GCCPRD

The Gulf Coast Community Protection and Recovery District

TEXAS GENERAL LAND OFFICE
ESTABLISHED 1836

STORM SURGE SUPPRESSION STUDY

PHASE I REPORT

Finalized February 27, 2015

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Acronyms and Abbreviations

ADCIRC: Advanced Circulation Model

BCR: Benefit-to-cost ratio

BFE: Base Flood Elevation

CAD: Computer Aided Design

CBRA: Coastal Barriers Resource Act

CBRS: Coastal Barriers Resource System

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act

CERCLIS: The Comprehensive Environmental Response, Compensation, and Liability Information System

CPT: Cone Penetration Tests

CRBA: Coastal Barriers Resource Act

CWA: Clean Water Act

CWDS: City Wide Drainage Study

DEM: Digital elevation model

EFH: Essential Fish Habitat

EPA: Environmental Protection Agency

ESI: Environmental Sensitivity Index

ESMT: Ecological Mapping System of Texas

FEMA: Federal Emergency Management Agency

FIRM: Flood Insurance Rate Map

FIS: Flood Insurance Study

FRS: Facility Registry Service

GCCPRD: Gulf Coast Community Protection and Recovery District

GIS: Geographic Information Systems

GIWW: Gulf Intracoastal Waterway

GLO: General Land Office

GWDB: Groundwater Database

H&H: Hydraulic and Hydrological

HCFCD: Harris County Flood Control District

HEC-FDA: Hydrologic Engineering Center-Flood Damage Risk Reduction Analysis

HEC-HMS: Hydrologic Engineering Center-Hydrologic Modeling System

HEC-RAS: Hydrologic Engineering Center-River Analysis System

H-GAC: Houston-Galveston Area Council

ICIS: Integrated Compliance Information System

IHNC: Inner Harbor Navigation Canal

JPM-OS: Joint Probability Method-Optimal Sampling

LiDAR: Light Detection and Ranging

LNG: Liquefied natural gas

M3: Model and Map Management System

MapMod: Map Modernization

MDP: Master Drainage Plan

MOSE: Experimental Electromechanical Module

MRLC: Multi-Resolution Land Characteristics

MSL: Mean Sea Level

NASA: National Aeronautics and Space Administration

NAVD: North American Vertical Datum

NEPA: National Environmental Policy Act

NFHL: National Flood Hazard Layer

NFIP: National Flood Insurance Program

NGVD: National Geodetic Vertical Datum

NLCD: National Land Cover Database

NOAA: National Oceanic and Atmospheric Association

NPDES: National Pollutant Discharge Elimination System

NPL: National Priorities List

NRHP: National Register of Historic Places

NWI: National Wetlands Inventory

NWR: National Wildlife Refuge

PBL: Planetary Boundary Layer

PCS: Permit Compliance System

PDF: Portable Document Format

RCRA: Resource Conservation and Recovery Act

ROW: Right-of-Way

SAFMC: South Atlantic Fishery Management Council

SDRDB: Submitted Driller's Reports Database

Sq-mi: Square-miles

SWAN: Simulating Waves Near Shore model

TDLR: Texas Department of Licensing and Regulation

TNRIS: Texas Natural Resources Information System

TPWD: Texas Parks and Wildlife Department

TRI: Toxic Releases Inventory

TWDB: Texas Water Development Board

TxDOT: Texas Department of Transportation

USACE: United States Army Corps of Engineers

USFWS: United States Fish and Wildlife Service

USGS: United States Geological Survey

VDD: Velasco Drainage District

1. Introduction

Texas is blessed with over 400 miles of pristine coastline that has historically attracted people and industry to the region to take advantage of a multitude of economic opportunities and quality of life amenities. In May of each year, coastal Texas residents, communities and businesses prepare for the annual hurricane season, which lasts from June to December. This Texas coastal region has over 4,300 square miles of land vulnerable to flooding induced by hurricane rains and storm surge (Figure 1).

