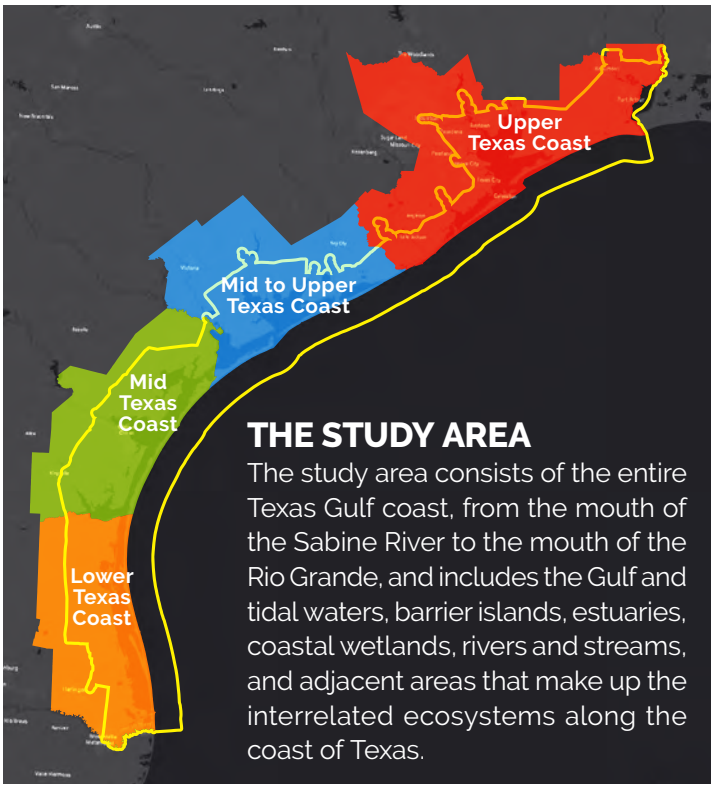
DEIS: Draft Environmental Impact Statement FEIS: Final Environmental Impact Statement ROD: Record of Decision

STUDY APPROACH

A "multiple lines of defense" strategy is utilized in the formulation of proposed measures and alternatives in the Coastal Texas Study. The system could include a combination of structural, natural, and, nonstructural systems that work together to provide the greatest level of safety possible based on societal values and site conditions. To achieve a multiple lines of defense strategy, the Coastal Texas Study evaluates the following coastal problems:

- Economic damage from coastal storm surge
- Bay shoreline erosion
- Gulf shoreline erosion
- Loss of threatened and endangered critical habitats
- Disrupted hydrology

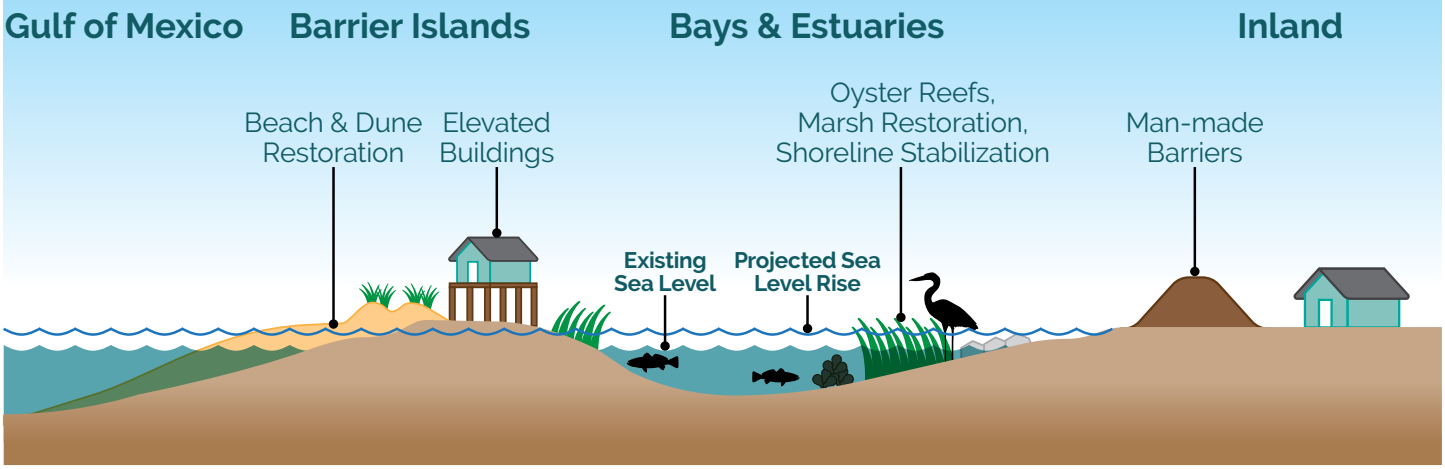
The Coastal Texas Study identifies nationally important environmental restoration strategies along the entire Texas coast. These restoration measures are evaluated based on long-term benefits, costs, feasibility, and resiliency.



THE STUDY AREA

The study area consists of the entire Texas Gulf coast, from the mouth of the Sabine River to the mouth of the Rio Grande, and includes the Gulf and tidal waters, barrier islands, estuaries, coastal wetlands, rivers and streams, and adjacent areas that make up the interrelated ecosystems along the coast of Texas.

EXAMPLES OF MULTIPLE LINES OF DEFENSE ON THE TEXAS COAST



PROPOSED STUDY FEATURES

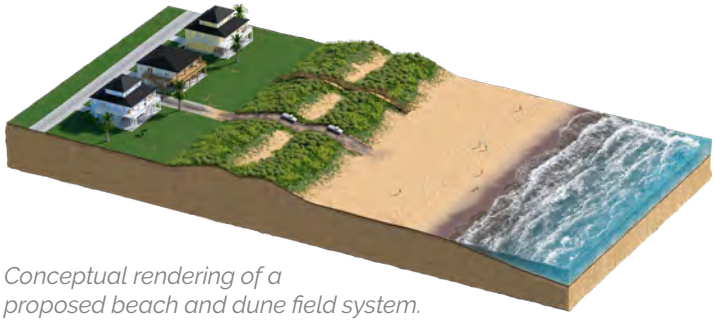
Proposed Ring Barrier

During Hurricane Ike, the most severe flooding came from the bayside. In order to protect this area, a ring barrier is suggested. **The current proposal envisions a system of flood walls, highway and railroad gates, and a 2,400-foot crossing of Offatts Bayou with surge gates for navigation and environmental flow.** The proposed ring barrier would encompass the Harborview Drive, or "Fish Village," neighborhood on the far east end of Galveston, consisting of a two-foot flood wall on top of the existing piers adjacent to the Strand Historical District on the north side of the island, continue west on Harborside Drive, wrap around Offatts Bayou to 103rd Street, and connect to high ground at the west end of the Seawall. The proposed ring barrier alignment extends to the west end of the Seawall to reduce risk to critical infrastructure (e.g. Scholes International Airport) and to avoid separating communities as much as possible.

Because Galveston Island currently operates on a gravity drainage system, the plan would add a forced drainage system consisting of approximately six new pump stations to move water off the island. The pump stations would address storm surge flooding as well as current flooding.

Beach and Dune system

The proposed ring barrier would tie into a 19-mile beach and dune system that would extend west to a tie-in point at the San Luis Pass Bridge. San Luis Pass will not have a closure structure.



Conceptual rendering of a proposed beach and dune field system.

The proposed beach and dune system along Bolivar Peninsula and the west end of Galveston Island will provide pedestrian and vehicular beach access by incorporating walk and drive over infrastructure at locations designated in each local government's Beach Access and Dune Protection Plan. Beach access will follow the Texas Open Beaches Act and any federal access requirements.

- 12-14 feet high
- 15-foot-wide dune crest width
- 200-foot beach

To address erosion and storm surge in the lower Texas coast, approximately two miles of dune and beach nourishment along South Padre Island is being proposed. The proposed nourishment would be aligned parallel to the existing beach and dune system, beginning about two miles north of the Brazos Santiago Pass North Jetty system and extending for an additional two miles north.

The current proposal includes a 12.5 foot dune and a 100-foot-wide beach berm, with additional sand to be added every 10 years.

The Texas General Land Office, as the local sponsor of the study, is interested in exploring a larger extent of beach and dune restoration along the entire South Padre Island from the Brazos Santiago Pass North Jetty system to almost 6 miles north of the jetty.

Gate Structure

The revised gate configuration includes two smaller sector gates separated by an island in the middle, providing two-way vessel traffic between the Gulf of Mexico and Galveston Bay. The remaining components of the gate structure include a combination of vertical lift gates and shallow section environmental gates in the shallower areas of the entrance channel. This gate design may provide less than ten percent water flow constriction between the Gulf and the Bay.

Maintaining tidal exchange between the Gulf and the bay is a priority. The gates would be closed only for storms and maintenance. Other large surge barriers worldwide are closed an average of 1 to 3 days per year for storms and operation and maintenance activities.

Closures at the Clear Creek Channel and Dickinson Bayou are also being investigated to address wind-driven surges in Galveston Bay. Both areas would include surge gates across the channel and associated pump stations.

Conceptual drawing of the proposed gate structure across Bolivar Pass

Ecosystem Restoration

Ecosystem restoration projects address habitat loss and degradation from coastal processes and support the coastal storm risk management components by providing a natural buffer from coastal storms. Each ecosystem restoration measure represents a combination of features and is formulated in a specific geographic location to restore diverse habitats and provide multiple lines of defense.

Marsh restoration improves degraded marsh habitat or restores habitat that has become open water due to erosion, relative sea level rise and other coastal forces. Breakwaters interrupt erosion and provide barrier so sediment can be placed to create marsh within tidal ranges. Restoration also includes planting of native marsh vegetation to provide habitat and trap sediment, thus reducing erosion.

Oyster reef restoration includes placement of oyster cultch material for new oysters to grow. Oyster reefs provide habitat for many other species and provide natural erosion reduction.

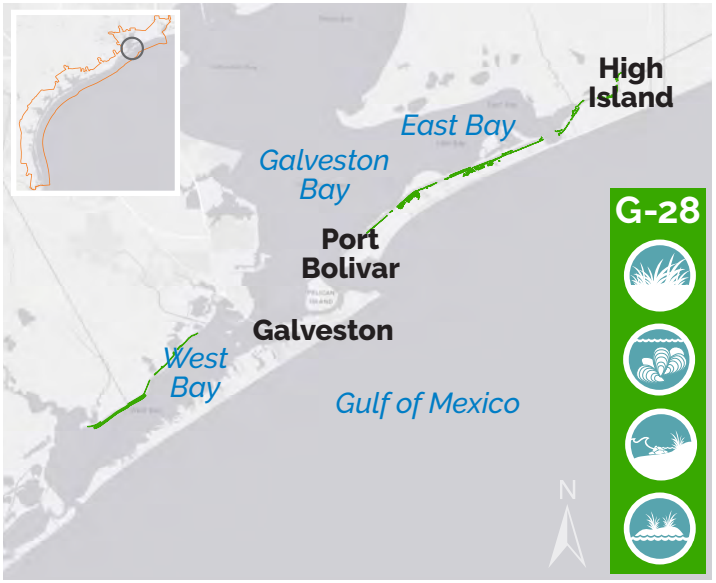
Beach restoration places sand on degraded gulf shorelines to restore dune and beach habitat.

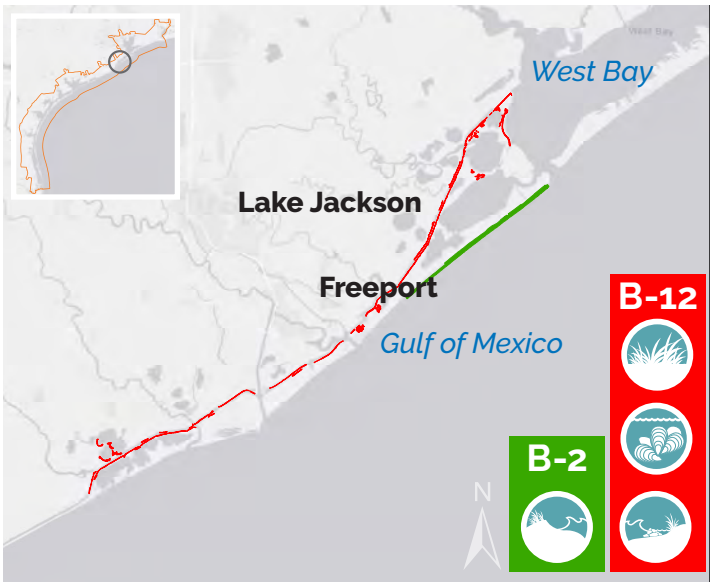
Island restoration includes placement of sediment to increase the elevation of degraded islands. These restored islands include shoreline stabilization along the Gulf Intracoastal Waterway to withstand erosion and will provide bird nesting habitat. To increase the diversity of habitat and provide natural erosion control, the bay side of the islands will slope to a created marsh and oyster reef.

