COASTAL TEXAS PROTECTION AND RESTORATION FEASIBILITY STUDY

US Army Corps of Engineers®
Galveston District

COASTAL TEXAS STUDY

EXECUTIVE SUMMARY

OCTOBER 2020

Along the Texas coast, vital resources critical to the social, economic, and environmental welfare of the nation are at risk. When storms damage homes, businesses, infrastructure, and the natural environments of the Texas coast, the immediate fallout and the continued aftermath affect not only the people who live in these coastal counties, but also the entire nation. Due to the importance of the Texas coast, the United States Army Corps of Engineers (USACE) has partnered with the State of Texas General Land Office (GLO) to identify and recommend solutions. The goals are to reduce risks to communities, public health, and the economy; to restore critical ecosystems; and to advance coastal resiliency.

This effort, known as the Coastal Texas Protection and Restoration Feasibility Study (Coastal Texas Study), was initiated in 2014 to evaluate large-scale coastal storm risk management (CSRM) and ecosystem restoration (ER) actions aimed at providing the coastal communities of Texas with multiple lines of defense to reduce impacts from a wide array of coastal hazards. Focused on redundancy and robustness, the proposed systems provide increased resiliency and are adaptable to future conditions. This study falls under the USACE's Civil Works Mission, which includes coastal flood risk management and the restoration of aquatic ecosystems. This planning effort was conducted in full compliance with the National Environmental Policy Act (NEPA) and this report includes a companion Draft Environmental Impact Statement (EIS).

This Draft Feasibility Report presents the findings and recommendations of this years-long study effort by the USACE and GLO. This report supersedes the previously issued 2018 Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR-EIS) and represents the most current and complete findings of this study effort. Following the public review and comment period for the revised Draft Feasibility Report and Draft EIS, the Study Team will document issues raised during the review and evaluate their effect on study recommendations before moving forward with completion of the Final Feasibility Report and EIS.

At the completion of the Coastal Texas Study, and upon approval by the Chief of Engineers of the United States Army, a plan would be recommended to Congress for authorization and funding. If authorized and funded by Congress, subsequent phases of the project would include preconstruction engineering and design (PED), construction, and operations and maintenance, as shown in Figure ES-1.

RESILIENCY

Resiliency is multifaceted and can best be defined as the ability of a specific system to withstand, recover, and adapt to disturbances.

REDUNDANCY

Redundancy is the layering of critical components or functions of a system with the intent of increasing the reliability of the system, either in the form of a backup feature, or to improve actual system performance.

ROBUSTNESS

Robustness is the ability to perform under various possible scenarios.

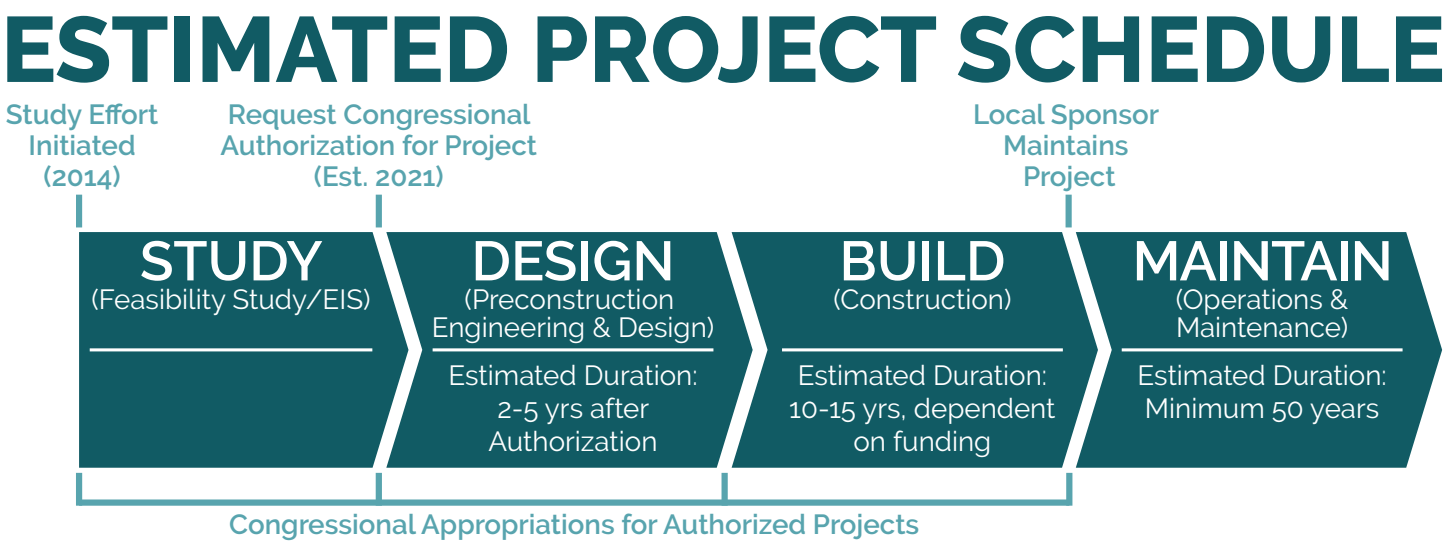

Figure ES-1: *Coastal Texas Study project phases*

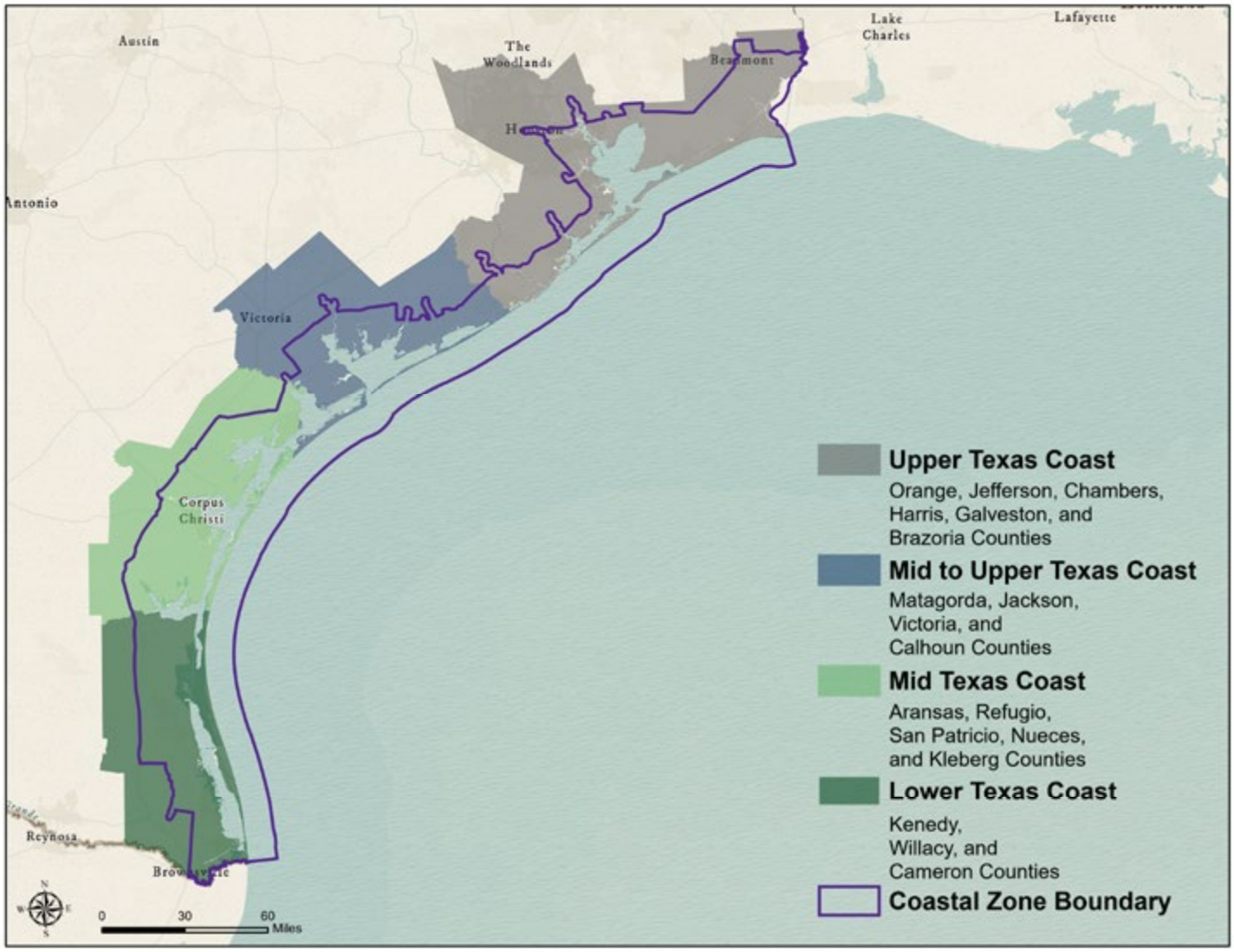

Figure ES-2: *Coastal Texas Study area and regions*

Authority and Study Area

The Coastal Texas Study was authorized by Congress in the Water Resources Development Act of 2007, which directed the Secretary of the Army, acting through the USACE, to "develop a comprehensive plan to determine the feasibility of carrying out projects for flood damage reduction, hurricane and storm damage reduction, and ecosystem restoration in the coastal areas of the State of Texas." This study is being conducted by the USACE in coordination with its non-Federal sponsor, the GLO. 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, as shown in Figure ES-2.