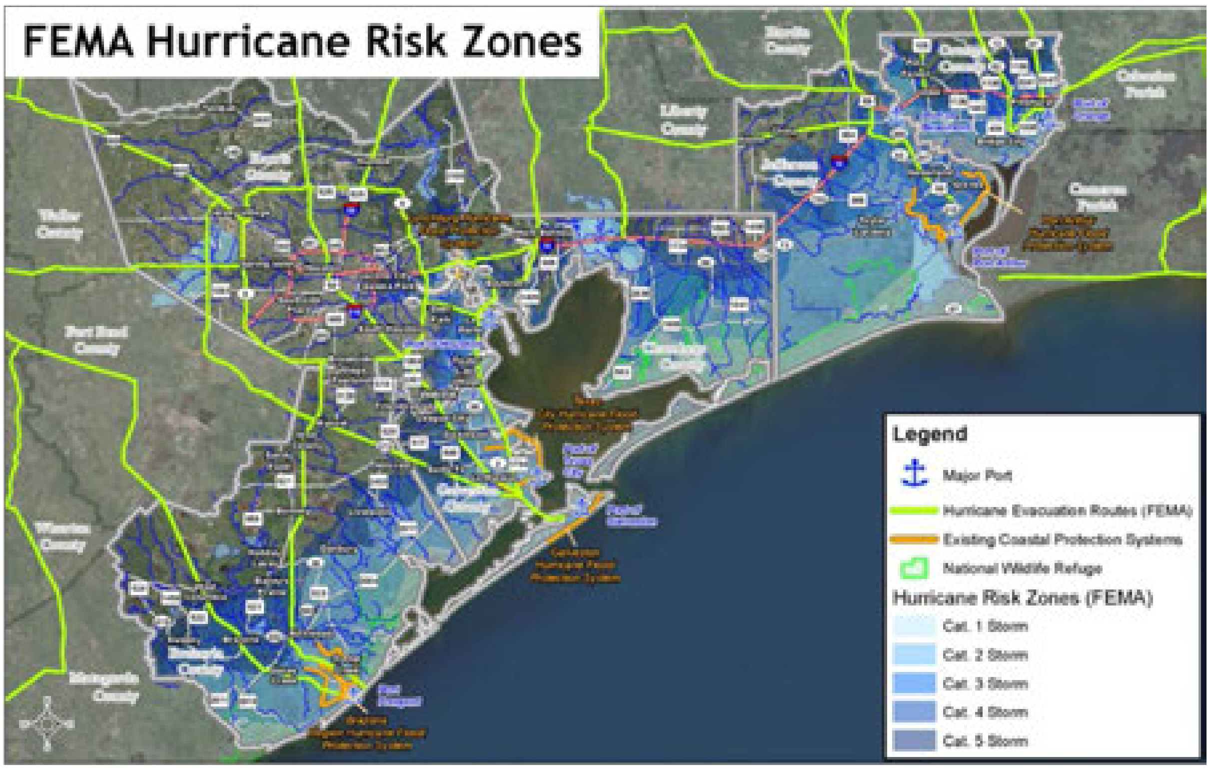


Figure 1 - FEMA map illustrating coastal areas within the study vulnerable to storm surge

History has shown that the state remains most vulnerable to large storms from June to October (Figure 2). The frequency of hurricanes along any 50-mile segment of the coast is about one storm event every nine years. Annual probabilities of a storm event range from 31 percent in the Sabine Pass Region to 41 percent in the Matagorda Region (Roth, 2010). The majority of these larger storms form in the tropical Atlantic, the Caribbean, and the Gulf of Mexico. The warm waters of the Gulf enable storms to grow in size and intensity, greatly increasing their ability to inundate areas with surges of 20 feet or greater and

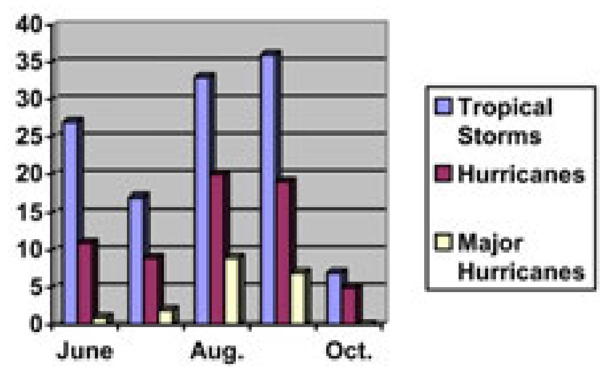


Figure 2 - Monthly Chart of Texas Hurricane Activity since 1850 (Roth, 2010)

causing flood-related damages. In 2008, Hurricane Ike made landfall on the Texas coast in the vicinity of Galveston Island, causing over $28 billion in damages and 84 deaths. To date, Hurricane Ike has been the most expensive storm in Texas' history.

Ike followed Hurricanes Gustav, Dolly, and Rita, as well as Tropical Storm Eduardo. Each of these storms struck the upper Texas coast within a three-year span. Devastating storms such as Hurricane Ike have plagued the Texas coast for centuries, claiming thousands of lives and placing overwhelming strains on communities, families, and individuals (Roth, 2010).

In the wake of these natural disasters, Governor Rick Perry issued an Executive Order creating the Governor's Commission for Disaster Recovery and Renewal. The Commission worked with local communities, industry, and state leaders to develop recommendations to:

- Help Texas communities rebuild after storm events;
- Improve the State's and communities' ability to recover from future disasters; and
- Seek federal reimbursement comparable to that of other states for disaster recovery.

One of the Commission's recommendations was to conduct a study to determine how coastal communities can reduce the impact of water damages of future storm events.

1.1. Gulf Coast Community Protection and Recovery District

In conjunction with recommendations made by the Governor's Commission for Disaster Recovery and Renewal, Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties formed the Gulf Coast Community Protection and Recovery District (GCCPRD) with the purpose of conducting studies and developing plans to alleviate damage from future storm events. The GCCPRD is a local government corporation governed by a board of directors comprised of the county judge of each participating county and three additional appointed members, each serving three-year terms. Board members include:

- Brazoria County – Judge Matt Sebesta
- Chambers County – Judge Jimmy Silva
- Galveston County – Judge Mark Henry
- Harris County – Judge Ed Emmett
- Jefferson County – Judge Jeff Branick
- Orange County – Judge Stephen Carlton
- District President – Robert Eckels
- At-large Member – Lisa LaBean
- At- large Member – Jim Sutherlin
- At-large-Member – Victor Pierson

In September 2013, the GCCPRD received a $3.9 million grant funded by the Texas General Land Office (GLO) through the Federal Housing and Urban Development (HUD) Community Development Block Grant (CDBG) Program. The purpose of this grant is to study opportunities for storm surge and flooding-related disaster mitigation, hazard warning, and other projects or programs to assist and protect persons, businesses, and properties along the upper Texas coast. The Storm Surge Suppression Study is a technical effort, based on science, to investigate opportunities to mitigate the vulnerability of the upper Texas coast from storm surge and flooding. Since receipt of the CDBG grant, the GCCPRD has been collecting and analyzing existing data, and collaborating with other organizations and universities conducting similar work.