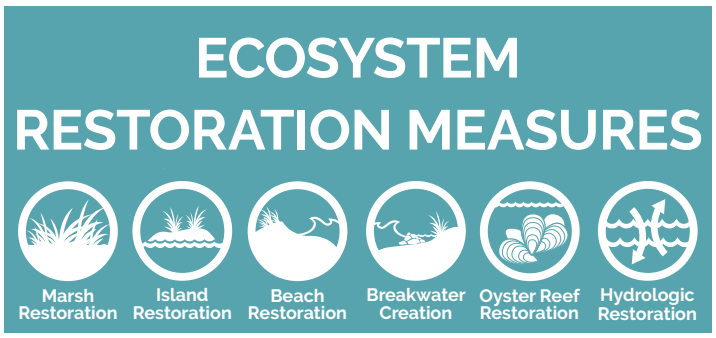
Hydrologic restoration is the reestablishment of a connection between water bodies to maintain salinity balances that sustain habitats.

- **G-28: Bolivar Peninsula and West Bay Gulf Intracoastal Waterway (GIWW) Shoreline and Island Protection**
- **B-2: Follets Island Gulf Beach and Dune Restoration**
- **B-12: Bastrop Bay, Oyster Lake, West Bay, and GIWW Shoreline Protection**
- **M-8: East Matagorda Bay Shoreline Protection**
- **CA-5: Keller Bay Restoration**
- **CA-6: Powderhorn Shoreline Protection and Wetland Restoration**
- **SP-1: Redfish Bay Protection and Enhancement**
- **W-3: Port Mansfield Channel, Island Rookery, and Hydrologic Restoration of the Laguna Madre System**

Proposed Ecosystem Restoration Measures in the Upper Coast







COASTAL **TEXAS** STUDY

STUDY UPDATE

US Army Corps of Engineers®
Galveston District

Representatives attend a Community Work Group Meeting in May 2019.

WE HEARD YOU!

The Coastal Texas Study has already begun considering the feedback received during the comment period for the Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR-EIS). Based upon your input, the study team is:

- Establishing Texas General Land Office (GLO)-led Community Working Groups
- Dropping the barrier levee along Galveston Island and Bolivar Peninsula from the study completely, and investigating a dune-and-beach system along Bolivar Peninsula beach
- Re-aligning the Galveston Ring Barrier
- Evaluating non-structural measures on the west side of upper Galveston Bay
- Exploring the use of storm surge gates at Clear Creek and Dickinson Bayou

Additionally, the study team will:

- Continue collaboration with Rice University's Severe Storm Prediction, Education, & Evacuation from Disasters (SSPEED) Center and Texas A&M University at Galveston
- Further storm modeling to refine alternatives
- Coordinate and hold a second public review and comment period during the summer of 2020 (including large-scale public meetings)
- Evaluate feedback received during an International Storm Surge Gate Design Workshop

More information is available online at:
coastalstudy.texas.gov

ABOUT THE STUDY

Serving as an important economic and industrial hub for the United States, the Texas Gulf Coast is home to a coastal ecosystem vital to the national economy that provides valuable natural resources, abundant seafood, recreational fishing and tourism, and a rich cultural heritage. Growth of a healthy economy and preservation of natural resources along the Texas coastline has made it imperative to provide improved coastal protection measures to ensure the stability of the state of Texas and nation for years to come. Historical and current weather events continue to challenge the vulnerabilities of the Texas coast emphasizing the need for enhanced resiliency of the coast to prevent future damage and loss.

With this in mind, the Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, has been developed to identify coastal storm risk management and ecosystem restoration measures. These key measures would protect the health and safety of Texas coastal communities, reduce the risk of storm damage to industries and businesses critical to the national and local economy, and address important coastal ecosystems needing restoration.

COASTAL TEXAS STUDY TEAM CONTACTS:

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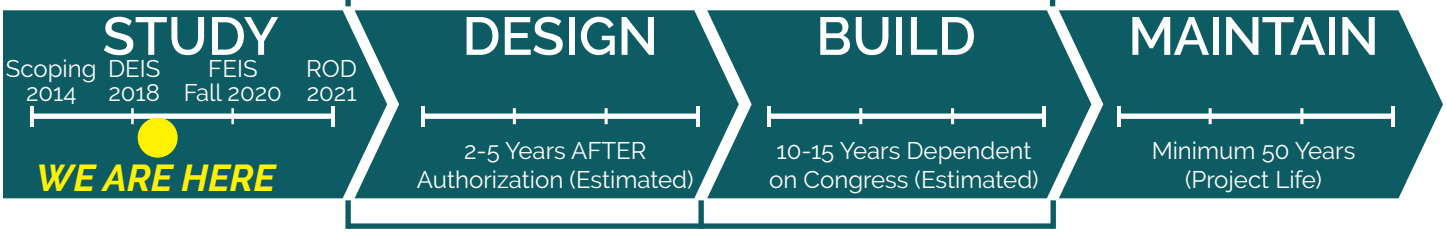
Kelly.A.Burks-Copes@usace.army.mil
Texas General Land Office:
Tony Williams
Tony.Williams@glo.texas.gov

ESTIMATED PROJECT SCHEDULE

Study Complete, Request Congressional Authorization for Project(s) – 2021

Local Sponsors Maintain Projects



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STUDY APPROACH

A "multiple lines of defense" strategy is utilized in the formulation of the measures and alternatives in the Coastal Texas Study. Employing three primary goals – avoid, minimize and preserve – coastal communities could consider a system of comprehensive, resilient and sustainable coastal storm risk management and ecosystem restoration solutions. The system could include a combination of measures (structural, natural and nature-based features, and nonstructural) to form resilient, redundant, robust and adaptable strategies that promote life and safety based on local site conditions and societal values. To achieve a multiple lines of defense strategy, the Coastal Texas Study evaluates the following coastal problems:

- Economic damage from coastal storm surge
- Bay shoreline erosion
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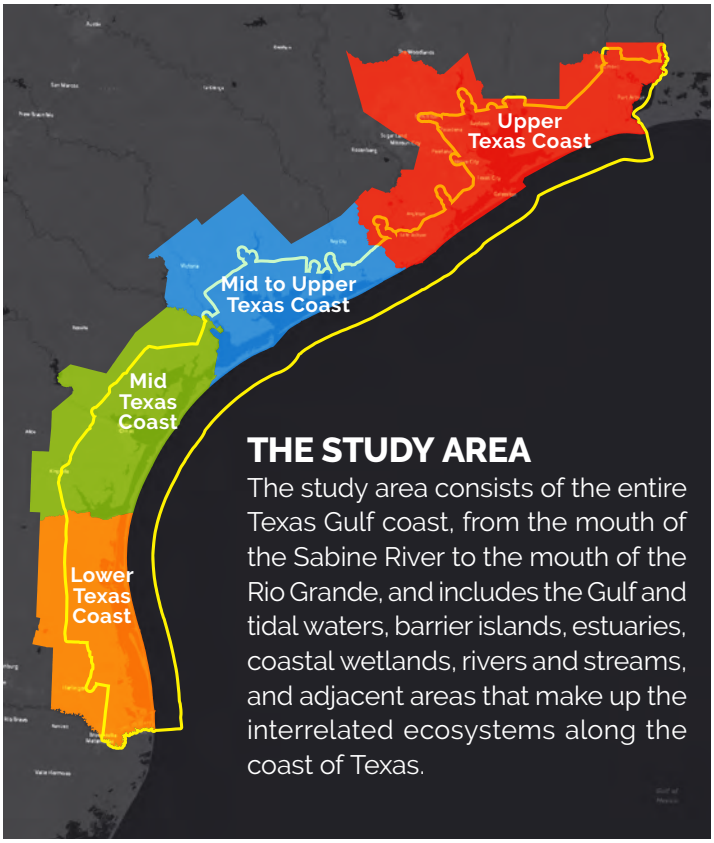

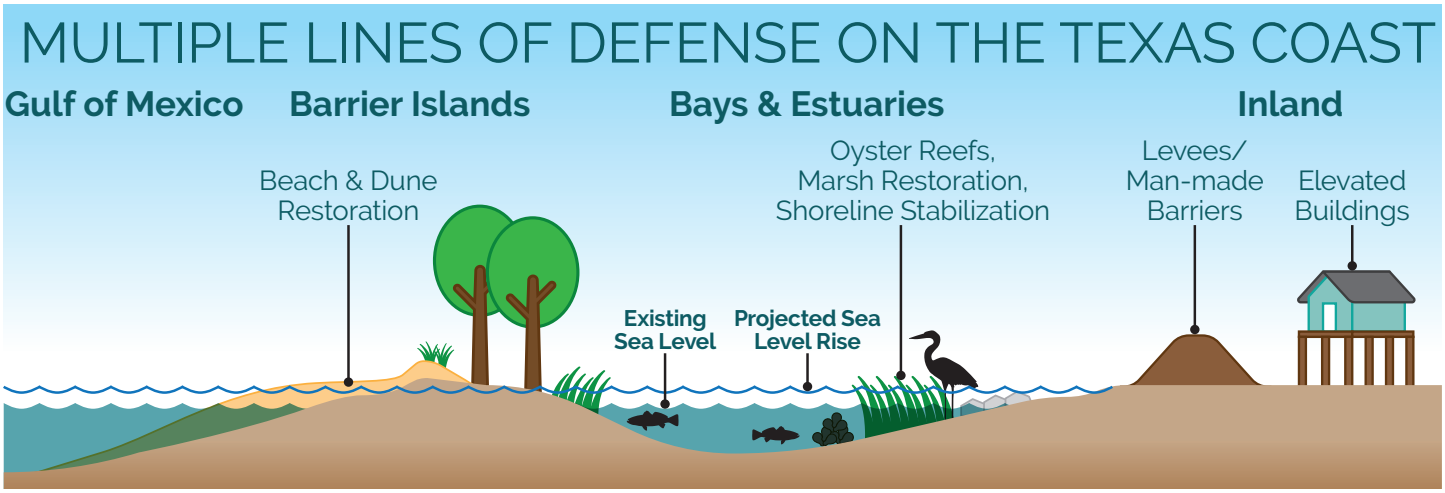

COASTAL **TEXAS** STUDY

NOTHING BUT THE FACTS

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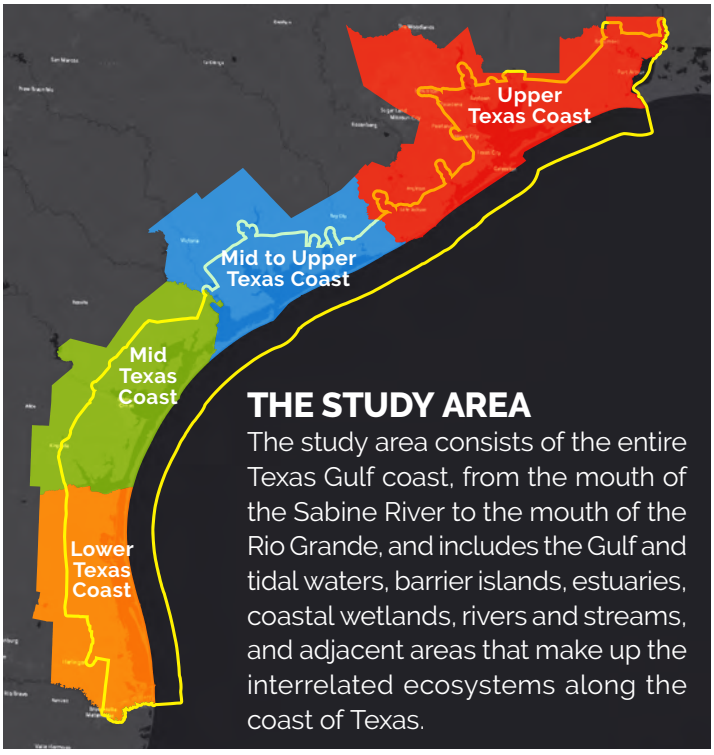
Large, long-term studies like the Coastal Texas Study often face misconceptions. The purpose of this document is to clear up some of these misconceptions and provide you with *"Nothing But the Facts."*

Misconception: The proposed plan would protect only highly populated areas and not all parts of the Texas coastline that have been impacted by past weather events.

The Coastal Texas Study includes a combination of ecosystem restoration (ER) and coastal storm risk management (CSRM) measures located throughout the 18 coastal counties of the Texas Gulf Coast.