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Risks to the Texas coast include hurricane storm surge, coastal erosion, and relative sea level change.

Study Need

The Texas coast is vulnerable to tropical storms and hurricanes that take human life, flood homes and businesses, and damage coastal ecosystems. The impacts are devastating to coastal communities. These impacts also extend to the State and National level. The Texas coast is an economic engine and a vibrant natural ecosystem which provides vast economic, social, and environmental benefits to the nation. Specifically, Texas is:

- One of the States where residential, commercial, and industrial infrastructure are increasingly vulnerable to coastal storm damage.
- One of the Nation's top States for waterborne commerce, which is a critical gateway to international trade and provides Texas with a multitude of economic opportunities.
- Home to energy production and refining critical to the nation's consumer, commercial, and military supply of petroleum and related products.
- Home to natural environments which provide priceless ecosystem services, recreational opportunities, and natural buffers protecting communities and commerce from erosion and storm surges.

Without a comprehensive plan to protect, restore, and maintain a diverse coastal ecosystem and reduce the risks of storm damage to homes and businesses, the economy and the health and welfare of the coastal communities will continue to be at risk from coastal storms.

Among a wide array of risks, three primary risks were identified as drivers for investment in CSRM and ER on the Texas coast. These interdependent risks include:

- Hurricane storm surge,
- Coastal erosion, and
- Relative sea level change.

The natural environment is interconnected with man-made features on the Texas coast. Population and industry grew in this region specifically because the natural features supported economic growth. However, erosion and storm surge impair physical landforms that are integral to maintaining a barrier between the Gulf of Mexico and the various bay systems along the coast. Furthermore, relative sea level change increases the vulnerability of these systems, and the damages from hurricanes and tropical storms could become more severe as wind speed is projected to increase with higher sea levels and rising ocean temperatures.

THE VALUABLE TEXAS COAST *BY THE NUMBERS...*

3,300
MILES OF ESTUARINE SHORELINE

24% *STATE'S POPULATION*

15.8% *U.S. PORT CARGO HANDLED*

30% *OF US REFINING CAPACITY*

Study Goals and Objectives

In accordance with the legislative authority and intent, and incorporating public and agency feedback from the scoping phase, the following high-level goals and objectives were established for the Coastal Texas Study effort, as detailed in Table ES-1. Specific to CSRM, the study aimed to develop and evaluate various coastal storm risk reduction measures primarily related to the management of storm surges. Specific to ER, the study aimed to increase the net quantity and quality of coastal ecosystem resources, such as fish and wildlife habitat.

Vegetated dunes on South Padre Island

Goals	Objectives
COASTAL STORM RISK MANAGEMENT *Promote a resilient and sustainable economy by reducing the risk of storm damage to residential structures, industries, and businesses critical to the Nation's economy*	1. Reduce risk to human life from storm surge impacts along the Texas coast; 2. Reduce economic damage from coastal storm surge to business, residents, and infrastructure along the Texas coast; 3. Enhance energy security and reduce economic impacts of petrochemical supply-chain related interruption due to storm surge impacts; 4. Reduce risks to critical facilities (e.g., medical centers, ship channels, schools, transportation, etc.) from storm surge impact; 5. Manage regional sediment, including beneficial use of dredged material from navigation and other operations so it contributes to storm surge reduction where feasible; 6. Increase the resilience of existing hurricane risk reduction systems from sea level rise and storm surge impacts; and 7. Enhance and restore coastal landforms that contribute to storm surge attenuation where feasible.
ECOSYSTEM RESTORATION *Promote a resilient and sustainable coastal ecosystem by minimizing future land loss, enhancing wetland productivity, and providing and sustaining diverse fish and wildlife habitats*	1. Restore size and quality of fish and wildlife habitats such as coastal wetlands, forested wetlands, rookery, oyster reefs, and beaches and dunes; 2. Improve hydrologic connectivity into sensitive estuarine systems; 3. Reduce erosion to barrier island, mainland, interior bay, and channel shorelines; 4. Create, restore, and nourish oyster reefs to benefit coastal and marine resources; and 5. Manage regional sediment so it contributes to improving and sustaining diverse fish and wildlife habitat.

Table ES-1: *Overall Coastal Texas Study goals and objectives*

Summary of the Planning Process

The study authorization directed the study team to evaluate both ER and CSRM solutions. These two purposes recognize that the study area is vulnerable to storm risk and gradual coastal processes that wear away natural coastal areas and habitats. To enhance resiliency, measures were generally assembled to:

- Form Multiple Lines of Defense: This strategy recognizes the benefits natural landforms provide against coastal storms. By combining various lines of defense (e.g. barrier islands, living shorelines, coastal marshes, etc.), redundant levels of protection and restoration are provided for both humans and coastal ecosystems.
- Be Comprehensive: The CSRM alternatives were assembled within a systems approach to work in concert with other measures considered, connect to existing systems, and be adaptable over time. The ER measures were created to provide a variety of habitats along the Texas coast and to fill in the gaps of other restoration work being conducted across Texas.

The study process occurred in three stages to develop and evaluate project alternatives, and to select and refine preferred solutions, known either as the Tentatively Selected Plan (TSP) or the Recommended Plan. These stages are described as follows:

- Conceptual Plans: Evaluates potential measures and assesses effectiveness of combined ER and CSRM measures to achieve study objectives.
- TSP Selection: Quantifies and compares benefits and impacts to identify the TSP, supporting publication of the 1st Draft Report (2018 DIFR-EIS).
- Integration and Refinement: Refining the TSP, considering public, agency, and technical comments, in addition to further technical refinement, to identify the Recommended Plan, which is presented in this 2nd Draft Report.