The Storm Surge Suppression Study presents an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, public, and private institutions to develop a plan that meets the needs of the region and the nation.

1.2. Purpose and Scope

1.2.1. Study Purpose

The purpose of the Storm Surge Suppression Study is to investigate the feasibility of reducing the vulnerability of the upper Texas coast to storm surge and flood damages. The intent of this study is to develop a plan to protect the life, health, and safety of the community, and provide environmental and economic resilience within the study region. This will be achieved through study and analysis of integrated flood damage reduction systems comprised of natural or nature-based features, as well as structural and nonstructural alternatives. The study will examine the technical, environmental, social, and economic factors that will determine a cost-effective and efficient set of alternatives for flood damage reduction and surge suppression to help protect the six-county region. The study outcomes are critical to informing the general public of the potential risks associated with living and operating within this region and to solicit future support to procure the necessary resources to implement an integrated protection system.

The goals of the study are to:

- Determine appropriate actions that may be taken to protect the life, health, and safety of the community, and provide environmental and economic resilience within the study area.
- Develop a viable region-wide program that, once implemented, would better protect the region from future natural disasters associated with storm surge flooding events.
- Identify potential funding mechanisms to implement a storm surge suppression system for the study region.

1.2.2. Study Scope

The scope of the Storm Surge Suppression Study includes planning activities associated with development of viable long-term plans and strategies to protect the region from storm surge and flooding caused by devastating storm events. The study region consists of coastal areas that could be impacted by storm surge in Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties, Texas.

The Storm Surge Suppression Study will consider the following factors:

- Public engagement
- Economic modeling and analysis
- Hydrologic and hydraulic analysis
- Geotechnical analysis
- Preliminary structural design
- Environmental analyses
- Social analysis
- Surveying and mapping
- Real estate

These factors and the economic cost-benefit analysis will contribute to the overall evaluation of potential plan alternatives. A cost-benefit analysis is a systematic approach to estimating the strengths and weaknesses of an alternative and examines the benefits compared to the cost of a project.

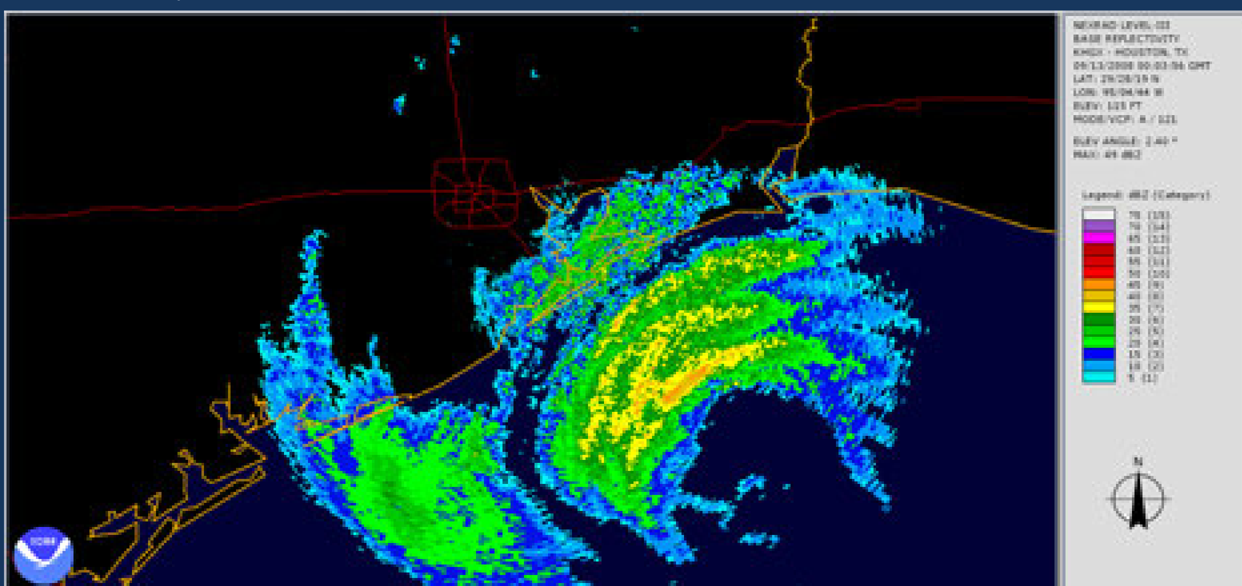
1.3. Methodology

The methodology used in this study is based on answering each of the following questions through a highly technical and scientific process which will enable the team to determine which potential alternatives will yield the highest benefits toward reducing storm-surge-related damages.

1.3.1. What is the threat?

The threat and subsequent impacts of storm events can be far-reaching and devastating to the life, health, and safety of the community, residential and commercial property, critical infrastructure, the natural environment, and the regional economy.

Hurricane Ike, 2008



NOAA representation of Hurricane Ike, 2008

On Saturday, September 13, 2008, Hurricane Ike made landfall over Galveston Island, Texas, around 2 a.m., with maximum sustained winds nearing 110 miles per hour and some higher gusts. At the time, Ike was an extremely large Category 2 hurricane with hurricane-force winds extending outward up to 120 miles from the center, and tropical-storm-force winds extending outward up to 275 miles. At its largest, Ike would have covered most of Texas. Ike's effects included deaths, widespread damage, and impacts to the price and availability of oil and gas. Ike also had a long-term impact on the U.S. economy and may become one of the most costly hurricanes in U.S. history (National Response Framework, 2008).