Misconception: The Coastal Texas Study is only being proposed to protect the industrial facilities in the Houston-Galveston area.

The proposed features reduce risk to the community at large, not just the concentration of industrial facilities in Houston. Surrounding areas are filled with residences, as well as railways and port facilities that serve Houston, Galveston, and the nation. Comprehensive risk reduction in the region requires a combined effort of federal, state, and private agencies increasing the area's ability to prepare for, withstand, respond, and adapt to coastal risk. Industries in the Houston area will contribute to risk reduction through investments in their own facilities that contribute to the success of the larger features.

Misconception: The study would use eminent domain to acquire and demolish any property along the proposed barrier alignment.

The non-federal sponsor will have the responsibility of acquiring all necessary real estate interests for the project and ensuring that relocation of utilities and facilities is accomplished. Where necessary, voluntary relocations and acquisitions will be pursued, and eminent domain would only be imposed by a local sponsor as a last resort.

Misconception: The Coastal Texas Study is only considering past, historical flood events

Over 600 storms that could potentially impact the Texas coast were modeled and analyzed. These possible tropical storms include the entire range of storm factors, such as storm intensity, storm size, forward speed and angle of approach on top of the landfall locations along the entire Texas coast. The storms range from very weak and small tropical storm events all the way to catastrophically strong and large Category 5 storms and beyond.

Based on this data, a sample of 170 storms was taken through the Advanced Circulation model (ADCIRC - Certified by the Federal Emergency Management Agency [FEMA] for use in performing storm surge analyses) to determine storm surge heights with and without the barrier systems. The storms that were selected were the most destructive scenarios for storm surge and wave conditions. Additional storm modeling is currently being conducted to optimize the plan.

More information is available online at: **coastalstudy.texas.gov.**

Misconception: Storm modeling was not analyzed, and protection features were not considered for San Luis Pass.
The anticipated risk reduction benefits for protective features at San Luis Pass do not outweigh the potential negative environmental impacts of closing off the last remaining natural pass along the Texas coast. Many of the structures and assets that would be protected as a result of the closure are already elevated above surge heights or are at a ground elevation that limits surge impact.

There is also limited surge risk when factoring in the full probability of potential storm directions. The pass and the adjoining West Bay are very shallow and constitute only to 10 to 12 percent of the water exchange between West Bay and the larger area of Galveston Bay. This condition minimizes the risk of surge being transmitted to the large area of Galveston Bay where there is a greater number of structures and assets at risk from storm surge.

Misconception: Simply building a wall or barrier is not going to help protect the Texas coast.
The Coastal Texas Study utilizes a "multiple lines of defense" approach/strategy that includes a combination of other structural and non-structural measures, as well as natural and nature-based features to form resilient, redundant, robust, and adaptable strategies that promote life safety. The specific measures proposed through the Study will be based on local site conditions and societal values.

Misconception: The proposed gate structures at Galveston Bay would severely impact the water quality and ecosystem in the bay.
The U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC) conducted quantitative analyses using 3D Adaptive Hydraulics (AdH) model to simulate hydrodynamics, salinity, and sediment transport to understand potential environmental impacts. This modeling characterized the changes to the Galveston Bay System with the storm surge gates across Bolivar Roads in the open condition (which represents the non-storm condition or "everyday" operations of the gate structures) to compare to the without barrier condition (present). All modeling was conducted using a tentative gate configuration across Bolivar inlet that would reduce the flow conveyance by less than ten percent.

This would change the height of tides as Gulf water inflow is somewhat restricted by the structure, and freshwater exit from the bay to the Gulf is similarly affected. The modeling so far indicates that the height of tides in the bay would not be at levels that endanger fish and oyster populations.

Misconception: The proposed levee barrier along Bolivar Peninsula and Galveston Island will require the acquisition and demolition of property, as well as cause obstruction to beach access and viewing for those that live, work, and play along Galveston Island and Bolivar Peninsula.
The levee barrier solution along Galveston Island and Bolivar Peninsula has been dropped completely. The Study team is investigating a dune-and-beach system along the front of Bolivar Peninsula and west of the Galveston seawall.

Misconception: The proposed beach and dune systems along Bolivar Peninsula and the west end of Galveston Island would severely restrict both pedestrian and vehicular beach access.
The proposed beach and dune systems will attempt to maintain the same level of both pedestrian and vehicular beach access by incorporating walk and drive over infrastructure at locations designated in each local government's Beach Access and Dune Protection Plan. Beach access will be in compliance with the Texas Open Beaches Act and any federal access requirements.

Misconception: The ecosystem restoration (ER) and coastal storm risk management (CSRM) features proposed by the study will never meet an acceptable benefit-to-cost ratio to receive funding.
Only projects where direct economic benefits exceed the direct economic costs of building and maintaining those projects are recommended for authorization. The project with the highest net benefits becomes the recommended or tentatively selected plan.

WE WANT YOUR FEEDBACK!

The Study Team encourages public feedback and participation. A second public review and comment period is anticipated to be held during late summer 2020. Comments will be accepted throughout the life of the study and can be directed to **USACE, Galveston District, Attn: Ms. Jennifer Morgan, Environmental Compliance Branch, Regional Planning and Environmental Center, P.O. Box 1229, Galveston, TX 77553-1229**, or via email to: **CoastalTexas@usace.army.mil**.

COASTAL TEXAS STUDY TEAM CONTACTS:

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Texas General Land Office:
Tony Williams – Tony.Williams@glo.texas.gov

COASTAL **TEXAS** STUDY

US Army Corps of Engineers®
Galveston District

ABOUT THE STUDY PROCESS

What is a Feasibility Study?

All major federal resource projects evaluate the practicality of proposed solutions to problems. This process analyzes engineering, economic, environmental, cost, as well as impacts and other aspects of proposed solutions and alternatives.

A Feasibility Study consists of six major steps that identify the most practical and valuable proposal to the economy and environment. It is consistent with protecting the nation's environment and follows principles and guidelines in federal water resource law and the U.S. Army Corps of Engineers (USACE) regulations.

Where are we in the study process?

The Study Team is currently developing a revised plan based on the input received following the public review and comment period for the Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR-EIS) released in fall 2018. A revised Feasibility Report and Environmental Impact Statement (not integrated) will be released together for a second public review and comment period (including large-scale public meetings) in fall 2020 following a series of public open houses anticipated to be held in February and September 2020.

Following the second public review and comment period, the Study Team will review and address the input received from the public, resource agencies, and the USACE and Texas General Land Office (GLO) leadership to produce the final report. It is anticipated that the Final Feasibility Report and Environmental Impact Statement will be published in March 2021.

USACE Six Step Planning Process

1. Identify problems and opportunities
2. Inventory and forecast conditions
3. Formulate alternatives
4. Evaluate alternatives
5. Compare alternatives
6. Select recommended plan

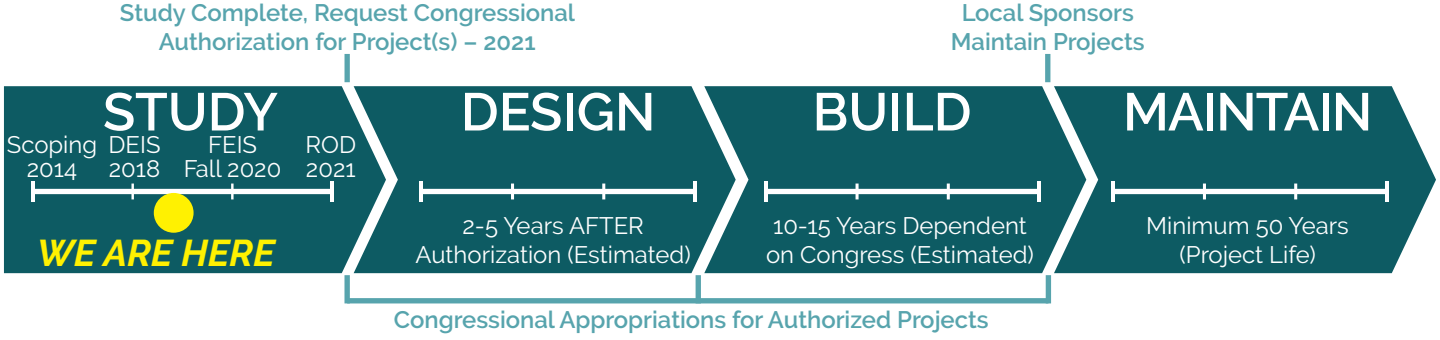
What will happen next in the study process?

After the Study Phase, a Recommended Plan will be proposed for congressional authorization and funding. Construction of the Recommended Plan is dependent upon congressional approval and funding.

If approved and funded, the Recommended Plan described in the Feasibility Report would be designed and constructed over a period of 10 to 15 years, depending on congressional authorization and appropriations and Non-Federal partnerships. The project would be maintained after construction by a local sponsor.

See back for Study Milestones

ESTIMATED PROJECT SCHEDULE



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STUDY MILESTONES

Initial Assessment

Approval to begin feasibility stage of study	**November 2015**

Alternative Evaluation Analysis

Identify viable projects for consideration, evaluation and comparison	**June 2016**
Identify projects for feasibility analysis. Draft Tentatively Selected Plan	**May 2018**
Release draft integrated feasibility report and environmental impact statement (DIFR-EIS) for public input	**October 2018**
Formal public meetings held by the USACE and the GLO	**November – December 2018**

Feasibility Analysis

Public Open Houses to provide study updates	**February 2020**
Further refinement of the Feasibility Report and Environmental Impact Statement based on public feedback, in-depth environmental and engineering analyses and evaluation for USACE endorsement	**February 2019 – Summer 2020**
Public Open Houses to provide study updates	**September 2020**
Release revised Feasibility Report and Environmental Impact Statement for second public review and comment period (including formal public meetings)	**Fall 2020**
Final Feasibility Report released for review by the Texas Governor's Office, federal, state and local elected officials in the affected areas, state and federal resource agencies, and tribes	**March 2021**
Chief's Report submittal to Congress	**May 2021**

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More information is available online at: **coastalstudy.texas.gov**

COASTAL **TEXAS** STUDY

ABOUT STORM SURGE MODELING

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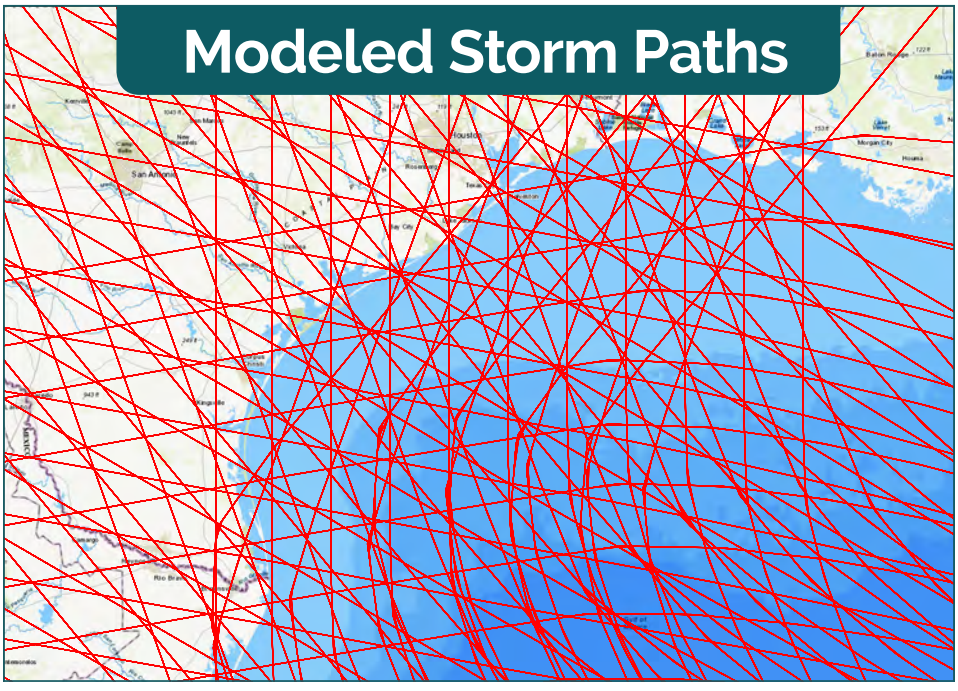
Galveston District

Before the Coastal Texas Study Team can design risk management features for the next major coastal storm, they must first anticipate what storms the Texas coast may face in the future. Computerized storm models incorporate historical storm data and other statistics to inform how a simulated storm will impact an area. These storm models allow engineers to simulate storms of varying size, strength, speed, landfall location, and path. Engineers use these computerized models to predict storm surge impacts to coastal areas, identify design criteria, and test effectiveness of proposed coastal protection features.