Example of a beach access point over a dune

Representatives attend a Community Work Group meeting in May 2019

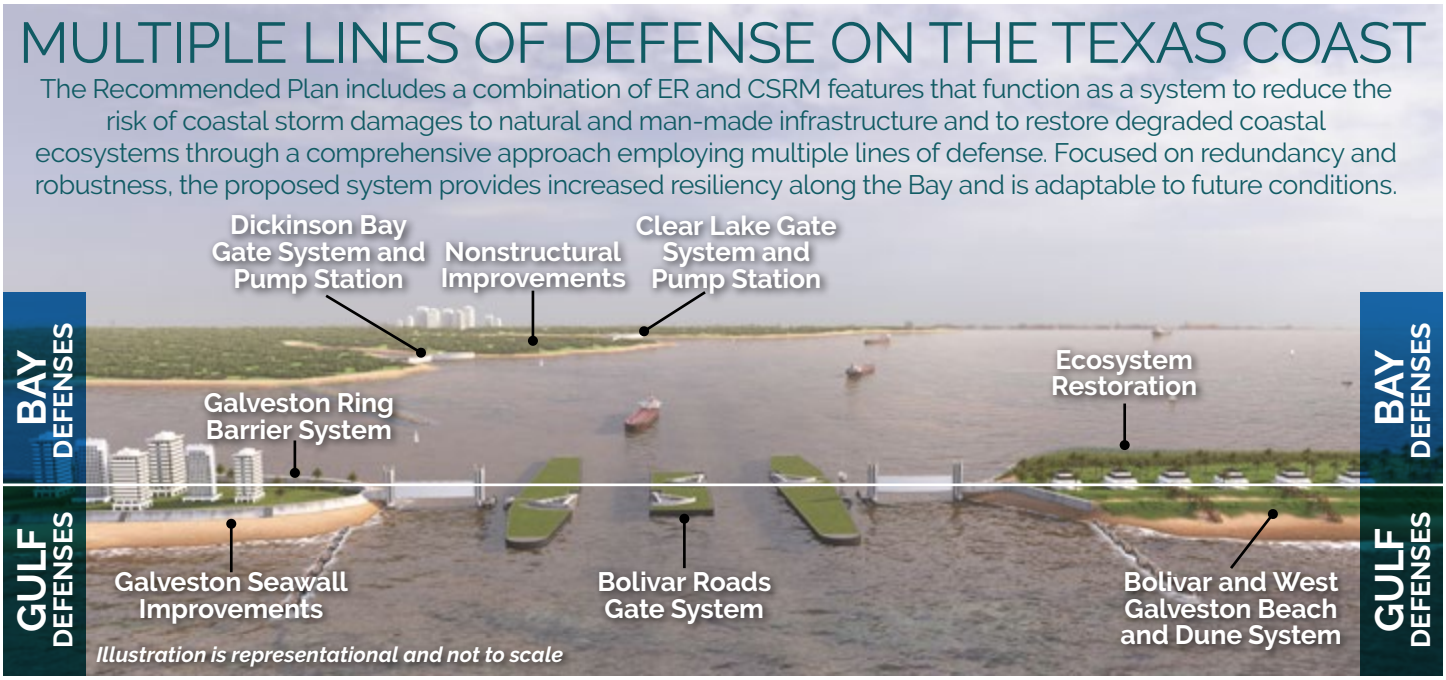
How the Plan has Changed

In accordance with USACE planning guidelines and NEPA requirements, a proactive approach was taken to engage the public, resource agencies, industry, local government, and other interested parties in the Coastal Texas Study planning process. This included regular and continued coordination over the study period, starting in 2014, during the reconnaissance phase, with a series of Scoping Meetings and extending through the current series of Virtual Public Meetings to review and finalize the Draft Feasibility Report and EIS.

Engagement activities have proved integral to the planning process, as they have generated thousands of comments and suggestions which informed study planners of key concerns and helped to shape and refine the Recommended Plan. Most significantly, after the TSP was presented in the 2018 DIFR-EIS for public comment, policy review, and agency technical review, multiple refinements and optimizations were considered and evaluated to enhance the performance of the ER and CSRM measures and to further minimize environmental and social impacts.

Most significantly, the plan now excludes the proposed levee/floodwall segments that would have paralleled State Highway 87 on Bolivar Peninsula and FM 3005 on Galveston Island. These segments were dropped from the plan to minimize both social and environmental impacts. Instead, the Bolivar and Galveston beach and dune systems initially proposed as ER measures in the TSP will be increased in size to also reduce storm surge impacts. In addition, among other changes at the Bolivar Roads crossing, two smaller deep-draft navigation gates are now proposed, instead of a single larger gate, and the overall constriction at Bolivar Roads was reduced from 27.5% to between 7-10%. Furthermore, the ring barrier on Galveston Island was refined to reduce impacts to surrounding neighborhoods and enclose more areas. In other changes, future nourishment cycles were removed from the proposed ER features, due to USACE policy, and minor revisions were made to individual features as part of continued feasibility phase preliminary design efforts.

These revisions and optimizations resulted in the identification of the Recommended Plan. To support development of the Recommended Plan, further environmental evaluations were advanced, cost and benefit analyses conducted, and implementation requirements and considerations determined. The following section provides a summary description of the full Recommended Plan.



A representational illustration of multiple lines of defense

Recommended Plan

The Recommended Plan includes a combination of ER and CSRM features that function as a system to reduce the risk of coastal storm damages to natural and man-made infrastructure and to restore degraded coastal ecosystems through a comprehensive approach employing multiple lines of defense. Focused on redundancy and robustness, the proposed system provides increased resiliency along Galveston Bay and is adaptable to future conditions, including relative sea level change. The Recommended Plan, as shown in Figure ES-3, can be broken into three groupings, as follows:

- A Coastwide ER plan was formulated to restore degraded ecosystems that buffer communities and industry on the Texas coast from erosion, subsidence, and storm losses. ER plan benefits have been estimated with standard habitat valuation procedures. The lowest-cost comprehensive ER plan is recommended. This includes a combination of ER measures proposed at eight locations along the coast, and include approximately 114 miles of breakwaters, 15 miles of bird rookery islands, 2,000 acres of marsh, 12 miles of oyster reef, and almost 20 miles of beach and dune. See Figures ES-3 and ES-4 for an overview of the Coastwide ER Plan.
- On the lower Texas coast, a CSRM beach restoration measure on South Padre Island (SPI) was formulated in a traditional National Economic Development (NED) framework to include 2.9 miles of beach nourishment and sediment management. The plan proposes beach nourishment on a 10-year cycle for the authorized project life of 50 years. The economic analysis confirms that beach nourishment is cost effective when considering construction costs, benefits, and currently estimated real estate costs. See Figure ES-5 for an overview of the SPI Beach Nourishment and Sediment Management measure.
- On the upper Texas coast, the Galveston Bay Storm Surge Barrier System was formulated as a system with multiple-lines-of-defense to reduce damage to communities, critical petrochemical and refinery complexes, Federal navigation channels, and other existing infrastructure in and around Galveston Bay from storm surge. See Figure ES-6 for an overview of the Galveston Bay Storm Surge Barrier System.

The Recommended Plan includes a combination of ER and CSRM features that function as a system to reduce the risk of coastal storm damages to natural and man-made infrastructure and to restore degraded coastal ecosystems through a comprehensive approach employing multiple lines of defense.

Specific to the upper Texas coast, the Gulf line of defense separates Galveston Bay from the Gulf of Mexico to reduce storm surge volumes entering the Bay. Components which make up the Gulf line of defense include:

- The Bolivar Roads Gate System, across the entrance to the Houston Ship Channel, between Bolivar Peninsula and Galveston Island (see Figure ES-7);
- 43 miles of beach and dune segments on Bolivar Peninsula and West Galveston Island that work with the Bolivar Roads Gate System to form a continuous line of defense against Gulf of Mexico surge, preventing or reducing storm surge volumes that would enter the Bay system (see Figure ES-8); and
- Improvements to the existing 10-mile Seawall on Galveston Island to complete the continuous line of defense against Gulf surge (see Figure ES-9).

The Bay defenses enable the system to manage residual risks. Residual risks are driven by the run-up of water contained within the Galveston Bay system plus any additional Gulf surge that overtops the Gulf line of defense. The Bay defenses also provide further resiliency against variations in storm track and intensity and relative sea level change. Bay defense components include:

- An 18-mile Galveston Ring Barrier System (GRBS) that impedes Bay waters from flooding neighborhoods, businesses, and critical health facilities within the City of Galveston (see Figure ES-10);
- 2 surge gates on the west perimeter of Galveston Bay (at Clear Lake and Dickinson Bay) to reduce surge volumes that push into neighborhoods around the critical industrial facilities that line Galveston Bay (see Figure ES-11); and
- Complementary non-structural measures, such as home elevations or floodproofing, to further reduce Bay-surge risks along the western perimeter of Galveston Bay (see Figure ES-12).

In addition, more than 1,328 acres of habitat will be restored as mitigation, in order to offset the direct and indirect impacts of the Recommended Plan (see Figure ES-13).