The study team will use advanced technical models, or a system of computer programs that simulate the many aspects of storm events, to determine the areas at risk within the study region. Specifically, the study team will use the ADvanced CIRCulation (ADCIRC), STeady-state spectral WAVE (STWAVE), and Simulating WAves Nearshore (SWAN) models to define the flooding depths, currents, and wave conditions associated with a variety of storm conditions.

Model outputs will be analyzed to predict potential storm water levels using a probabilistic approach. The ADCIRC model simulates tidal circulation and storm surge propagation. Wave models compute short-crested, wind-generated waves in coastal regions and inland waters. Wind-driven wave action combined with storm surge determines potential flood elevations. Using these models to predict potential storm water levels will enable the study team to determine the assets at risk as well as develop and design potential alternatives that reduce damages and provide enhanced protection.

1.3.2. What needs to be protected?

The study seeks to determine the appropriate actions that may be taken to protect life, health, and safety within the study region, and provide environmental and economic resilience. Once potential storm water elevations are determined using numerical models, the study team will be able to assess the existing vulnerability of the population, industry, and environment within the study region. These "baseline conditions" will provide the foundation for determining the effectiveness of potential alternatives. The study team will use Hydrologic Engineering Center-Flood Damage Risk Reduction Analysis (HEC-FDA) software developed by the U.S. Army Corps of Engineers (USACE) to perform an integrated hydrologic engineering and economic analysis during development and evaluation of potential surge reduction alternatives. The HEC-FDA software is an effective model for analyzing the economics of storm surge protection projects and is certified by the USACE and the White House Office of Management and Budget for use on federal flood protection projects.

1.3.3. How will we protect?

The study team will develop region-wide systematic programs that, once implemented, would better protect the region from future storm events. Systems of structural, nonstructural, and natural or nature-based alternatives will be developed and analyzed to evaluate the benefits gained from reduced storm damages. These benefits will then be compared to the cost for each alternative to develop a benefit-to-cost ratio (BCR) for each alternative. Understanding the BCR for each alternative will provide the study team the technical foundation to conduct an alternatives comparison. Final alternative selection will be based on decision support criteria. It should be noted that, regardless of the storm surge suppression system developed and implemented, **it will still be necessary for at-risk communities to evacuate homes and businesses to ensure personal safety during storm events**.

1.4. Report Presentation

The GCCPRD Storm Surge Suppression Study will be presented in three separate reports that align with the phases designated in the grant from the GLO. The study team has completed the first phase of the study, which focuses on data collection, and this report reflects the study team's findings for this phase.

1.4.1. Phase 1 – Data Collection

This phase consisted of collecting and analyzing the existing studies, reports, concepts, and background data pertinent to the region. The study team worked collaboratively with other researchers working within the same region to share data in order to avoid redundancy in our work efforts, and maximize each team's resources.

All of the data collected were stored in the study team database, which will be provided to the GLO as a public library. This data library will help advance the efforts of other researchers working on related studies now and in the future. The data sets collected include:

- Existing flood maps and modeling data from the USACE and the Federal Emergency Management Agency (FEMA)
- Existing topographic, drainage, geotechnical, and Geographic Information Systems (GIS) data pertinent to the six-county region and the Gulf Coast
- Data documentation collected or prepared by universities and planning agencies (Houston-Galveston Area Council, Jefferson County and Orange County Councils of Government, Rice University, Texas A&M University, and the University of Houston)
- Data and documentation collected by FEMA, USACE, the Texas Water Development Board (TWDB), and the GLO regional drainage districts
- Data related to the economic values associated with property on the county tax rolls, homes within the existing floodplain, and their first story elevations
- Economic data related to the potential national security impacts of a severe storm within the six-county region
- Data pertaining to other international solutions to prevent or mitigate flood damage resulting from extreme storm surge and repetitive water events
- Data associated with the existing hurricane protection systems within the region

The research conducted during Phase 1 of the study provided the knowledge and tools that planners and engineers will use in choosing the best course of action when developing alternatives to alleviate storm surge and flooding along the upper Texas coast. These alternatives based on sound technical, environmental, and economic analyses will create an integrated protection system that will reduce risk to the public, the economy, and the environment within the study region. Appendix A of this report presents a bibliography of the data collected during this phase. It is presented by name of file, file description, and regional location to which the data applies.

This Phase 1 Data Collection report will include recommendations for the next phase of the study, Phase 2-Technical Mitigation. After the report is reviewed and accepted by the GCCPRD Board and the GLO, the report findings will be disseminated to the public via the GCCPRD study website (www.gccprd.com).

Figure 3 - The GCCPRD study process

2. Description of the Study Area

The study region consists of coastal areas that could be impacted by storm surge in or around Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties, Texas. This six-county region currently has a growing population of over 5 million people and contains six major rivers and their watersheds, a nationally significant coastal estuary and navigation system, a booming fisheries and tourism industry, and is home to NASA and the largest complex of petro-chemical facilities in the United States (U.S.).

2.1. Objectives of the Study

The study seeks to determine the appropriate actions that may be taken to protect life, health, and safety within the region, and provide environmental and economic resilience. Based on the study team's investigation and analysis, the GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and surge suppression measures to help protect the six-county region.