There are many variables that can affect how much storm surge will produce in a given location. For the Coastal Texas Study, one variable is set in stone: the location being evaluated, which is the entire Texas coast. However, the same storm can have different impacts on the same location by changing its variables such as path or intensity as it makes landfall. For this reason, storm models test many different storms with varying parameters or variables that occur under various conditions. This is known as a model "ensemble."

A set of 660 storms with different variables were modeled by the study team as shown below



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Study Approach

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A "multiple lines of defense" strategy is utilized in the formulation of the measures and alternatives in the Coastal Texas Study. Employing four primary goals – prepare, adapt, withstand, and recover – coastal communities could consider a system of comprehensive, resilient and sustainable coastal storm risk management and ecosystem restoration solutions. The system could include a combination of measures (structural, natural and nature-based features, and nonstructural) to form resilient, redundant, robust and adaptable strategies that promote life and safety based on local site conditions and societal values. To achieve a multiple lines of defense strategy, the Coastal Texas Study evaluates the following coastal problems:

- Economic damage from coastal storm surge
- Bay shoreline erosion
- Gulf shoreline erosion

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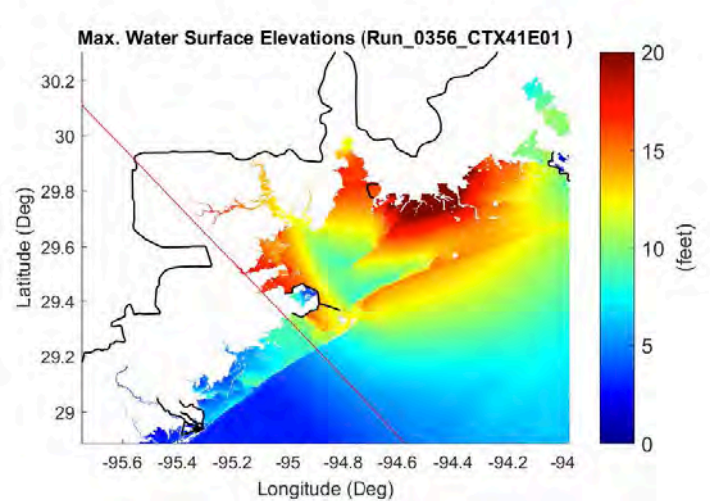
Storm Surge Variables and Example Models

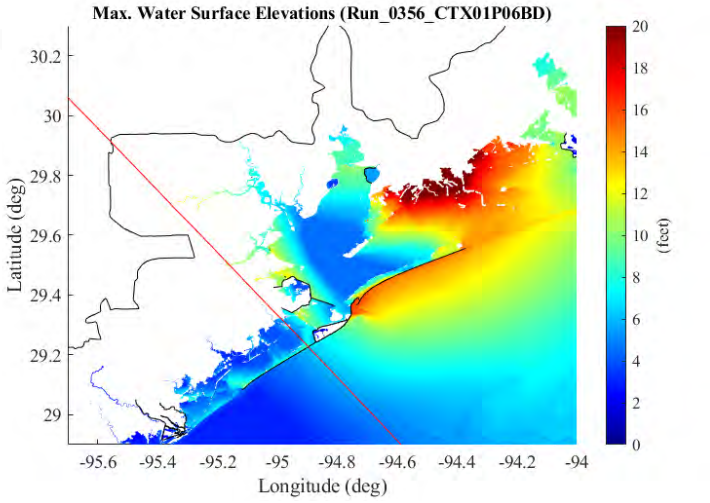
Tropical Storm – Category 5

Storm Intensity (Saffir-Simpson Scale)

82 Storm Paths | **5-66** Radius to Max Winds (Miles) | **4-27** Storm Forward Speed (MPH)



WITHOUT PROJECT



WITH PROJECT

The Study Team used the Coastal Storm Modeling System (CSTORM)—a comprehensive system of highly skilled and highly resolved models used to simulate coastal storm waves and water levels, as well as a comprehensive methodology of how those models are applied in order to accurately provide inputs for assessing risk to coastal communities. CSTORM was used to evaluate a set of 660 simulated storms as part of the Coastal Texas Study to evaluate risks as thoroughly as possible. This set represents a discrete population of past and possible future storms developed based on ongoing storm-climatology from the historical record. A total of 82 master storm paths were created, and four key storm variables were considered: storm heading, storm intensity, radius to maximum winds, and forward speed of the storm. The modeled storms ranged in intensity from very weak tropical storms to catastrophic category 5 hurricanes. The radius to maximum winds ranged from approximately 5 miles for very small storms to 66 miles for very large storms. The forwardal speeds of the storms varied from 4 miles per hour (mph) to 27 mph.

The results of these models helped define the parameters the Study Team would consider when developing features to reduce risk along Texas coast from future storm surge.

It is important to note that any proposed storm surge protection system will *not* provide complete risk reduction to the Texas coast from every storm. Even though the study team simulated scenarios ranged from tropical storms to above 1,000- year hurricanes, there could be few extreme cases that may occur in future which are beyond the limits of statistics. These extreme storms will likely challenge the proposed surge protection system and may have residual risks. The proposed storm surge barriers at Bolivar Roads are designed to provide coastal defense from extreme events while other system such as the soft, nature based beach and dune system, are designed to overtop during extreme events, while still maintaining the overall system benefits.

Sea Level Rise Considerations

Storm surge heights are measured relative to seal level. In general, a 10-foot storm surge will not directly impact land that is 15 feet above sea level. However, sea level rise means an increasing amount of land is under threat from surge and flooding. Along the Texas coast, the variability of sea level rise is mainly due to global sea level rise due to ocean warming and ground settlement due to the compaction of soft ocean sediment. For example, measurements from Pier 21 in Galveston Bay shows that the sea level is rising at a rate about two times higher than other coasts. This high rate should not be considered due to local sea level rise, but due to ground settlement and sediment movement at different rates across different bay systems. This and other factors such as the CORE sea level rise guidance were considered by the Study Team when designing storm surge barrier system to reduce risks along the Texas coast.

COASTAL **TEXAS** STUDY

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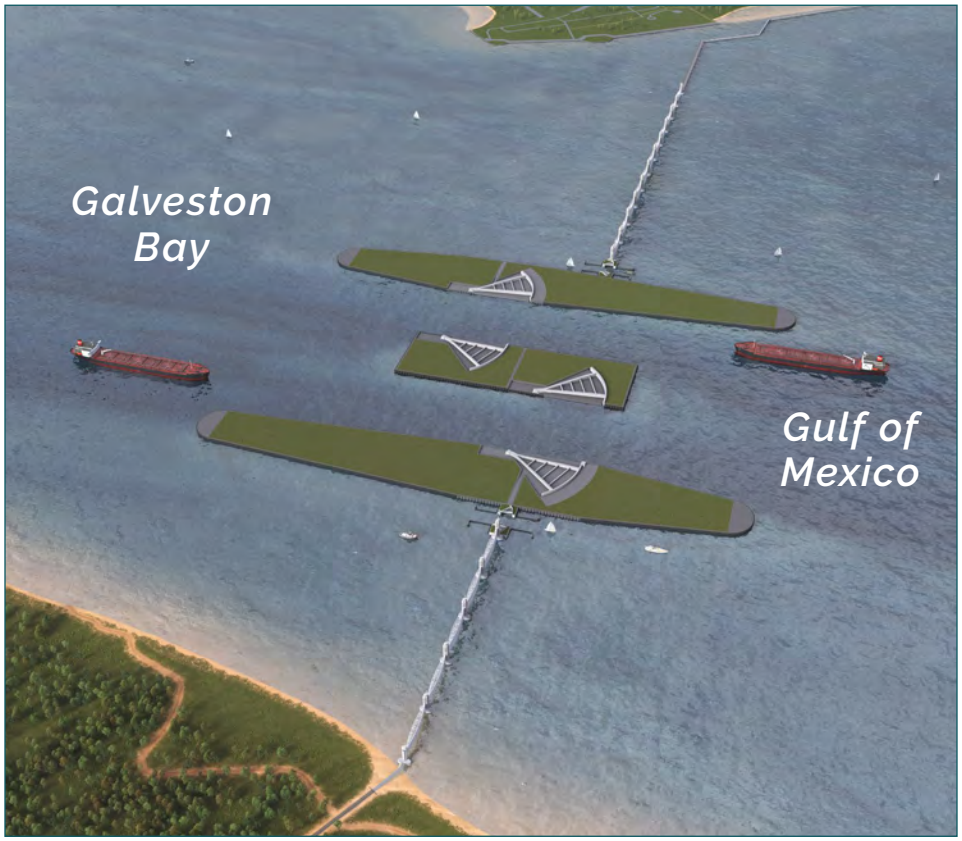
PROPOSED SURGE BARRIER FACT SHEET

About the Study

Serving as an important economic and industrial hub for the United States, the Texas Gulf Coast is home to a coastal ecosystem vital to our national economy which provides valuable natural resources, abundant seafood, recreational fishing and tourism, and a rich cultural heritage. Growth of a healthy economy and preservation of natural resources along the Texas coastline is imperative to provide improved coastal protection measures thus ensuring the stability of the state of Texas and the nation for years to come. Historical and current weather events continue to challenge the vulnerabilities of the Texas coast emphasizing the need for enhanced resiliency of the coast to prevent future damage and loss.

With this in mind, the Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, was developed to identify coastal storm risk management and ecosystem restoration measures. These key measures will protect the health and safety of Texas coastal communities, reduce the risk of storm damage to industries and businesses critical to the national and local economy, and address important coastal ecosystems needing restoration.



Conceptual drawing of the proposed gate structure across Bolivar Pass

The Proposed Surge Barrier

The revised gate configuration includes two 650-foot navigation gates separated by an island in the middle, providing two-way vessel traffic between the Gulf of Mexico and Galveston Bay. The remaining components of the gate structure include a combination of vertical lift gates and shallow water environmental gates in the shallower areas of the entrance channel. This gate configuration will allow an estimated 90 percent of the existing flow of water between the Gulf of Mexico and Galveston Bay to be maintained.

Maintaining tidal exchange between the Gulf and the bay is a priority. The gates would be closed only for storms and maintenance. Other large surge barriers worldwide are closed an average of 1 to 3 days per year for storms and operation and maintenance activities.

Closures at the Clear Creek and Dickinson Bayou are also being investigated to address residual wind-driven surges in Galveston Bay. Both areas would include surge gates across the channel and associated pump stations.

See back for more Surge Barrier conceptual renderings

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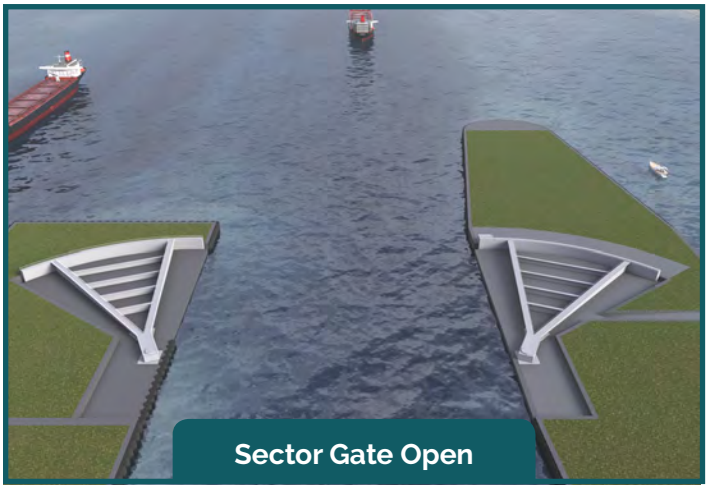
PROPOSED SURGE BARRIER

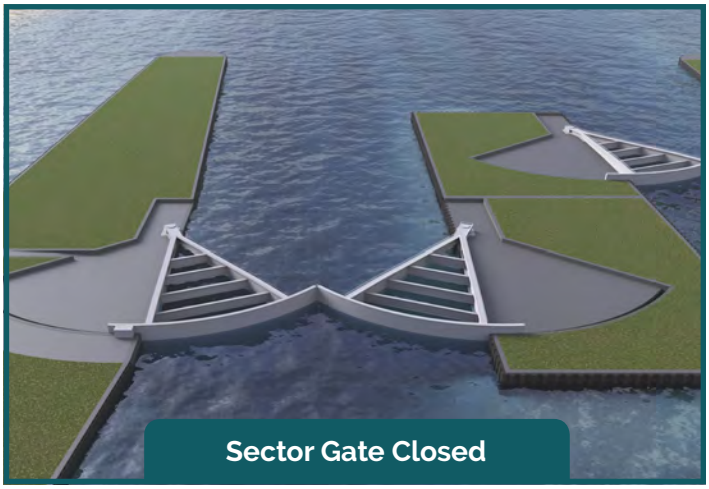
Note: *These renderings are conceptual and for illustrative purposes only.*