Conceptual rendering of proposed vertical lift gates that would be used as part of the Bolivar Roads Gate System

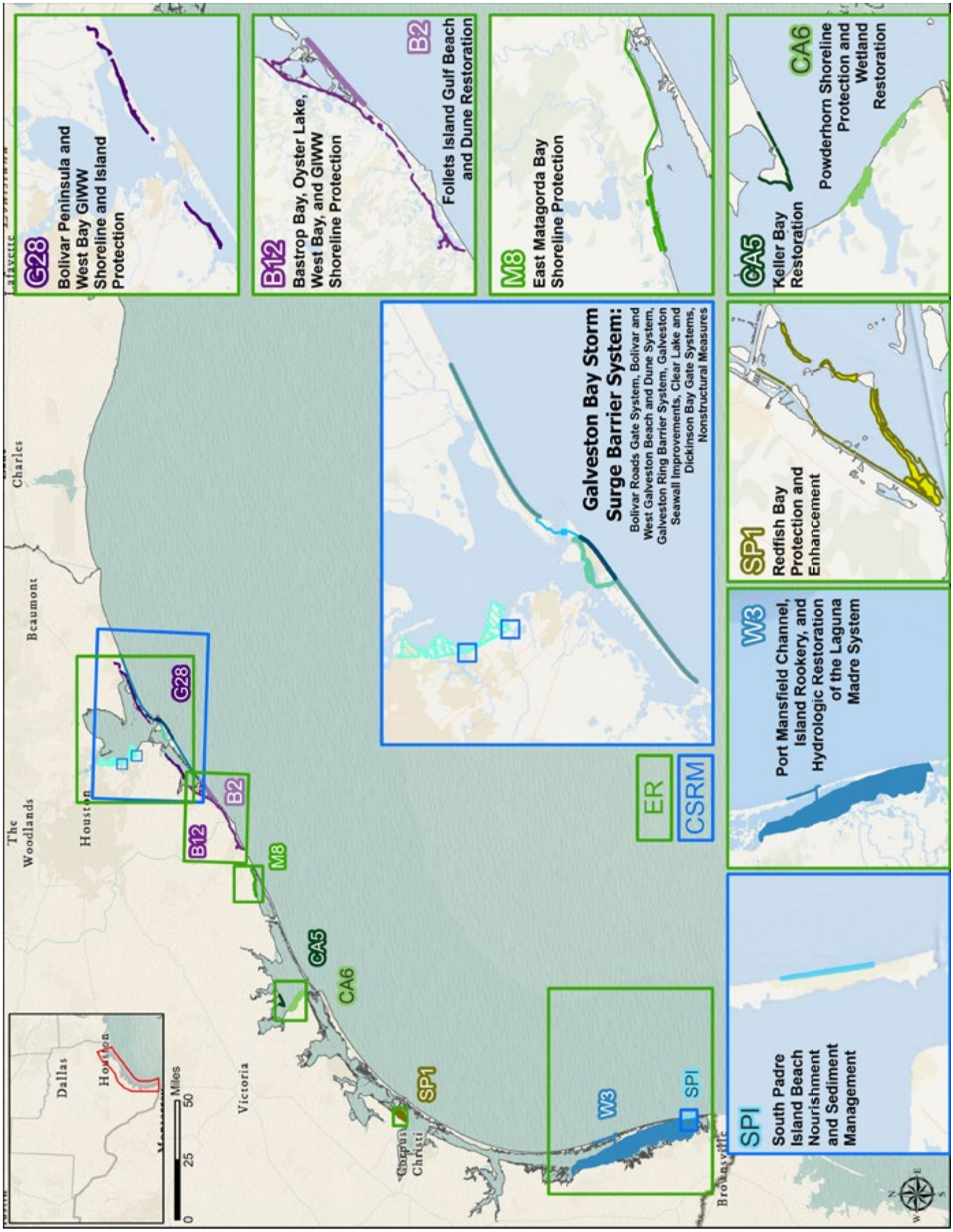
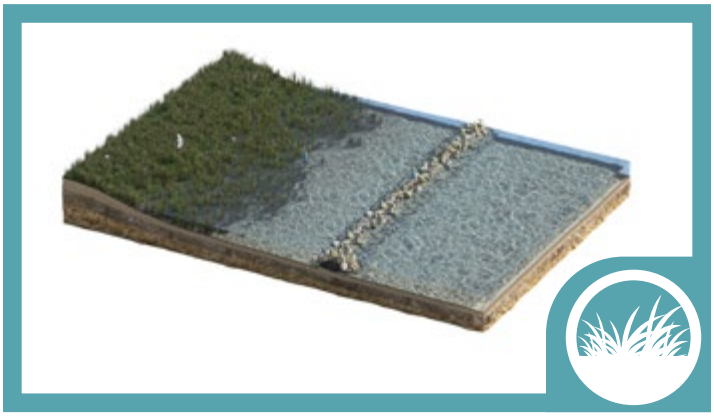