The goals of the study are to:

- Determine appropriate actions that may be taken to protect the life, health, and safety of the community, and provide environmental and economic resilience within the study area.
- Develop a viable region-wide program that, once implemented, would better protect the region from future natural disasters associated with storm surge flooding events.
- Identify potential funding mechanisms to implement a storm surge suppression system for the study region.

2.2. Background of the Natural and Human Environment

Spanning nearly 600,000 square miles across five states (Alabama, Florida, Louisiana, Mississippi, and Texas), six Mexican states, and Cuba, the Gulf of Mexico constitutes a diverse and vibrant ecosystem, which is a vital environmental, economic, and cultural asset for the entire U.S. Despite many significant environmental and human-made stressors, the Gulf is able to support a host of commercial and recreational uses and provide the backdrop for the unique cultures and heritage of the region. However, unless bold and broad-scale measures are taken soon, the health and future of the Gulf will remain in jeopardy.

The Gulf is endowed with a variety of coastal and marine habitats, including wetlands, barrier islands, beaches, and coral and oyster reefs. These habitats are integral to the economies and cultural fabric of the Gulf and the nation, providing a range of ecosystem services including fisheries, wildlife-related activities, food production, energy production, infrastructure protection, and recreational opportunities. Healthy Gulf Coast habitats also contribute to the resilience of Gulf Coast communities, providing a line of defense for coastal communities and their associated infrastructure against powerful storms. The Gulf's wetlands provide a natural flood attenuation function, which may reduce the impacts of flooding associated with storms. During flood events, riparian buffers and wetlands can slow runoff and absorb excess water.

Gulf habitats are rich havens of biodiversity. The Gulf Coast's wetlands, beaches, coastal woodlands, and waterbird nesting islands are major nurseries for breeding birds, and provide foraging and stopover sites for millions of migrating birds that converge from several of the most important migratory flyways. Coastal marshes and near-shore habitats provide essential nursery habitat for ecologically, commercially, and recreationally important species of fish and invertebrates. Offshore, the Gulf supports biologically diverse marine habitats and species, including deepwater corals, sponges, fish stocks, and other unique communities. The Gulf region is also home to coastal, marine, and freshwater species listed as threatened or endangered and several species of protected marine mammals.

The Texas Gulf Coast is a powerful economic engine for the nation and home to a wide range of industries, including more than 90 percent of offshore oil and gas production, one-third of the UNITED STATES seafood harvest, and a vast network of commercially important shipping lanes and ports. Tourism and recreational activities, such as fishing, boating, beachcombing, and bird watching, support more than 800,000 jobs across the region, making a significant economic input to Gulf communities and the nation. All of these industries depend on a healthy and resilient Gulf (Gulf Coast Ecosystem Restoration Task Force, 2011).

The upper Texas Gulf Coast ecosystem, consisting of offshore waters and coastal habitats, is home to ecologically, culturally, commercially, and recreationally important species of fish and wildlife (Gulf Coast Ecosystem Restoration Task Force, 2011). The National Aeronautics and Space Administration's (NASA) Johnson Space Center is located within the study region. The region is essential not only to the national economy, but to national security as well. The study region contains the largest concentration of energy, petrochemical, and refining industries in the UNITED STATES This includes 25 percent of the nation's petroleum refining capability, 40 percent of the nation's capacity for downstream chemical production, and the fastest growing liquefied natural gas (LNG) industry in the nation. The study region contains seven ports, three of which are ranked in the top fifteen ports in the nation (Houston, Beaumont, and Texas City). The Texas Gulf Coast is among the nation's most valuable and important resources.

2.3. Study Area Boundary

The geographical boundaries for the study area consists of all land located within the storm surge risk zone of a Category 5 Hurricane (Figure 4, Page 11). The storm surge risk zone is defined as how far inland seawater will be pushed onshore from a hurricane. The size of the six-county region study area is approximately 2,915 square miles with a continually growing population of over 5 million people. The following table identifies total area coverage per county within the GCCPRD study area:

Table 1 - Total Size of the GCCPRD Study Area

County	Area in Square Miles
Brazoria	808
Chambers	506
Galveston	384
Harris	207
Jefferson	702
Orange	308
TOTAL	**2,915**

Source: FEMA, 2014

2.4. Environmental Constraints

This section describes the environmental setting of the six-county GCCPRD study area that could potentially be affected by any future alternatives.

2.4.1. Land Use

Land use is defined as the human use of land. Land use involves the management and modification of natural environment or wilderness into built environment such as cities and semi-natural habitats such as arable fields, pastures, and managed woods.

2.4.1.1. County Population

Population and housing growth patterns for the region are dominated by urban-rural migration and the increasing suburbanization of the larger urban areas within the study area. The following table identifies total population amounts per county as well as population counts just within the GCCPRD study area of each county:

Table 2 - Population Counts by County

County	Population within the Study Area	Total County Population
Brazoria	134,990	330,242
Chambers	23,436	36,812
Galveston	280,253	306,782
Harris	357,140	4,337,000
Jefferson	186,834	252,358
Orange	65,327	82,957
TOTAL	**1,231,020**	**5,346,151**

Source: NLCD, 2011

2.4.1.2. Cities

The following table identifies some of the cities that are within or partially within the GCCPRD study area as well as their populations as of 2010:

Table 3 - Cities in the GCCPRD Study Area

City	County	Population
Alvin	Brazoria	24,236
Angleton	Brazoria	18,862
Brazoria	Brazoria	3,019
Freeport	Brazoria	12,049
Lake Jackson	Brazoria	26,849
Anahuac	Chambers	2,210
Mont Belvieu	Chambers	3,835
Dickinson	Galveston	18,680
Friendswood	Galveston	35,808
Galveston	Galveston	47,743
Kemah	Galveston	3,334

City	County	Population
League City	Galveston	83,560
Texas City	Galveston	45,099
Baytown	Harris	71,802
Deer Park	Harris	32,010
Galena Park	Harris	10,887
Houston	Harris	2,195,914
La Porte	Harris	33,800
Pasadena	Harris	149,043
Webster	Harris	10,400
Beaumont	Jefferson	118,296
Nederland	Jefferson	17,547
Port Arthur	Jefferson	57,755
Orange	Orange	18,643
Pinehurst	Orange	2,097
Vidor	Orange	11,440

Source: 2010 U.S. Census Bureau

2.4.1.3. Roadways

High quality transportation is necessary for Texas, and highways provide the overwhelming majority of the public transportation infrastructure in the Texas Gulf Coast area. Also, trade through Texas Gulf Coast ports and across the Mexican border requires highway access in order to be competitive in global industries and serve Texas citizens and businesses. In addition, roadways provide evacuation routes during hurricanes and are serviced by emergency personnel during times of crisis (Texas Department of Transportation, 2014).

The following table depicts major roadways in the six-county study area:

Table 4 - Major Roadways in the Six-County GCCPRD Study Area

Roadway	County
IH 10	Chambers, Harris, Jefferson, Orange
IH 45	Galveston, Harris
IH 69/US 59	Harris
IH 610	Harris
US 69/96/287	Jefferson
US 90	Harris, Orange
US 90A	Harris
SH 3	Harris, Galveston
SH 6	Brazoria, Galveston, Harris
SH 12	Orange
SH 35	Brazoria/Harris/Galveston
SH 36	Brazoria
SH 61	Chambers
SH 62	Orange
SH 65	Chambers
SH 73	Jefferson, Orange
SH 82	Jefferson
SH 87	Chambers, Galveston, Jefferson, Orange
SH 105	Jefferson
SH 124	Jefferson
SH 146	Chambers, Galveston, Harris
SH 225	Harris
SH 249	Harris
SH 288	Brazoria, Harris
SH 326	Jefferson
SH 347	Jefferson

Source: Texas Department of Transportation, 2014

2.4.1.4. Rail

The upper Texas Gulf Coast region has an extensive rail network, with east-west lines linking the southern U.S. and north-south lines connecting the northern U.S. as well as Mexico. This rail network supports important regional industries, such as chemical, paper, and lumber, and international trade (U.S. Climate Change Science Program, 2008). Major Rail providers within the study area are:

- BNSF
- Kanas City Southern
- Union Pacific Railroad
- Sabine River and Northern Railroad

2.4.1.5. Ports

Seven ports are located within the study area. These ports are not only crucial for the economy of the nation, but they are instrumental in national security as well. The following table lists the ports and the rank they hold in total tonnage transported according to the U.S. Bureau of Transportation Statistics:

Table 5 - Ports in the GCCPRD Study Area

Port	County	U.S. Rank in Total Tons
Houston	Harris	2
Beaumont	Jefferson	5
Texas City	Galveston	11
Port Arthur	Jefferson	23
Freeport	Brazoria	31
Galveston	Galveston	47
Orange	Orange	*

*Source: U.S. Bureau of Transportation Statistics, 2014 *The report only covered the top 50 ports in the U.S.*

2.4.1.6. National Wildlife Refuges and State Parks

National Wildlife Refuge (NWR) is a designation for certain protected areas of the U.S. managed by the U.S. Fish and Wildlife Service (USFWS). The National Wildlife Refuge System is the system of public lands and waters set aside to conserve America's fish, wildlife, and plants (USFWS, 2014).

Texas state parks are protected areas (such as state historic sites) managed at the sub-national level within those nations which use "state" or "province" as a political subdivision. State parks are typically established by a state to preserve a location on account of its natural beauty, historic interest, or recreational potential (TPWD, 2014).

There are six NWRs and five Texas state parks located within the GCCPRD study area (Figure 4). The following table identifies them and the county in which they are located:

Table 6 - NWR and State Parks in the GCCPRD Study Area

Name	County
San Bernard National Wildlife Refuge	Brazoria
Brazoria National Wildlife Refuge	Brazoria

Name	County
Battleship Texas State Historic Site	Harris
San Jacinto Battleground State Historic Site	Harris
San Jacinto Monument State Historic Site	Harris
Galveston Island State Park	Galveston
Anahuac National Wildlife Refuge	Galveston/Chambers
McFaddin National Wildlife Refuge	Galveston/Chambers/Jefferson
Moody National Wildlife Refuge	Chambers
Sea Rim State Park	Jefferson
Texas Point National Wildlife Refuge	Jefferson