The Proposed Surge Barrier consists of the following components:

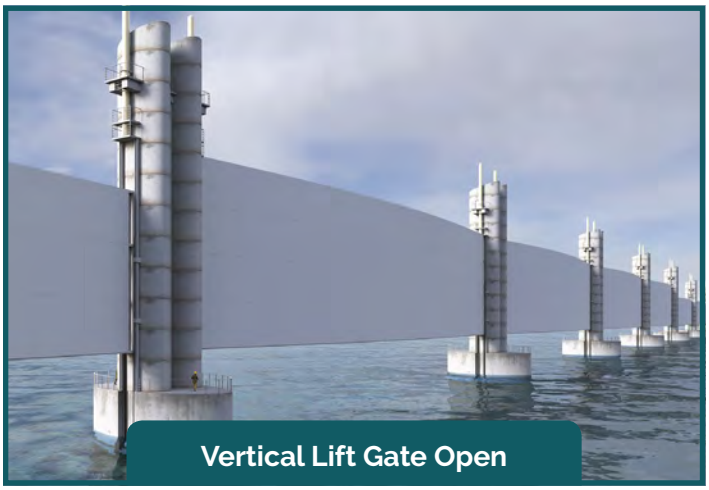
2 - 650-foot-wide Navigation Gates | **2** - 125-foot-wide Sector Gates for recreation vessels
15 - 300-foot-wide Vertical Lift Gates | **96 -** 16-foot-wide Shallow Water Environmental Gates



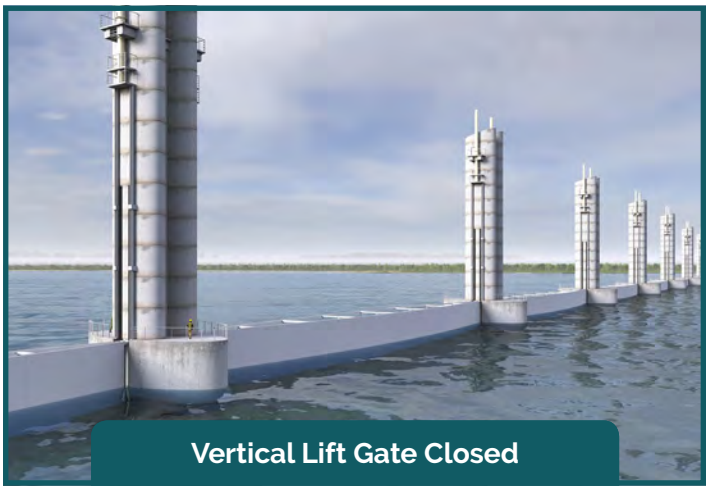
Sector Gate Open



Sector Gate Closed



Vertical Lift Gate Open



Vertical Lift Gate Closed

Environmental Gates

Combi-wall

COASTAL **TEXAS** STUDY

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PROPOSED UPPER TEXAS COAST PROTECTION PLAN

Coastal Texas Study Background

The Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, involves engineering, economic, and environmental analyses on large-scale civil works projects. The Study team is comprised of the U.S. Army Corps of Engineers (USACE) and the Texas General Land Office (GLO) and their engineering, environmental, and public outreach consultants.

The purpose of the Coastal Texas Study is to identify coastal storm risk reduction and ecosystem restoration measures that would protect the health and safety of Texas coastal communities, reduce the risk of storm damage to industries and businesses critical to the Nation's economy, and address critical coastal ecosystems in need of restoration.

The Coastal Texas Study's history began in 2007 with congressional authorization to identify and evaluate a comprehensive plan for the restoration and conservation of wetlands, barrier islands, shorelines, and related lands and features that protect critical resources, habitat, and infrastructure from the impacts of coastal storms, erosion, and subsidence. In 2015, the Non-Federal Sponsor, the GLO, was identified and funding to initiate the study was received. At that time, three other organizations also began studying a comprehensive solution for the upper Texas Coast, specifically the Houston/Galveston Region, including:

- the Ike Dike Plan from Texas A&M University at Galveston,
- the Coastal Spine Plan by the Gulf Coast Community Protection and Restoration District (GCCPRD), and
- the Mid-Bay Plan (now referred to as the Bay Park Plan) from the Severe Storm Prediction Education and Evacuation from Disasters (SSPEED) Center at Rice University.

In 2018, the Study Team presented their plan for the Upper Texas Coast called the Coastal Barrier Plan for public review. In 2019, the Study Team began evaluating feedback received during the public review and comment period for the Draft Integrated Feasibility Report and Environmental Impact Statement.

Conceptual drawing of the proposed gate structure across Bolivar Pass

Representatives attend a Community Work Group meeting in May 2019

What is the Study Team doing in response to feedback received during the public review and comment period?

- Providing a second public review and comment period (anticipated to be held during late Fall of 2020)
- Removing the barrier levee along Bolivar Peninsula and Galveston Island from the study completely and investigating a dune-and-beach system along the Bolivar Peninsula and west Galveston Island
- Adjusting the Galveston Ring Barrier System
- Evaluating non-structural measures on the west side of upper Galveston Bay
- Working with the SSPEED Center and Texas A&M at Galveston to better understand their plan features
- Refining the ecosystem restoration measures
- Hosted an International Storm Surge Gate Design Workshop
- Established GLO-led Community Work Groups

WHAT ARE THE DIFFERENCES BETWEEN THE COASTAL BARRIER AND THE GALVESTON BAY PARK PLANS?

Coastal Barrier Plan

The Coastal Barrier Plan for the Houston/Galveston Region takes a "multiple-lines-of-defense" approach. The primary intent is to prevent storm surge from entering Galveston Bay with an estimated 42 miles of Gulf-side dune/beach barrier along Bolivar Peninsula and the west end of Galveston Island, and two sets of navigation sector gates, 15 vertical lift gates and 16 shallow water environmental gates at Bolivar Roads Inlet. Construction of an approximately 18-mile ring barrier around the bay-side of the City of Galveston, sector gates at Dickinson Bayou and Clear Creek, and non-structural measures (buildings being raised & flood-proofed) on the upper west side of Galveston Bay have also been proposed.

Galveston Bay Park Plan

The Galveston Bay Park Plan proposes a levee system along the Houston Ship Channel created by dredged material from a future ship channel deepening and widening project. The levee system would include a 25-foot-tall levee along the shipping lane and additional dredged materials would be piled behind it to form parkland. The proposed system would also connect to the existing levee at Texas City. If constructed, this Plan could replace the secondary features recommended by the USACE and GLO for west Galveston Bay.

HOW ARE THEY THE SAME?

The two coastal storm risk reduction projects focus on different solutions with different funding sources that do not interfere with each other. Both projects include large navigation gates (most likely only one set would initially be constructed). The plans can be designed to be compatible and complementary; and together, they comprise a comprehensive, multipurpose regional plan for resilience and economic development.

PLAN COMPARISON	**Coastal Barrier Plan** U.S. Army Corps of Engineers & Texas General Land Office	**Galveston Bay Park Plan** Center for Severe Storm Prediction Education and Evacuation from Disasters (SSPEED), Rice University
Approach:	Multiple Lines of Defense	Single Line of Defense
Goal:	Keep storm surge out of the Bay	Focus is not on keeping the surge out of the Bay, but stopping it before it reaches to Houston
Surge Gates Deployment:	Surge gates across Bolivar Road	Single surge gate inside the Bay at San Leon
Surge Gates:	25 ft above the water's surface	25 ft above the water's surface
Surge Gate Type:	Floating Sector Gates	Sliding Gate
Dune/Levee System:	14 ft high dune field with 100-200 ft wide beach	25 ft high levee system
Storm modeling:	600+ synthetic storms run	1 storm (10,000-year storm) has been run
Recreation/Enviro Gates:	Vertical Lift Gates	Vertical Lift Gates
Enviro Impact Statement:	Draft Completed	Not complete
Enviro Impacts:	Identified, will be mitigated	Not identified
Natural Resource Agency Coordination:	Monthly	Unknown
Cost:	$23-$32B (40% attributed to Ecosystem Restoration)	$6B+ (preliminary, subject to examination)
Study Status:	Ongoing, to be completed May 2021	Conceptual
Funding:	Federal and state	Yet to be identified

More information is available online at: **coastalstudy.texas.gov**
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COASTAL **TEXAS** STUDY

BEACH AND DUNE SYSTEMS

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Texas has some of the highest erosion rates in the United States, with 64 percent of the Texas coast eroding at an average rate of 5.9 feet per year and some areas experiencing greater than 30 feet per year. When the Texas coast erodes, homes are lost, property values decrease, tourism suffers, local economies are negatively impacted, and the impact of major storms is more severe.

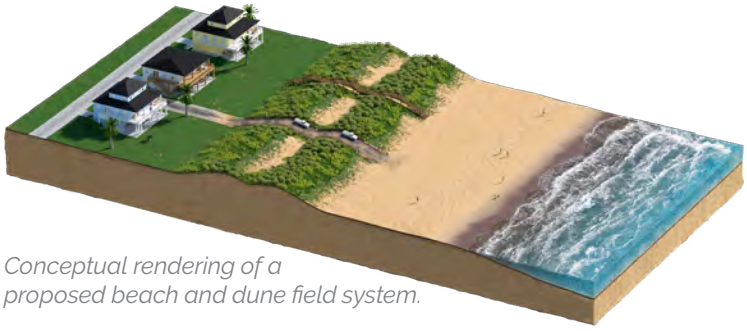
A vital factor in maintaining a healthy Texas Gulf shoreline is the construction and restoration of beach and dune systems in areas vulnerable to high rates of erosion. Beach and dune construction and restoration involves the placement of sand dredged from offshore sources or from nearby navigation channels on degraded gulf shorelines to create or restore dune and beach habitat. Beach and dune systems are maintained by replacing sand at regular intervals after storm events. These systems provide habitat to many plant and animal species and protect habitat, homes, and infrastructure that may be washed away due to erosion and severe storms.

Proposed beach and dune construction and/or restoration projects include:

- Construction of a beach and dune system along the Gulf-side of Bolivar Peninsula;
- Construction of a beach and dune system along the Gulf-side of the west end of Galveston Island; and
- Maintenance and re-nourishment of the existing beach and dune system along the Gulf-side of South Padre Island.

The proposed beach and dune system along Bolivar Peninsula and the west end of Galveston Island will provide pedestrian and vehicular beach access by incorporating walk and drive over infrastructure at locations designated in each local government's Beach Access and Dune Protection Plan. Beach access will follow the Texas Open Beaches Act and any federal access requirements.

Conceptual rendering of the beach restoration process.



Conceptual rendering of a proposed beach and dune field system.

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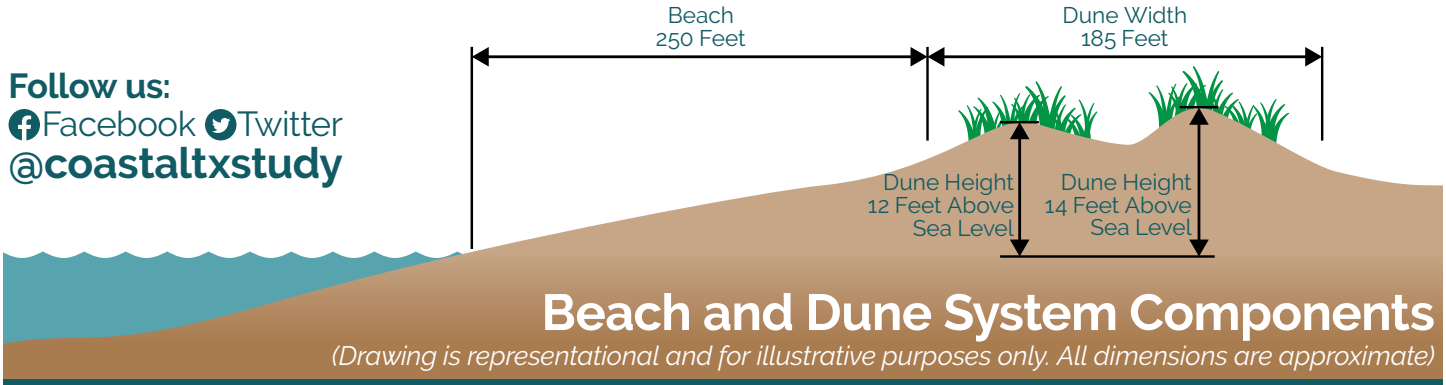


Beach and Dune System Components

(Drawing is representational and for illustrative purposes only. All dimensions are approximate)

More information is available online at: **coastalstudy.texas.gov**

Study Approach

The Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, has been developed to identify coastal storm risk management and ecosystem restoration measures. These measures are evaluated based on long-term benefits, costs, feasibility and resiliency.