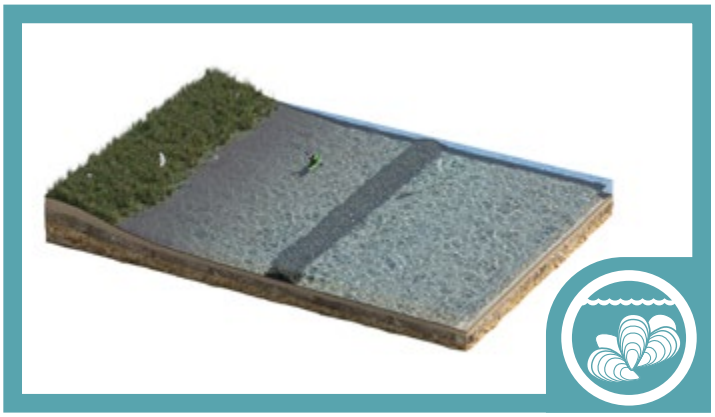
Figure ES-3: *Recommended Plan*

COASTIWIDE ECOSYSTEM RESTORATION MEASURES

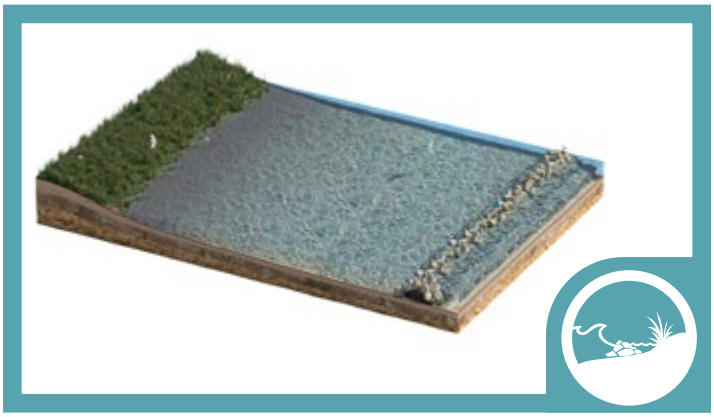
BEACH AND DUNE RESTORATION



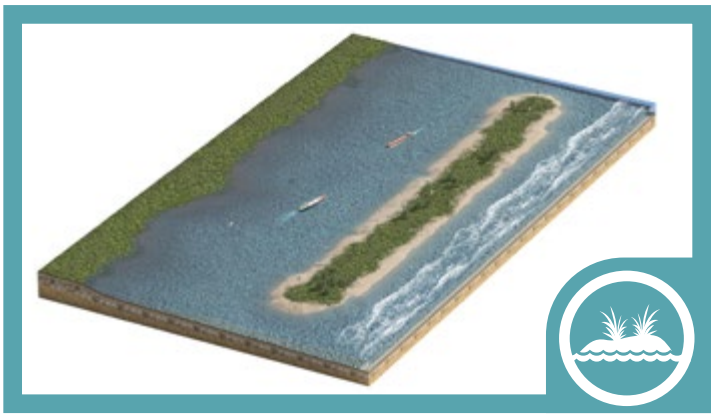
MARSH RESTORATION



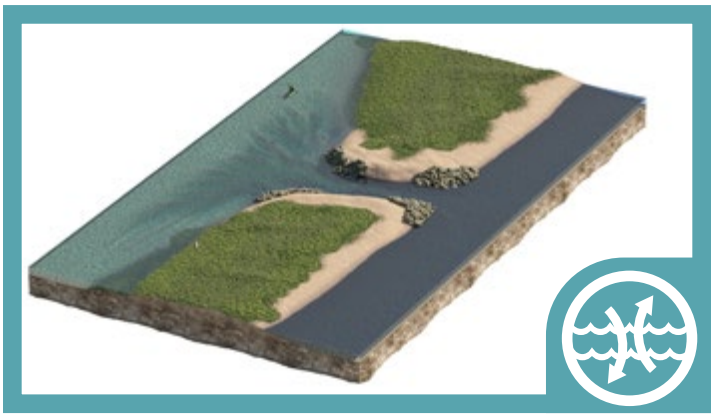
OYSTER REEF CREATION



BREAKWATER CREATION



ISLAND RESTORATION



HYDROLOGIC RESTORATION

Figure ES-4: *Conceptual renderings of ER measures*

SOUTH PADRE ISLAND BEACH NOURISHMENT AND SEDIMENT MANAGEMENT

Figure ES-5: *SPI beach nourishment and sediment management*

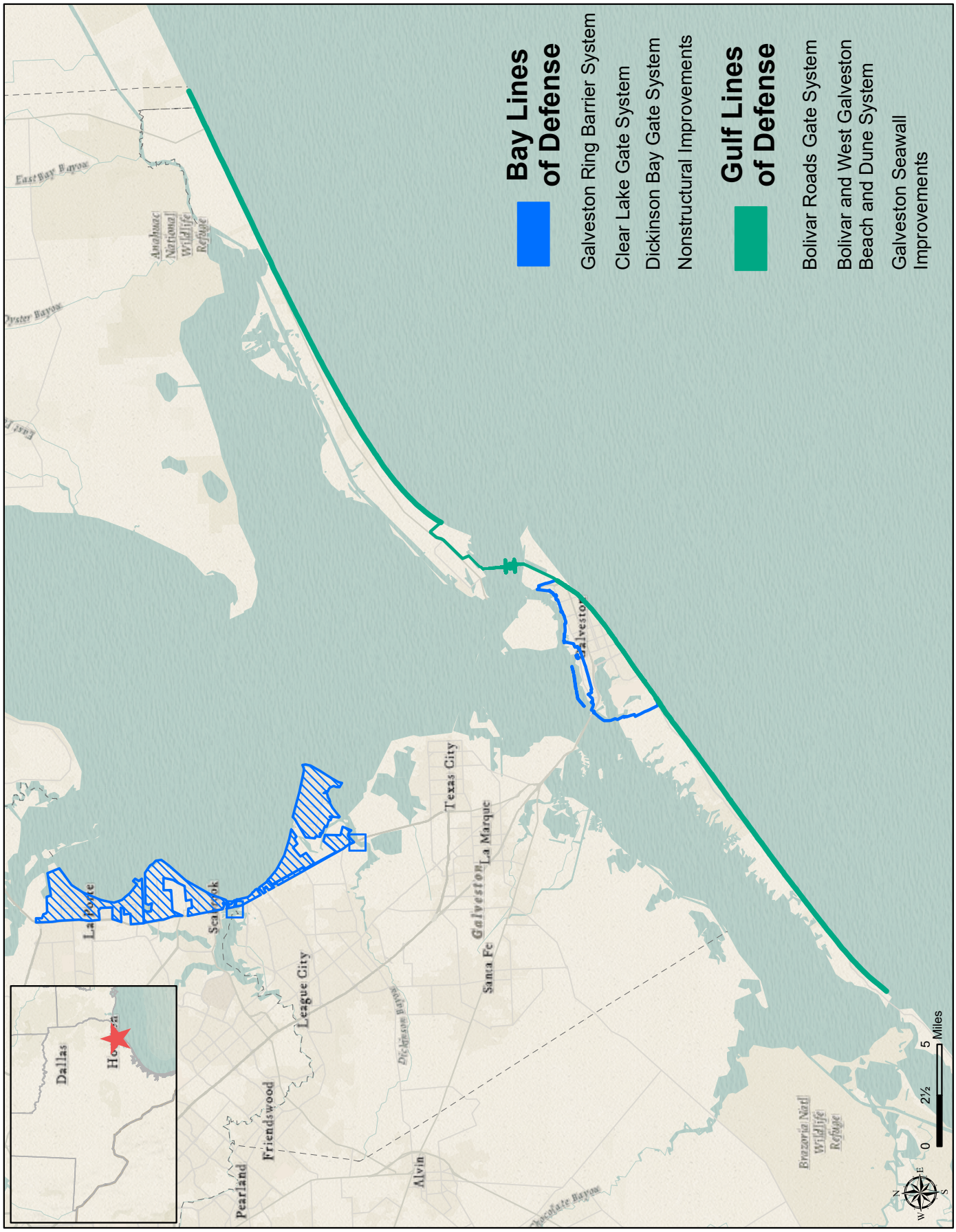
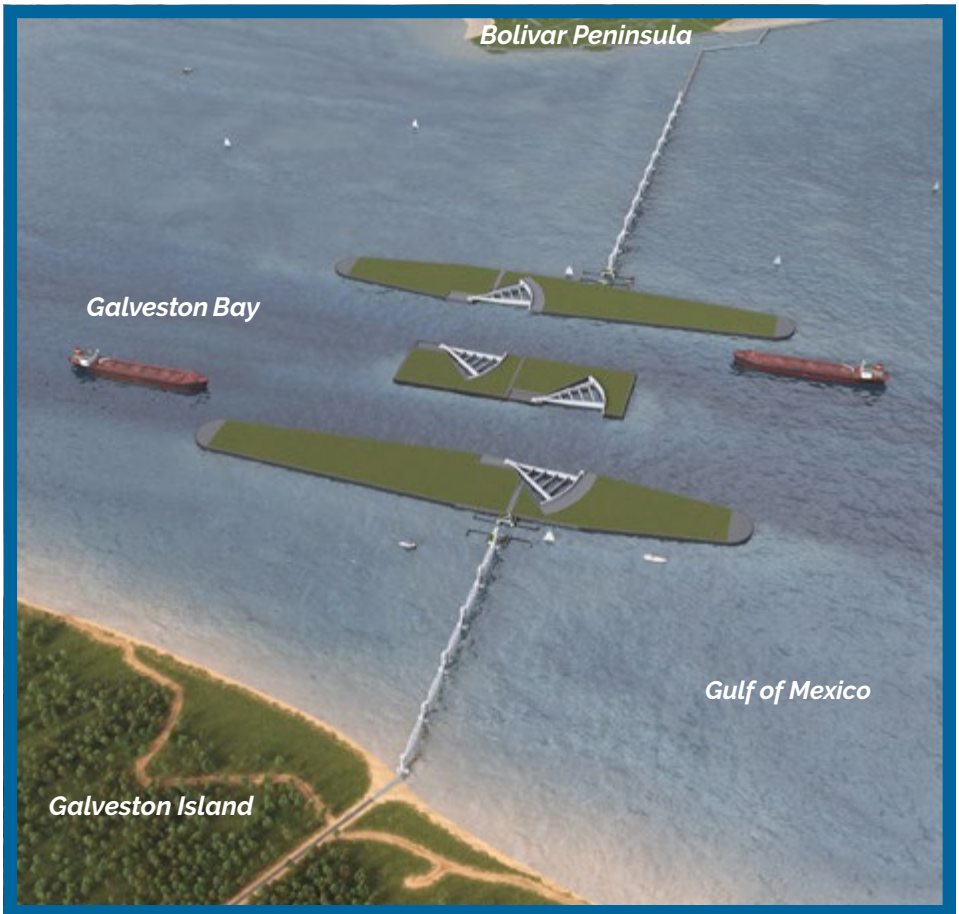