Source: USFWS and TPWD, 2014

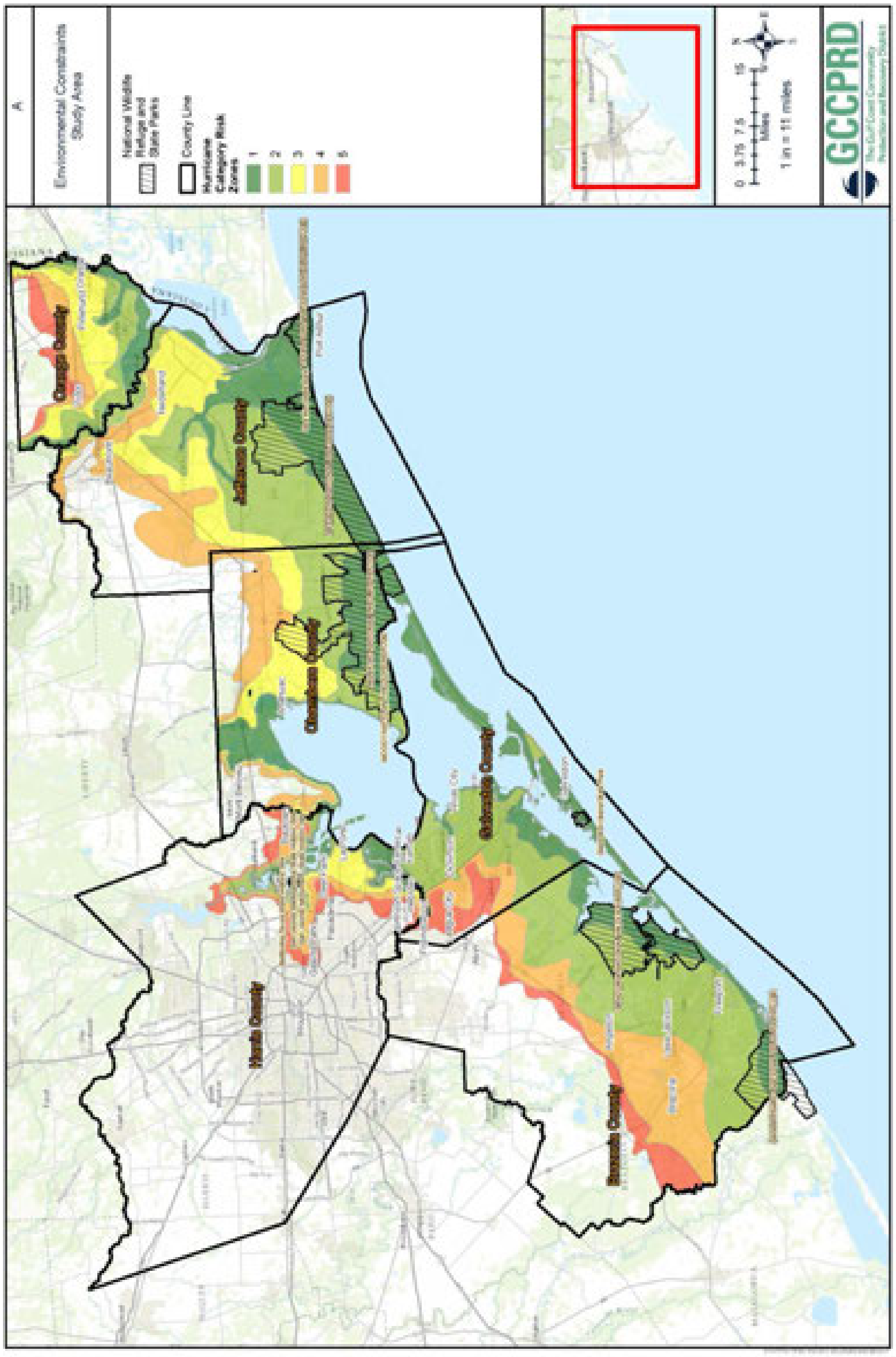


Figure 4 - Environmental Constraints Study Area

2.4.2. *Water Resources*

2.4.2.1. National Wetland Inventory

Wetlands of the U.S. are defined by the USACE and the U.S. Environmental Protection Agency (EPA) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Wetlands generally include swamps, marshes, bogs, and similar areas." Wetlands can be valued in terms of their contributions to ecological, economic, and social systems. Wetlands service these systems through multiple processes including water filtration, water storage, and biological productivity. They also contribute to the functions of flood control, providing a nutrient sink, groundwater recharge, and habitat (USFWS, 2014).

In the U.S., the National Wetland Inventory (NWI) is a USFWS program started in the 1970s to inventory and map all wetlands, primarily for scientific purposes. The data and maps it produces have been used to track gains and loss of wetlands for more than two decades. The following table identifies total NWI amounts per county within the GCCPRD study area (Figure 5 - Figure 10):

Table 7 - NWI in the GCCPRD Study Area

County	Area in Square Miles
Brazoria	244
Chambers	237
Galveston	110
Harris	27
Jefferson	460
Orange	114
TOTAL	**1,192**

Source: USFWS, 2014

2.4.2.2. River Basins

Water resources can usefully be divided into two major categories river and coastal basins. A river basin is the portion of land drained by a river and its tributaries. It encompasses the entire land surface dissected and drained by many streams and creeks that flow downhill into one another, and eventually into the Gulf of Mexico (Milwaukee Riverkeeper, 2014).

Rivers thread together creeks and streams; valleys and hills; and lakes and underground springs that share a common assembly of water. Whatever happens to surface or groundwater in one part of the river basin will find its way to other parts. If water is diverted out of its downward course in one section, other parts will come to "know" of its absence. A river basin comes closer than any other defined area of land, with the exception of an isolated island, to meeting the definition of an ecosystem in which all things, living and non-living, are connected and interdependent (Milwaukee Riverkeeper, 2014).

Once the river basin flows to the coast their boundaries become harder to define. Each coastal basin is named according to the major river basin that bound them (ie. Brazos-Colorado, Neches-Trinity). Each coastal basin is also bounded by a bay or other outlet to the Gulf of Mexico (TWDB 14).