A "multiple lines of defense" strategy is utilized in the formulation of the measures and alternatives in the Coastal Texas Study. Employing four primary goals – prepare, adapt, withstand, and recover – coastal communities could consider a system of comprehensive, resilient and sustainable coastal storm risk management and ecosystem restoration solutions. The system could include a combination of measures (structural, natural and nature-based features, and nonstructural) to form resilient, redundant, robust and adaptable strategies that promote life and safety based on local site conditions and societal values. To achieve a multiple lines of defense strategy, the Coastal Texas Study evaluates the following coastal problems:

- Economic damage from coastal storm surge
- Bay shoreline erosion
- Gulf shoreline erosion

BEACH AND DUNE SYSTEM MISCONCEPTIONS

Misconception: The study would use eminent domain to acquire and demolish any property along the proposed barrier alignment.

The levee system solution along Galveston Island and Bolivar Peninsula has been dropped completely. The Study team is now investigating a beach and dune system along the front of Bolivar Peninsula and west of the Galveston seawall. The non-federal sponsor will have the responsibility of acquiring all necessary real estate interests for the project and ensuring that relocation of utilities and facilities is accomplished. Where necessary, access easements, voluntary relocations and acquisitions will be pursued, and eminent domain would only be used as a last resort.

Misconception: Simply building a beach and dune system is not going to help protect the coastline.

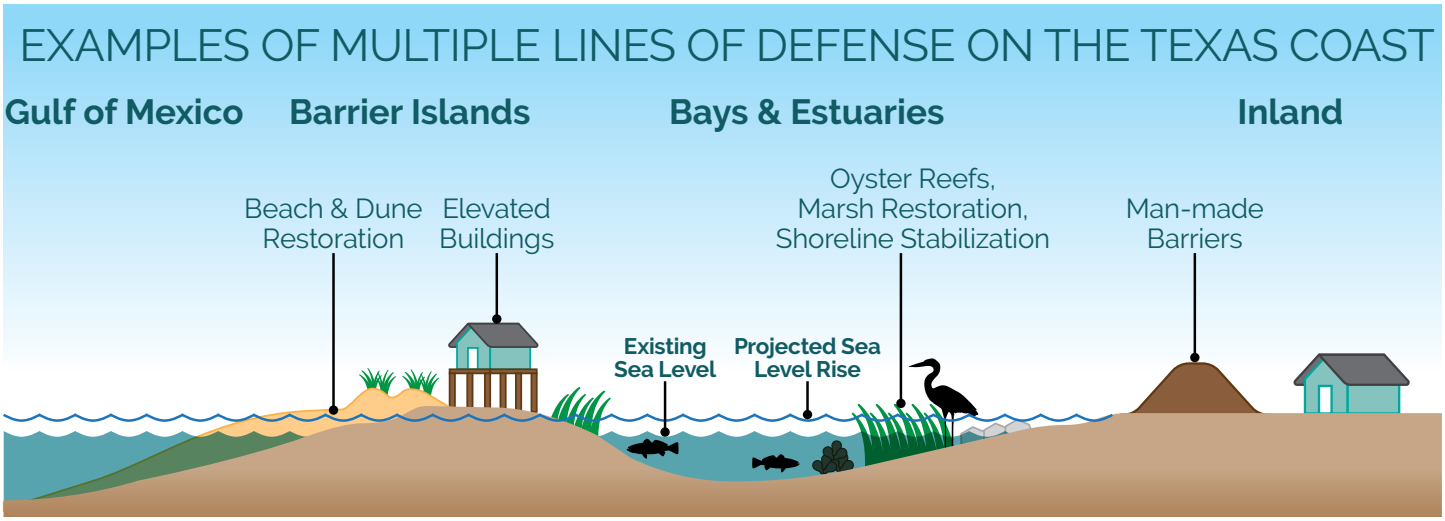
The Coastal Texas Study utilizes a "multiple lines of defense" approach/strategy. The system would include a combination of structural, natural, and non-structural systems that work together to provide the greatest level of safety possible based on societal values and site conditions.

Misconception: The proposed beach and dune systems along Bolivar Peninsula and the west end of Galveston Island would severely restrict both pedestrian and vehicular access.

The proposed beach and dune systems will provide pedestrian and vehicular beach access by incorporating walk and drive over infrastructure at locations designated by each local government. Beach access will be in compliance with the Texas Open Beaches Act and any federal access requirements.

Misconception: Owners of pedestrian crossovers will not be compensated for the removal of their crossover if the proposed beach and dune system is constructed.

Compensation for the removal of privately owned pedestrian cross over structures will be evaluated on a case by case basis. The evaluation will include the confirmation of valid crossover permit and determination of owner's eligibility to compensation for a substitute crossover. Owners of crossovers that were constructed without proper permits will not be eligible for compensation, however they will have the opportunity to submit an application for a permit to construct a new crossover.



COASTAL **TEXAS** STUDY

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GALVESTON RING BARRIER FACT SHEET

About the Study

Serving as an important economic and industrial hub for the United States, the Texas Gulf Coast is home to a coastal ecosystem vital to our national economy which provides valuable natural resources, abundant seafood, recreational fishing and tourism, and a rich cultural heritage. Growth of a healthy economy and preservation of natural resources along the Texas coastline is imperative to provide improved coastal protection measures thus ensuring the stability of the state of Texas and the nation for years to come. Historical and current weather events continue to challenge the vulnerabilities of the Texas coast emphasizing the need for enhanced resiliency of the coast to prevent future damage and loss.

With this in mind, the Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, was developed to identify coastal storm risk management and ecosystem restoration measures. These key measures will protect the health and safety of Texas coastal communities, reduce the risk of storm damage to industries and businesses critical to the national and local economy, and address important coastal ecosystems needing restoration.

About the Proposed Galveston Ring Barrier

The proposed coastal barrier system along the upper Texas coast is comprised of multiple lines of defense from storm surge. Each proposed structure will work together to provide the most flood protection possible.

During Hurricane Ike, the most severe flooding came from the bayside. In order to protect this area, a ring barrier is suggested. **The current proposal envisions a system of flood walls, highway and railroad gates, and a 2,400-foot crossing of Offatts Bayou with surge gates for navigation and environmental flow.** The proposed ring barrier would encompass the Harborview Drive, or "Fish Village," neighborhood on the far east end of Galveston, consisting of a two-foot flood wall on top of the existing piers adjacent to the Strand Historical District on the north side of the island, continue west on Harborside Drive, wrap around Offatts Bayou to 103rd Street, and connect to high ground at the west end of the Seawall. The proposed ring barrier alignment extends to the west end of the Seawall to reduce risk to critical infrastructure (e.g. Scholes International Airport) and to avoid separating communities as much as possible. Near the west end of the seawall the ring barrier would tie into a gulf-side 19-mile beach and dune system that would extend west to a tie-in point at the San Luis Pass Bridge. San Luis Pass will not have a closure structure.

Because Galveston Island currently operates on a gravity drainage system, the plan would add a forced drainage system consisting of approximately six new pump stations to move water off the island. The pump stations would address storm surge flooding as well as current flooding.

Please note that this proposed measure is currently the subject of ongoing coordination with Galveston Island stakeholders and may be **further** refined during the next phase of the study.

Misconception: The proposed Galveston Ring Barrier would create a "bathtub effect" in Galveston city proper, trapping water within the barrier on the island and creating a severe flooding threat.

Any features proposed by the study are not permitted to worsen any existing conditions (i.e. the risk of flooding from a rain event cannot be increased with the implementation of the proposed ring barrier). Pump stations would be implemented to expedite the release of water back into Galveston Bay and the Study team is working with the City of Galveston to determine potential solutions for the City's drainage system.

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See back for a map of the Proposed Galveston Ring Barrier →

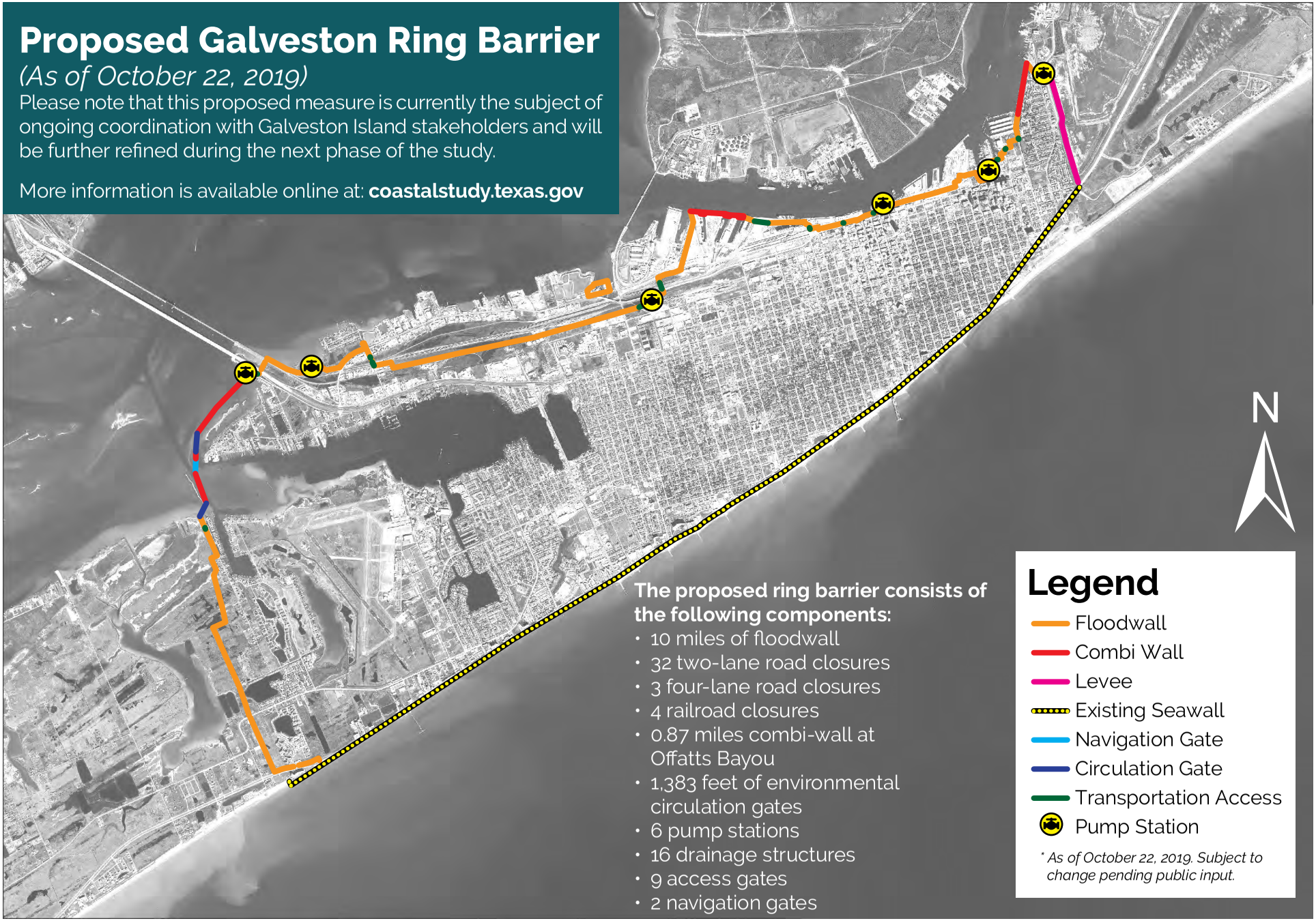
More information is available online at: **coastalstudy.texas.gov**

Proposed Galveston Ring Barrier

(As of October 22, 2019)

Please note that this proposed measure is currently the subject of ongoing coordination with Galveston Island stakeholders and will be further refined during the next phase of the study.