Figure ES-6: *Galveston Bay Storm Surge Barrier System*

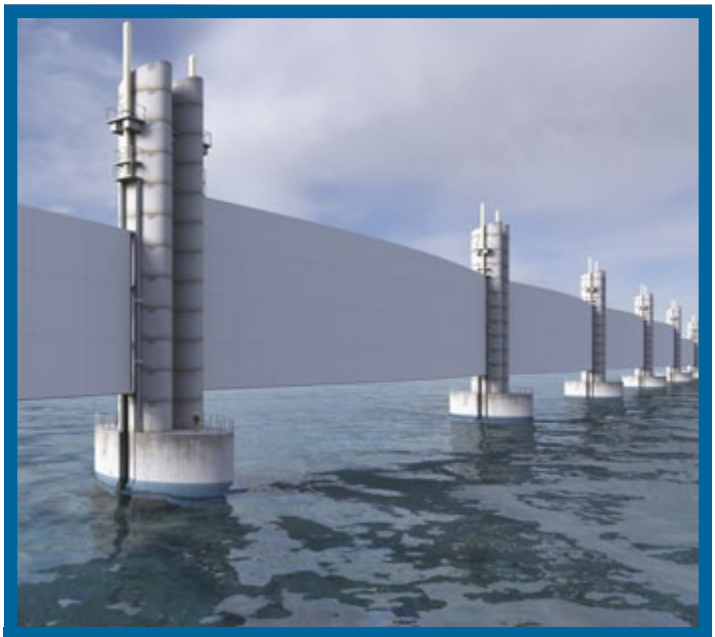
BOLIVAR ROADS GATE SYSTEM



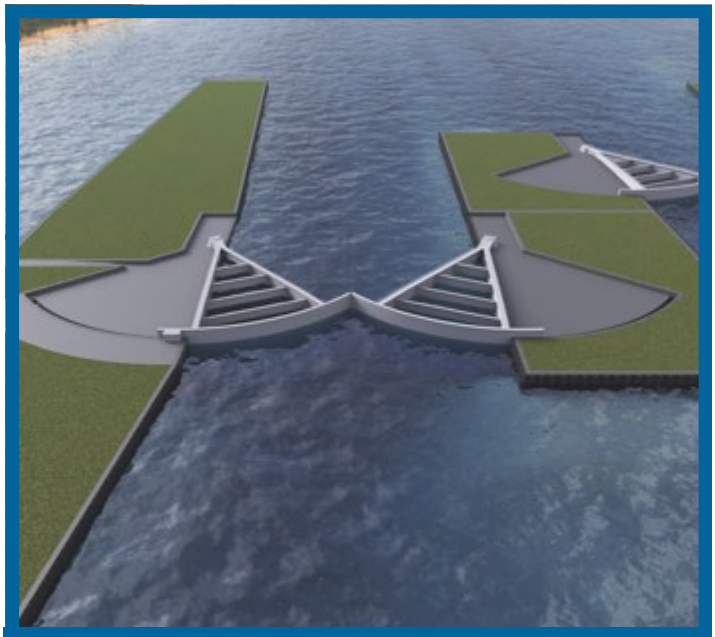
GATE SYSTEM OVERVIEW

COMBI-WALL

SHALLOW WATER ENVIRONMENTAL GATES



VERTICAL LIFT GATES



DEEP-DRAFT NAVIGATION GATES

Figure ES-7: *Bolivar Roads Gate System*

BOLIVAR AND WEST GALVESTON BEACH AND DUNE

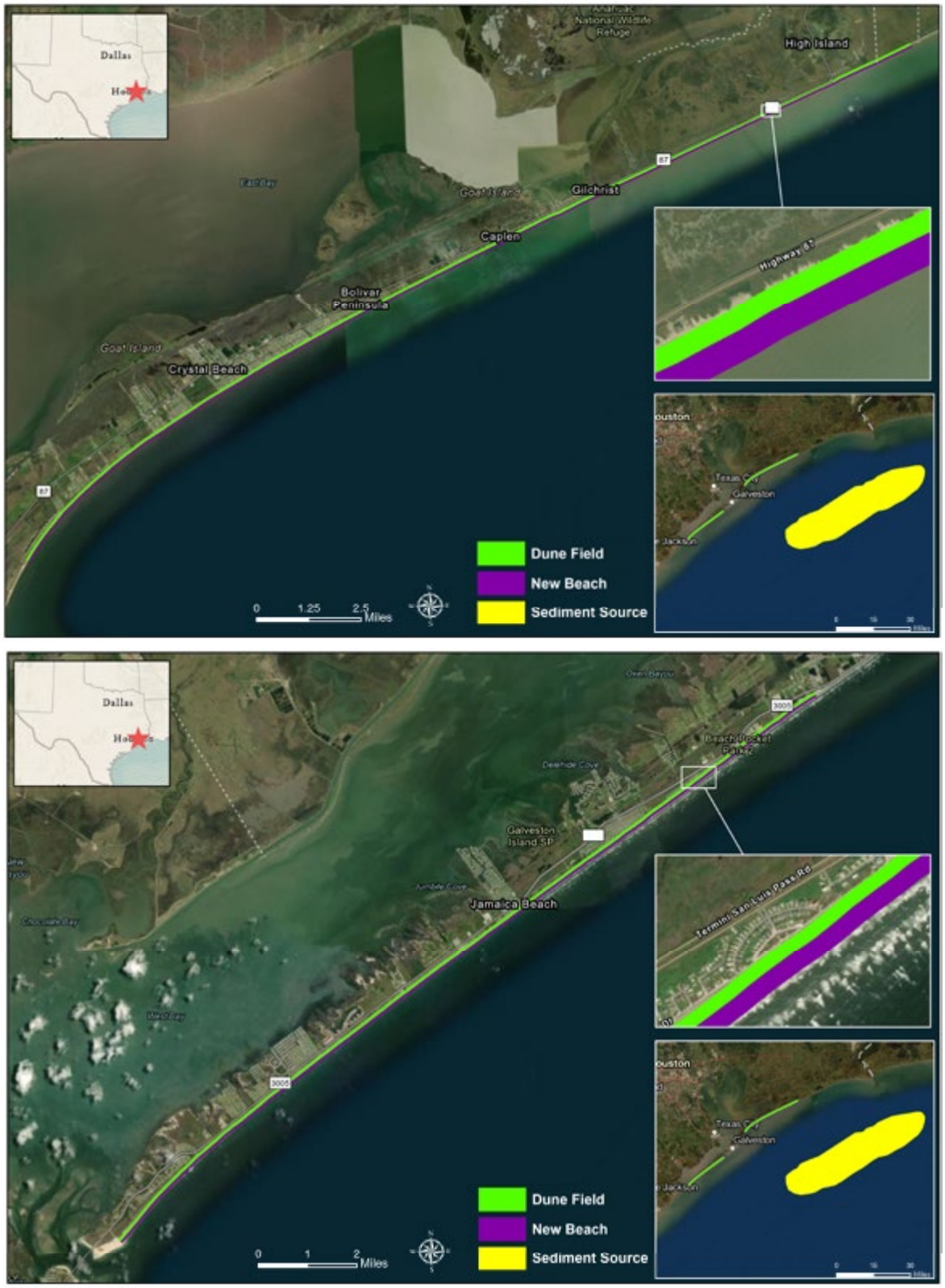


Figure ES-8: *Bolivar and West Galveston Beach and Dune*

GALVESTON SEAWALL IMPROVEMENTS

Figure ES-9: *Galveston Seawall Improvements*

GALVESTON RING BARRIER SYSTEM


INVERTED "T" FLOODWALL


ROAD/RAIL CLOSURE (OPEN)


CLOSED SLUICE GATE


EXAMPLE FLOODWALL


ROAD/RAIL CLOSURE (CLOSED)


CLOSED FLAP GATE

Figure ES-10: *Galveston Ring Barrier System*

CLEAR LAKE AND DICKINSON BAY

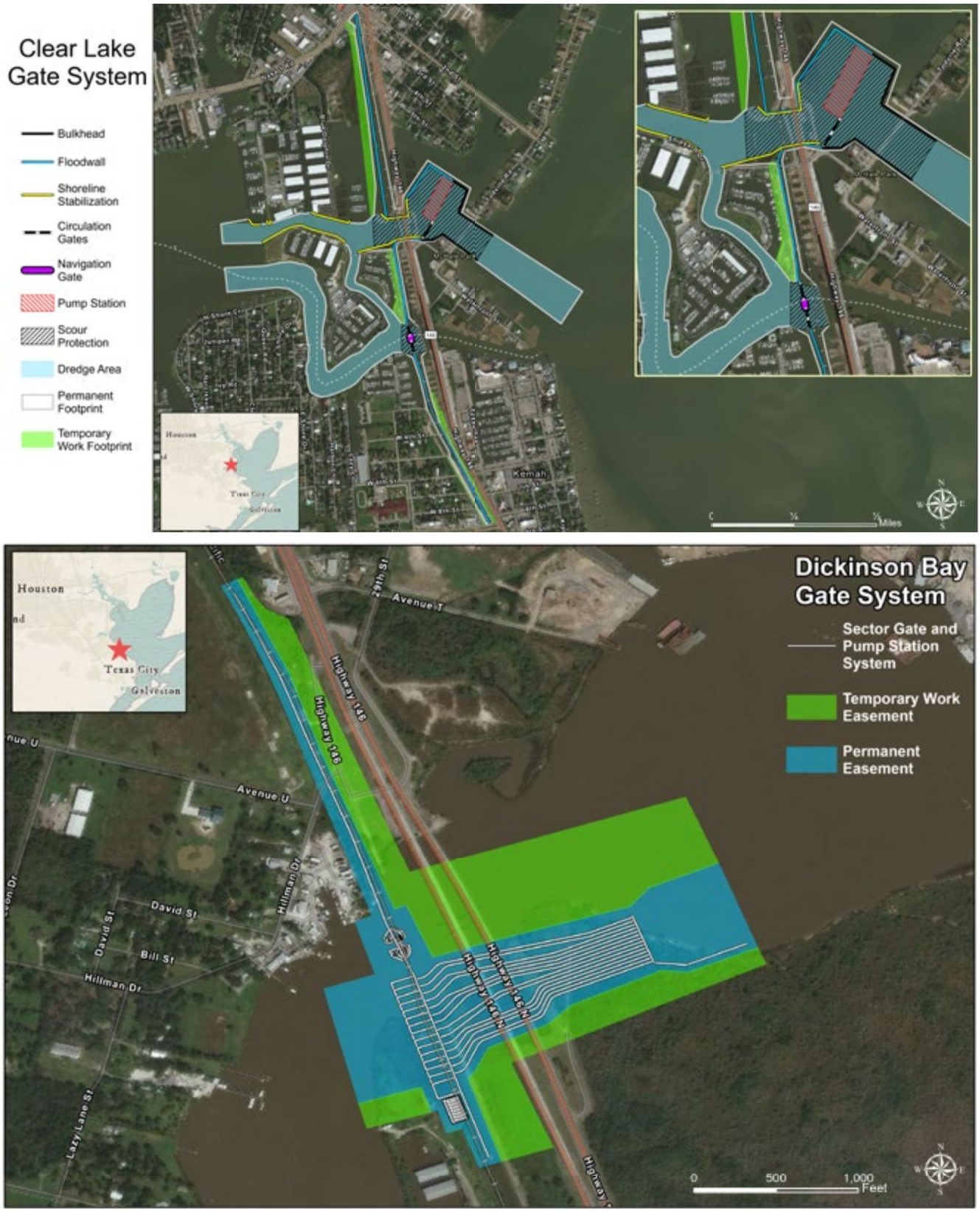


Figure ES-11: *Clear Lake and Dickinson Bay Gate Systems and Pump Stations*

NONSTRUCTURAL IMPROVEMENTS

Figure ES-12: *Nonstructural Improvements*

MITIGATION SITES

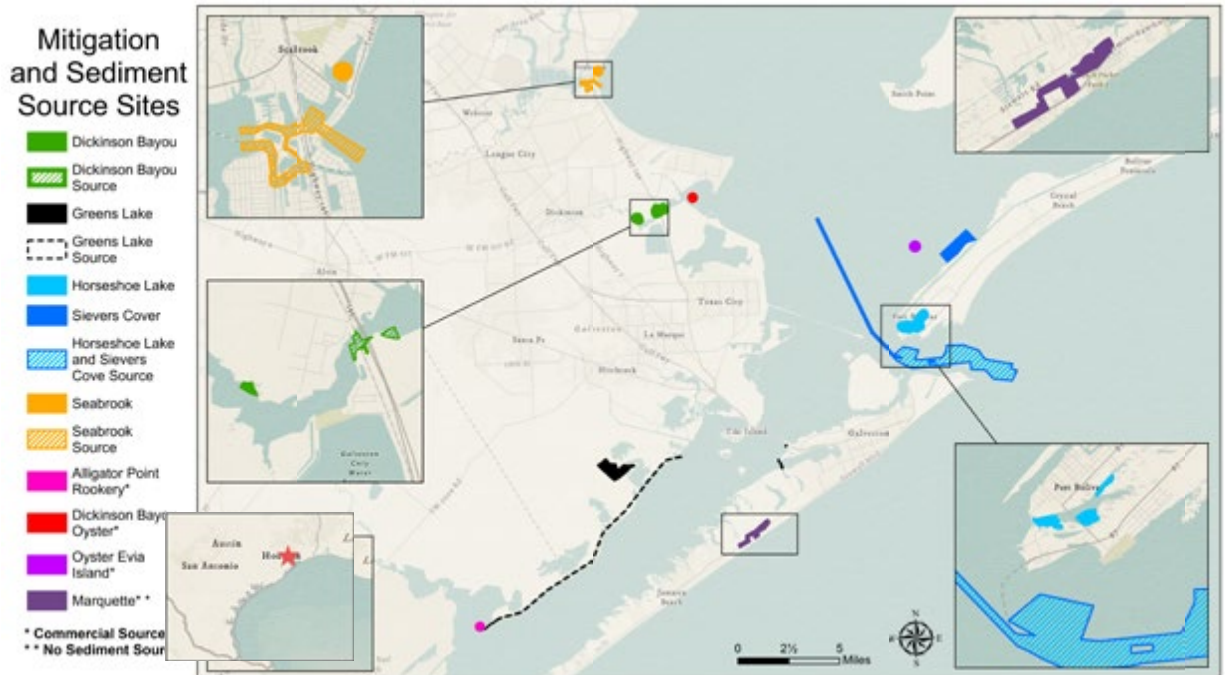


Figure ES-13: *Mitigation and sediment source sites*

NEPA Compliance

To comply with NEPA, a Federal agency must prepare an EIS if it is proposing actions that may significantly affect the quality of the natural and human environment. The NEPA environmental review process seeks to facilitate better-informed decisions, focused on avoiding, minimizing, and/or mitigating potentially negative impacts of Federal action.

For the Coastal Texas Study, rather than preparing a single definitive EIS as the basis for approving the entire project, the USACE will conduct two or more rounds, or tiers, of environmental review. The "Tier One" assessment (the attached Draft EIS) analyzes the project on a broad scale, while considering the full range of potential effects to both the human and natural environments from implementing the proposed solutions. The purpose of the Tier One EIS is to present the information considered in selecting a preferred alternative, describe the comprehensive list of measures, and identify data gaps and future plans to supplement the data needed to better understand the direct, indirect, and cumulative effects of the proposed solutions.

Once refinements and additional information is gathered during the PED phase, the USACE will update the impact assessments and prepare additional NEPA documents (either an EIS or Environmental Assessment) that supplement the original EIS to examine individual components of the Recommended Plan in greater detail. The updated assessments would disclose site-specific impacts associated with the proposed solution and identify the avoidance, minimization, and compensatory mitigation efforts to lessen adverse effects. In addition, the updated documents will undergo formal public review periods and resource agency coordination.

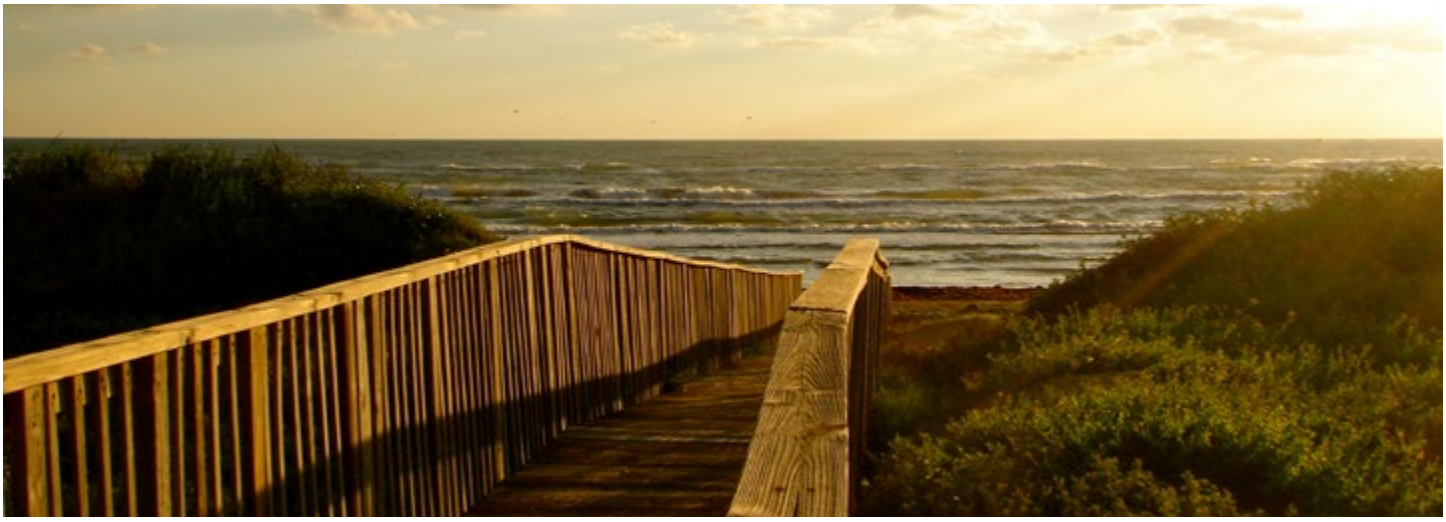
Within the attached Draft EIS, measures have either been denoted as "Actionable Measures" or "Tier One Measures," as defined below:

- Actionable Measures. The Recommended Plan includes several proposed measures that currently have enough design detail to complete the environmental review. These are identified in this Draft EIS as "actionable measures", because this report provides a complete environmental review consistent with NEPA for these measures.
- Tier One Measures. The measures included in the Recommended Plan that will require Tier Two environmental review are referred to as "Tier One Measures" because this report is the Tier One assessment for these measures.