More information is available online at: **coastalstudy.texas.gov**



The proposed ring barrier consists of the following components:

- 10 miles of floodwall
- 32 two-lane road closures
- 3 four-lane road closures
- 4 railroad closures
- 0.87 miles combi-wall at Offatts Bayou
- 1,383 feet of environmental circulation gates
- 6 pump stations
- 16 drainage structures
- 9 access gates
- 2 navigation gates

COASTAL **TEXAS** STUDY

ECOSYSTEM RESTORATION

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MARSH RESTORATION

OYSTER REEF RESTORATION

BEACH RESTORATION

ISLAND RESTORATION

Ecosystem restoration projects, often referred to as "ER" projects by the study team, address habitat loss and degradation from coastal processes and support the coastal storm risk management components by providing a natural buffer from coastal storms. Each ecosystem restoration measure represents a combination of features and is formulated in a specific geographic location to restore diverse habitats and provide multiple lines of defense. A total of eight ecosystem restoration measures are proposed along the entire Texas coast. These measures would collectively provide approximately 6,400 acres of ecosystem restoration.

Recommended Ecosystem Restoration measures include:

- **Marsh restoration** improves degraded marsh habitat or restores habitat that has become open water due to erosion, relative sea level rise and other coastal forces. Breakwaters interrupt erosion and provide barrier so sediment can be placed to create marsh within tidal ranges. Restoration also includes planting of native marsh vegetation to provide habitat and trap sediment, thus reducing erosion.
- **Oyster reef restoration** includes placement of oyster cultch material for new oysters to grow. Oyster reefs provide habitat for many other species and provide natural erosion reduction.
- **Beach restoration** places sand on degraded gulf shorelines to restore dune and beach habitat.
- **Island restoration** includes placement of sediment to increase the elevation of degraded islands. These restored islands include shoreline stabilization along the Gulf Intracoastal Waterway to withstand erosion and will provide bird nesting habitat. To increase the diversity of habitat and provide natural erosion control, the bay side of the islands will slope to a created marsh and oyster reef.
- **Hydrologic restoration** is the reestablishment of a connection between water bodies to maintain salinity balances that sustain habitats.

Proposed Ecosystem Restoration Measures

- **G-28: Bolivar Peninsula and West Bay Gulf Intracoastal Waterway (GIWW) Shoreline and Island Protection**
- **B-2: Follets Island Gulf Beach and Dune Restoration**
- **B-12: Bastrop Bay, Oyster Lake, West Bay, and GIWW Shoreline Protection**
- **M-8: East Matagorda Bay Shoreline Protection**
- **CA-5: Keller Bay Restoration**
- **CA-6: Powderhorn Shoreline Protection and Wetland Restoration**
- **SP-1: Redfish Bay Protection and Enhancement**
- **W-3: Port Mansfield Channel, Island Rookery, and Hydrologic Restoration of the Laguna Madre System**

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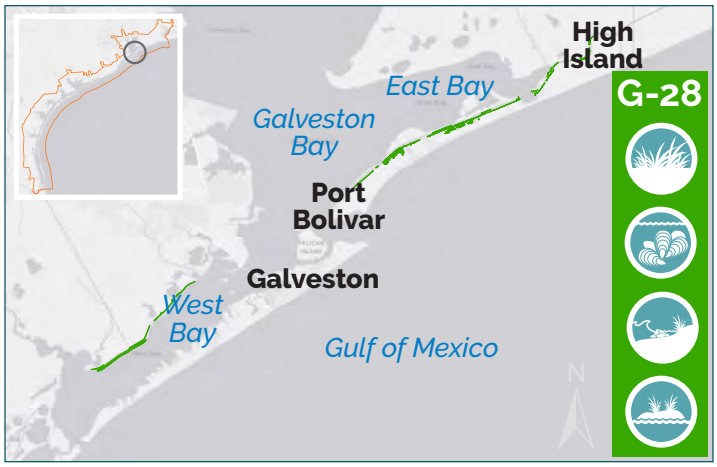
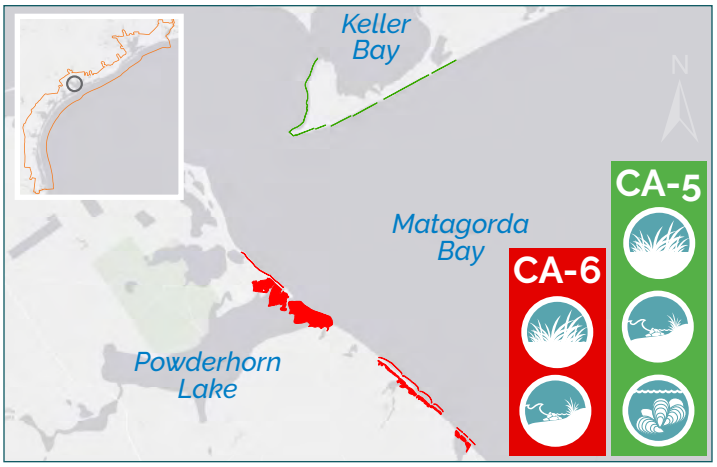
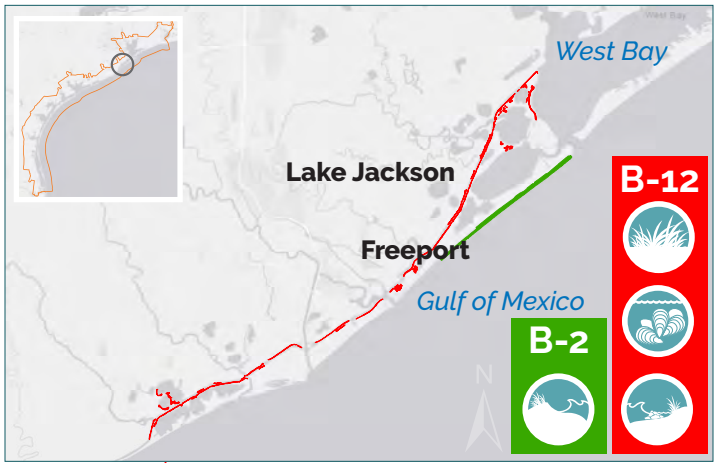
See back for maps of the proposed Ecosystem Restoration Measures

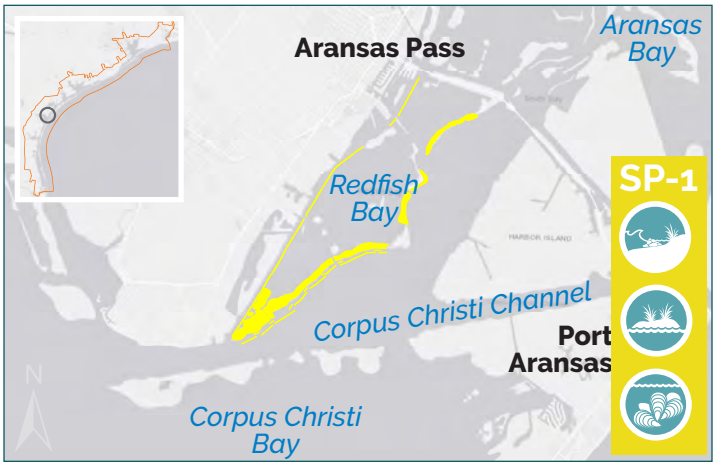
ECOSYSTEM RESTORATION MEASURES

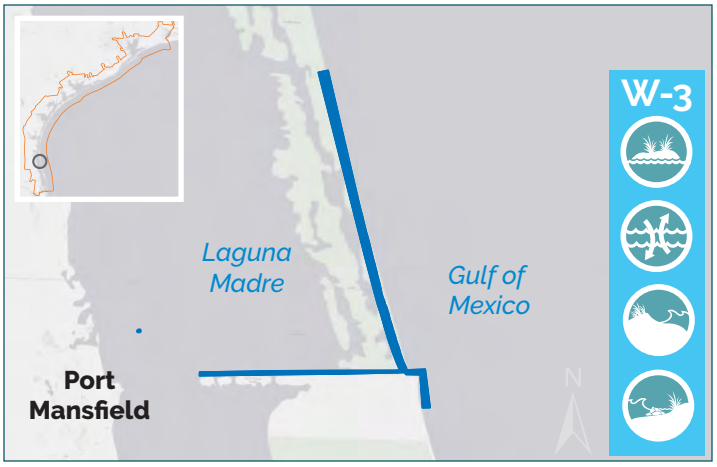
Marsh Restoration | Beach Restoration | Oyster Reef Restoration | Island Restoration | Breakwater Creation | Hydrologic Restoration











COASTAL **TEXAS** STUDY

ENVIRONMENTAL IMPACTS

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Documenting Environmental Impacts

A Federal agency must prepare an EIS if it is proposing a major federal action that may significantly affect the quality of the natural and human environment to comply with National Environmental Policy Act, or NEPA. NEPA established our country's national environmental policies in 1969. The environmental review process seeks to facilitate better-informed decisions and involve citizens. The USACE will seek to involve the many stakeholders throughout this study process.

It can be expected that any effort as large as the Coastal Texas Study will have at least some impact on the natural environment. Unavoidable Impacts (permanent or temporary) are associated with construction of the coastal storm risk management (CSRM) features of the plan. These include impacts caused by the storm surge barrier at Bolivar Roads, the ring barrier on Galveston Island, and the beach and dune systems on Bolivar Peninsula, Galveston Island, South Padre Island, and storm surge barriers at Clear Creek and Dickinson.

These environmental impacts can be divided into two categories: Direct impacts and indirect impacts. Direct Impacts include those due to the direct footprint of CSRM feature construction. This would include impacts to tidal and non-tidal wetlands, oyster reef, and open bay bottom.

Indirect Impacts would include changes to tidal wetlands due to altered tidal exchange into the bay due to changes in cross sectional area of Bolivar Roads. 3D Adaptive Hydraulics (AdH) modeling was conducted to understand potential environmental impacts of the gate structure with a less than 10 percent constriction at Bolivar Roads.

To address potential impacts and prevent impacts from significantly affecting the environment, the Study Team employs the mitigation concept of avoid, minimize, and mitigate:

- Avoid impacts, where possible
- Minimize impacts, where they cannot be avoided
- Mitigate impacts that are unavoidable

What is Mitigation?

Mitigation refers to projects intended to offset known and unavoidable impacts to natural resources and the creation of similar habitat to replace lost function.

Mitigation needs are determined by evaluating the quality of habitat, calculating habitat units (AAHUs) which then determines acreage of high functioning habitat to be created.

The Mitigation Plan includes creation of wetlands and oyster reef to compensate for direct and indirect impacts.

Study Approach

The Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, has been developed to identify coastal storm risk management and ecosystem restoration measures. These measures are evaluated based on long-term benefits, costs, feasibility and resiliency.

A "multiple lines of defense" strategy is utilized in the formulation of the measures and alternatives in the Coastal Texas Study. Employing four primary goals – prepare, adapt, withstand, and recover – coastal communities could consider a system of comprehensive, resilient and sustainable coastal storm risk management and ecosystem restoration solutions. The system could include a combination of measures (structural, natural and nature-based features, and nonstructural) to form resilient, redundant, robust and adaptable strategies that promote life and safety based on local site conditions and societal values. To achieve a multiple lines of defense strategy, the Coastal Texas Study evaluates the following coastal problems:

- Economic damage from coastal storm surge
- Bay shoreline erosion
- Gulf shoreline erosion

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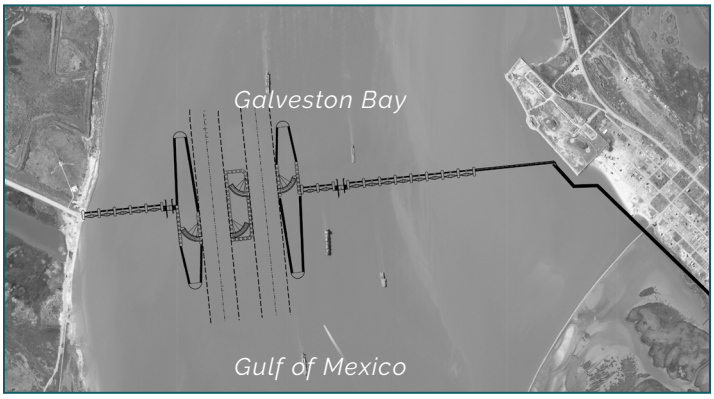
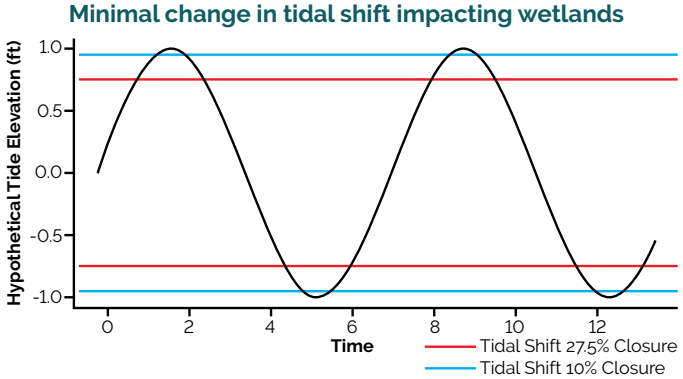
AVOID • MINIMIZE • MITIGATE

- **Unavoidable Impacts** (permanent or temporary) are associated with construction of the Coastal Storm Risk Management features of the plan: Storm Surge Barrier at Bolivar Roads, Ring Barrier on Galveston Island, and Beach and Dune Systems.
- **Direct Impacts**: Impacts due to the direct footprint of CSRM feature construction; includes tidal and non-tidal wetlands, oyster reef, and open bay bottom.
- **Indirect Impacts**: Impacts to tidal wetlands due to altered tidal exchange into the bay due to changes in cross sectional area of Bolivar Roads. 3D Adaptive Hydraulics (AdH) modeling was conducted to understand potential environmental impacts of the gate structure with a less than 10 percent constriction at Bolivar Roads.