Table ES-2 identifies which measures are Actionable and which are Tier One Measures.

Recommended Plan Component	Actionable	Tier One*
ER Measures		
G28 – Bolivar Peninsula and West Bay GIWW Shoreline and Island Protection	•	
B2 – Follets Island Gulf Beach and Dune Restoration		•
B12 – West Bay and Brazoria GIWW Shoreline Protection	•	
CA5 – Keller Bay Restoration	•	
CA6 – Powderhorn Shoreline Protection and Wetland Restoration	•	
M8 – East Matagorda Bay Shoreline Protection	•	
SP1 – Redfish Bay Protection and Enhancement	•	
W3 – Port Mansfield Channel, Island Rookery, and Hydrologic Restoration	•	
CSRM Measures		
South Padre Island Beach Nourishment and Sediment Management	•	
Bolivar Roads Gate System		•
Bolivar and West Galveston Beach and Dune System		•
Galveston Seawall Improvements		•
Galveston Ring Barrier System		•
Clear Lake Gate System and Pump Station		•
Dickinson Bay Gate System and Pump Station		•
Nonstructural Improvements		•
* Requires additional NEPA analysis and environmental compliance consultation		

Table ES-2: *Actionable and Tier 1 Measures of the Recommended Plan*



Example of a beach access point over a dune on South Padre Island

Costs and Benefits

Table ES-3 provides a summary of the estimated costs and benefits of the Recommended Plan. This information is presented separately for each component, including the Coastwide ER Plan, the South Padre Island Beach Nourishment and Sediment Management measure, and the Galveston Bay Storm Surge Barrier System. As shown in the table, the Recommended Plan has a total First Cost, or construction cost, of $26.13 billion. Each CSRM measure has a strong benefit-cost ratio (BCR), 2.74 for South Padre and 1.96 for Galveston Bay. A BCR over one indicates that the benefits of the project exceed the costs, which is a requirement for Federal investment. Most critically, if damages from storms were distributed equally across the fifty-year period of analysis, the CSRM measures are anticipated to reduce average annual damages by $2.28 billion per year (FY 2020 Price Level, 2.75% Discount Rate), which represents a significant reduction in anticipated future flood damages and supports increased resiliency for the communities along the coast and the local, regional, and national economy.

In addition, the Coastwide ER Plan generates over 21,919 average annual habitat units (AAHUs) through the creation or restoration of thousands of acres of coastal habitat, including global, national, state, and locally significant resources providing unique services, functions, and values. In addition, restoration efforts enhance the resiliency of natural and man-made systems and increase the effectiveness of CSRM features along the coast.

Example of beach renourishment

	South Padre Island Beach Nourishment and Sediment Management	Galveston Bay Storm Surge Barrier System (2043 Base Year)	Coastwide ER Plan	Total
Project First Cost	$62,741	$23,480,351	$2,625,645	$26,168,737
Total Average Annual Cost	$1,400	$1,162,000	N/A	
Equivalent Annual Benefits	$3,834	$2,280,000	21,919 AAHUs	
Equivalent Annual Net Benefits	$2,434	$1,118,000	N/A	
BCR	2.74	1.96	N/A	
FY20 Price Level, 2.75% Discount Rate, Presented in $1,000s				

Table ES-3: *Total Costs and Benefits of the Recommended Plan*

Tables ES-4 and ES-5 provide the cost apportionment for the CSRM and ER portions of the Recommended Plan, subject to credits for lands, easements, rights-of-way, relocations, and disposal areas, detailing the projected split of costs between the Federal government and the non-Federal sponsor (the State of Texas and its local partners).

	Federal ER Plan		Total Costs
	Federal Cost (65%)	Non-Federal Cost (35%)	
PED	$206,071	$110,961	$317,032
Construction	$1,350,611	$727,252	$2,077,863
Lands Easements & ROW	--	$106,079	$106,079
Construction Management	$81,037	$43,635	$124,672
Total Project First Costs	$1,637,718	$987,927	$2,897,233

FY20 Price Level, 2.75% Discount Rate, Presented in $1,000s

Table ES-4: *Coastwide ER Plan – Cost Apportionment (Project First Costs)*

	Cost Share %		South Padre Island Beach Nourishment and Sediment Management*		Galveston Bay Storm Surge Barrier System*		Total Cost	
	FED	NON-FED	FED	NON-FED	FED	NON-FED	FED	NON-FED
PED	65%	35%	$3,933	$2,118	$1,768,178	$952,096	$1,772,111	$954,214
Construction	65%	35%	--	--	$11,641,196	$6,268,336	$11,641,196	$6,268,336
Renourishment	50%	50%	$19,182	$19,182	$514,899	$514,899	$534,081	$534,081
Lands Easements & ROW		100%	$0	$18,328	$0	$746,174	$0	$764,502
Construction Management	65%	35%	$0	$0	$698,472	$376,100	$698,472	$376,100
Total Project First Costs			$23,114	$39,627	$14,622,745	$8,857,606	$14,645,859	$8,897,233

FY20 Price Level, 2.75% Discount Rate, Presented in $1,000s

* Costs associated with renourishment, including PED and Construction Management, have been reallocated to the appropriate cost-share category (50%/50%).

Note: Final cost apportionment subject to CBRA zone determination

Table ES-5: *CSRM Measures – Cost Apportionment (Project First Costs)*

Implementation Requirements and Next Steps

While the GLO has served as the non-Federal sponsor for the feasibility study phase, due to the scale of the project, a modified arrangement is necessary for the subsequent phases of the project, including PED, construction, and operations and maintenance. The State of Texas (encompassing its various entities, including the GLO) anticipates issuing a Letter-of-Intent in the near future stating its intent to serve as the non-Federal sponsor, with support from local entities, for future phases of the Coastal Texas Protection and Restoration Plan, pending legislation to be considered in the 2021 Texas legislative session. Accordingly, local entities such as counties, cities, levee improvement districts, drainage districts, municipal utility districts, or other special taxing entities may elect to, or be created to, support the State of Texas and the USACE in the implementation of this project.

Federal implementation of the project would be subject to the identified non-Federal sponsor(s) agreeing to comply with applicable Federal laws and policies. Furthermore, the non-Federal sponsor(s) shall, prior to implementation, agree to perform the required items of cooperation. In general, cost share for the design and construction of the project will be 65 percent Federal and 35 percent non-Federal. Most critically, the non-Federal sponsor must provide all lands, easements, and rights-of-way, including those required for relocation, the borrowing of material, and the disposal of dredged or excavated materials.

If authorized and funded by Congress, subsequent phases of the project would include PED, construction, and operations and maintenance. Completion of PED and construction of the Recommended Plan, specifically the pace of construction, is highly dependent on Congressional approval and funding. Assuming an ample funding stream, the Recommended Plan described could be designed and then constructed over a period of 12 to 20 years. Furthermore, construction sequencing will also be dependent on completion of supplemental environmental studies, in accordance with the tiered NEPA approach described herein. Ultimately, implementation activities will be optimized to consider the size and frequency of funding infusions, environmental clearance of individual components, and beneficial sequencing.

COASTAL TEXAS COSTS & BENEFITS *BY THE NUMBERS...*

~$2.28 Billion
EQUIVALENT ANNUAL BENEFITS

1.96 BCR
FOR THE COMBINED CSRM MEASURES

IN A 1% AEP SURGE EVENT:

~77%
REDUCTION IN DAMAGED STRUCTURES

~66%
REDUCTION IN FLOODED CRITICAL INFRASTRUCTURE POINTS

21,919
AAHUs ECOLOGICAL LIFT

6,610
ACRES HABITAT IMPROVED

~$26.17 Billion
TOTAL RECOMMENDED PLAN PROJECT COST (CSRM & ER)

Photo of East Galveston Island