Storm Surge Gates

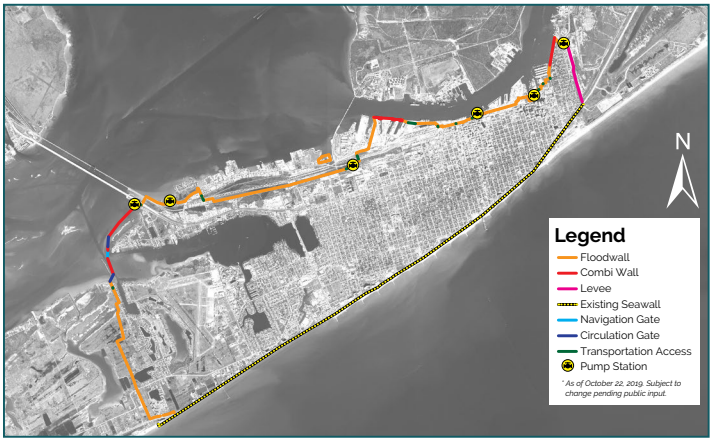
- **Minimized** impacts to piping plover critical habitat
- **Minimized** impacts to movement of aquatic organisms with gate design; particle track modeling shows little to no change in movement of larvae
- **Minimized** impacts to bay circulation with gate design:
  - » tidal shift
  - » flow in and out of bay
  - » salinity
  - » velocity





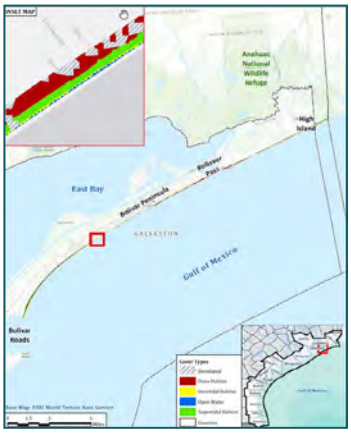
Galveston Ring Barrier

- **Minimized** impacts to:
  - » Wetlands
  - » Oyster reef
  - » Tidal exchange at Offatts Bayou



Beach and Dune System

- **Minimized** direct impacts to wetlands from construction, staging areas, access roads
- Beach and dune is self-mitigating



COASTAL **TEXAS** STUDY

US Army Corps of Engineers
Galveston District

WHAT IS A LOCALLY PREFERRED PLAN?

About the Study

Serving as an important economic and industrial hub for the United States, the Texas Gulf Coast is home to a coastal ecosystem vital to our national economy which provides valuable natural resources, abundant seafood, recreational fishing and tourism, and a rich cultural heritage. Growth of a healthy economy and preservation of natural resources along the Texas coastline is imperative to provide improved coastal protection measures thus ensuring the stability of the state of Texas and the nation for years to come. Historical and current weather events continue to challenge the vulnerabilities of the Texas coast emphasizing the need for enhanced resiliency of the coast to prevent future damage and loss.

With this in mind, the Coastal Texas Protection and Restoration Feasibility Study, also known as the Coastal Texas Study, was developed to identify coastal storm risk management and ecosystem restoration measures. These key measures will protect the health and safety of Texas coastal communities, reduce the risk of storm damage to industries and businesses critical to the national and local economy, and address important coastal ecosystems needing restoration.

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Federal Projects

In the 1970 Flood Control Act, Congress identified four equal national objectives for use in water resources development planning. They were: national economic development (NED); regional economic development (RED); environmental quality (EQ); and other social well-being (OSW). During the 1970s, two of these, NED and EQ, were identified as national objectives. Today, NED remains the national object.

As such, the Federal authorization process requires that U.S. Army Corps of Engineers (USACE) projects the NED objective and have the greatest net economic benefit. NED guidelines prescribe the minimum acceptable economic benefit-to-cost ratio for a civil works project - for each dollar spent, there should be an equal amount of future cost savings.

To meet the public safety and community ressilience objectives of the Coastal Texas Study, however, USACE will seek an exception to the NED policy from the ASA(CW). The study team will formulate the recommended plan to maximize the benefits of a comprehensive plan.

This will be the Federal Plan.

Locally Preferred Plan

If the local sponsor (GLO) wants alternative actions to what is identified in the Federal Plan, a Locally Preferred Plan, or LPP, can be developed. An LPP would include changes to project component(s) to address local interests.

An LPP would have to be approved by the Assistant Secretary of the Army for Civil Works.

An LPP would be evaluated in the same way as the federal plan is analyzed, including a full environmental assessment to identify the impacts as required by the National Environmental Policy Act, or NEPA. The LPP components can be presented to Congress by USACE as alternatives to the study findings.

If the LPP is smaller in scale and cost than the Federal Plan, the Federal cost-share will be 65 percent of total project costs as long as the LPP changes are consistent with the objectives of the project.

An LPP that costs more than the Federal Plan is eligible for ASA(CW) consideration, if the following conditions are met:

1. The LPP must produce as many or more benefits as the Federal Plan.
2. The Non-Federal Sponsor, in this case possibly the State of Texas, must pay all increased costs of the LPP over the Federal Plan. The Federal cost share of a higher-cost LPP is established as 65 percent of the Federal Plan for flood/coastal risk management on projects.

COASTAL **TEXAS** STUDY

ABOUT THE GLO'S COMMUNITY WORK GROUPS

Representatives attend a Community Work Group Meeting in July 2019.

As a result of the feedback received during the public review and comment period following the release of the first Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR-EIS) in fall 2018, the Texas General Land Office (GLO) approached elected officials in four coastal Texas communities to request assistance in establishing the Coastal Texas Study Community Work Groups (CWGs).

Community Work Groups include:

- Bolivar Peninsula
- Galveston Island
- Galveston and Harris County Mainland
- South Padre Island

Appointed by elected officials from each community, CWG members are regularly invited to meet with the GLO and study team representatives for up-to-date study information and topic-specific presentations. During presentations, CWG members are encouraged to ask questions, request clarity, and raise issues of concern that may impact their communities.

CWG members are also encouraged to share all updated study information with members of their community through any means available to them, including social media, advocacy/community group presentations, and/or casual conversation. To support the CWG members in the effort to distribute accurate and up-to-date information on the study, the GLO is developing information tools in coordination with the CWGs that will more effectively convey study information and proposed study features.

The GLO and the study team are committed to providing the public with up-to-date and accurate information by maintaining this important and effective relationship with the CWGs.

What is the Purpose of the CWGs?

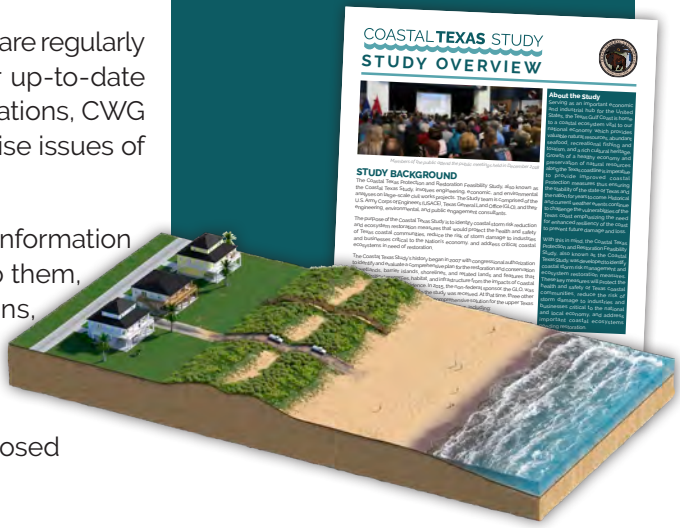
- Establish and maintain dialogue between the communities and the study team
- Develop a better understanding of the questions and concerns of each community
- Distribute accurate and up-to-date study information to the community

What is the Structure of the CWGs?

- Open forum for discussion
- Study update presentations
- Topic-specific presentations

What is discussed during the CWG meetings?

- Project design
- Public safety
- Beach access
- Environmental & economic impacts
- Storm modeling results & methodology
- Community engagement & information tools



Examples of public communication tools for the Coastal Texas Study.

WHO'S INVOLVED IN THE COMMUNITY WORK GROUPS?

Bolivar Peninsula

- Commissioner Darrell Apffel, *Galveston County Precinct 1*
- Azure Bevington, *Bevington Consulting*
- Brian Byrom, *Brint Construction, Inc.*
- Tim Byrom, *Brint Construction, Inc.*
- Seth Collins, *Galveston County Precinct 1*
- Mark Faggard, *Mark Faggard Law LLC*
- Brenda Flanagan, *Bolivar Peninsula Chamber of Commerce*
- Neil Spiller, *RE/MAX On the Water - Bolivar*
- Anne Willis, *Swedes Real Estate*
- Keith Zahar, *GCM THE BIG STORE*

Galveston Island

- Council Member David Collins, *City of Galveston*
- Brandon Cook, *City of Galveston*
- Lee Crowder, *Galveston County*
- Commissioner Joe Giusti, *Galveston County Precinct 2*
- Commissioner Stephen Holmes, *Galveston County Precinct 3*
- Sean Hutchison, *City of Jamaica Beach*
- Shrub Kempner, *Kempner Capital Management*
- Jerry Mohn, *American Shore and Beach Preservation Association*
- Jeff Patterson, *East End Historic District Association*
- Michael Shannon, *Galveston County*
- Jeff Sjostrom, *Galveston Economic Development Partnership*
- Gina Spagnola, *Galveston Chamber of Commerce*
- Mayor Steve Spicer, *City of Jamaica Beach*
- Joanie Steinhaus, *Turtle Island Restoration Network*
- Kelly Teichman, *Teichman Group*
- Jeffery Thomas, *Port of Galveston*

Galveston and Harris County Mainland

- Mayor Michel Bechtel, *City of Morgan's Point*
- Council Member Craig Bland, *City of Morgan's Point*
- Chad Burke, *Economic Alliance Houston Port Region*
- Shane Bonnot, *Coastal Conservation Association*
- Commissioner Ken Clark, *Galveston County Precinct 4*
- Helen Drummond, *Houston Audubon Society*
- Mayor Mike Foreman, *City of Friendswood*
- Lisa Halili, *Prestige Oysters*
- Raz Halili, *Prestige Oysters*
- Scott Jones, *Galveston Bay Foundation*
- Carl Joiner, *Former Mayor of Kemah*
- Mayor Thom Kolupski, *City of Seabrook*
- Jordan Macha, *Bayou City Waterkeeper*
- Tanya Makany-Rivera, *Harris County Precinct 2*
- Ed Matuszak, *La Porte Citizen/Houston Yacht Club*
- Bob Mitchell, *Bay Area Houston Economic Partnership*
- Milton Rahman, *Harris County Precinct 2*
- Jeff Tave, *La Ventana del Lago*

South Padre Island

- Christopher Allison, *Resident of South Padre Island*
- Commissioner Sofia Benavides, *Cameron County Precinct 1*
- Kristina Boburka, *City of South Padre Island*
- Council Member Eva Jean Dalton, *City of South Padre Island*
- Commissioner David Garza, *Cameron County Precinct 3*
- Juan Gonzalez, *Cameron County*
- Virginia Guillot, *Parrot Eyes, Inc.*
- Rob Nixon, *Surfrider Foundation South Texas Chapter*
- Barry Patel, *Hilton Garden Inn South Padre Island*
- Neil Rasmussen, *South Padre Island Shoreline Task Force*
- Augusto Sanchez, *Cameron County*
- Council Member Kerry Schwartz, *City of South Padre Island*
- Randy Smith, *City of South Padre Island*
- Joe Vega, *Cameron County*
- Paulina Vega, *Cameron County*

More information is available online at: **coastalstudy.texas.gov**

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QUESTIONS? Tony Williams, Texas General Land Office – Tony.Williams@glo.texas.gov