The following table identifies the river and coastal basins by county within the GCCPRD study area:

Table 8 - River and Coastal Basins in the GCCPRD Study Area

County	Basins in Each County
Brazoria	Brazos, Brazos-Colorado, & San Jacinto-Brazos
Chambers	Neches-Trinity, Trinity, & Trinity-San Jacinto
Galveston	San Jacinto-Brazos
Harris	San Jacinto-Brazos & Trinity-San Jacinto
Jefferson	Neches-Trinity & Neches
Orange	Neches & Sabine

Source: TWDB (14)

2.4.2.3. Floodplains

The 100-year floodplain is the land that is predicted to flood during a 100-year storm event, which has a 1 percent chance of occurring in any given year. The 100-year floodplain is also referred to as the 1 percent annual chance floodplain or base flood. Areas within the 100-year floodplain may flood during much smaller storms as well (FEMA, 2014). The 100-year floodplain is used by the FEMA to administer the Federal Flood Insurance Program. The following table identifies total floodplain amounts per county within the GCCPRD study area (Figure 5 - Figure 10):

Table 9 - Floodplains in the GCCPRD Study Area

County	Area Within 100-year Floodplain (Square Miles)
Brazoria	244
Chambers	237
Galveston	110
Harris	27
Jefferson	460
Orange	114
TOTAL	**1,192**

Source: FEMA, 2014

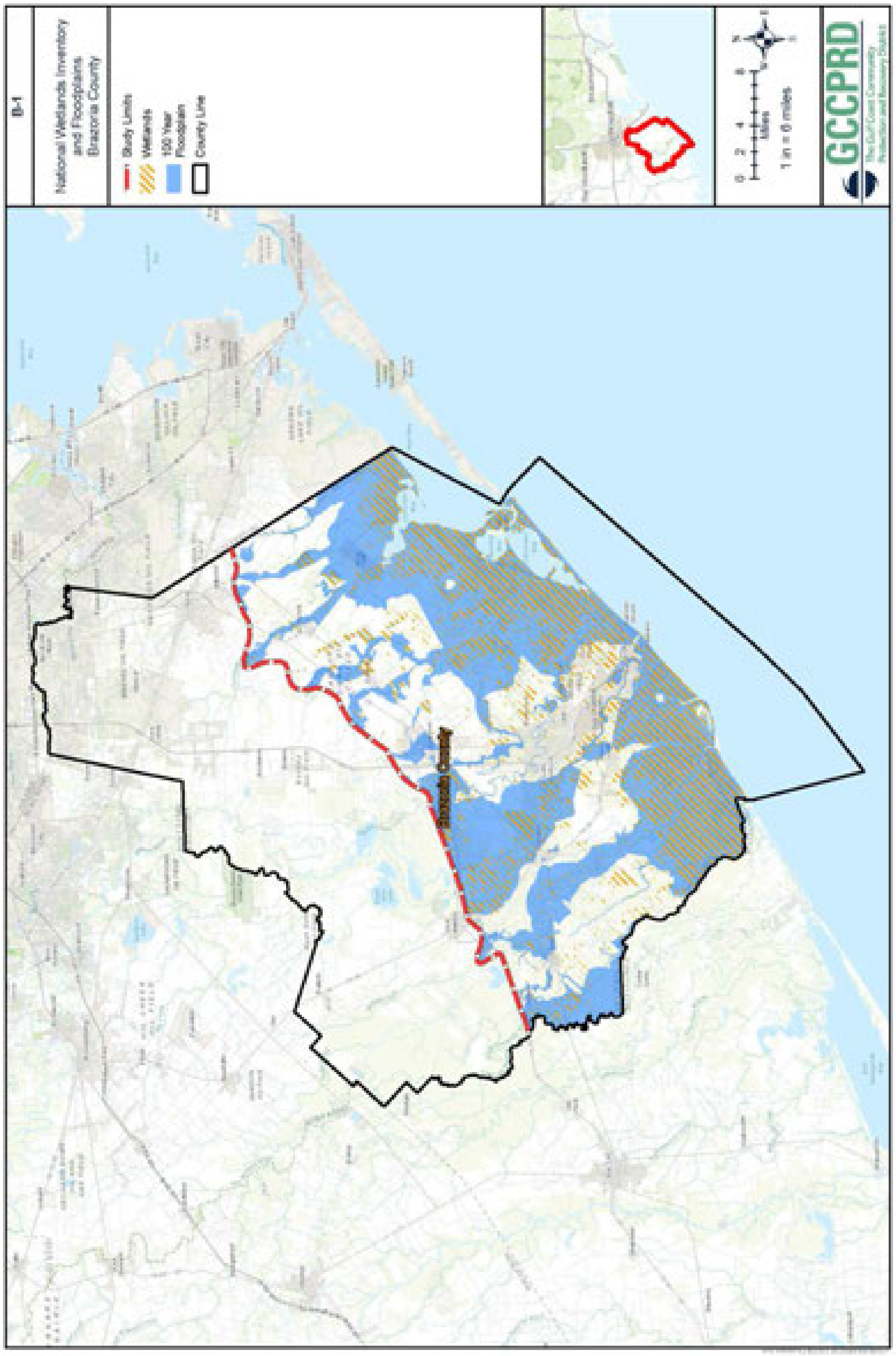


Figure 5 - National Wetlands Inventory and Floodplains - Brazoria County

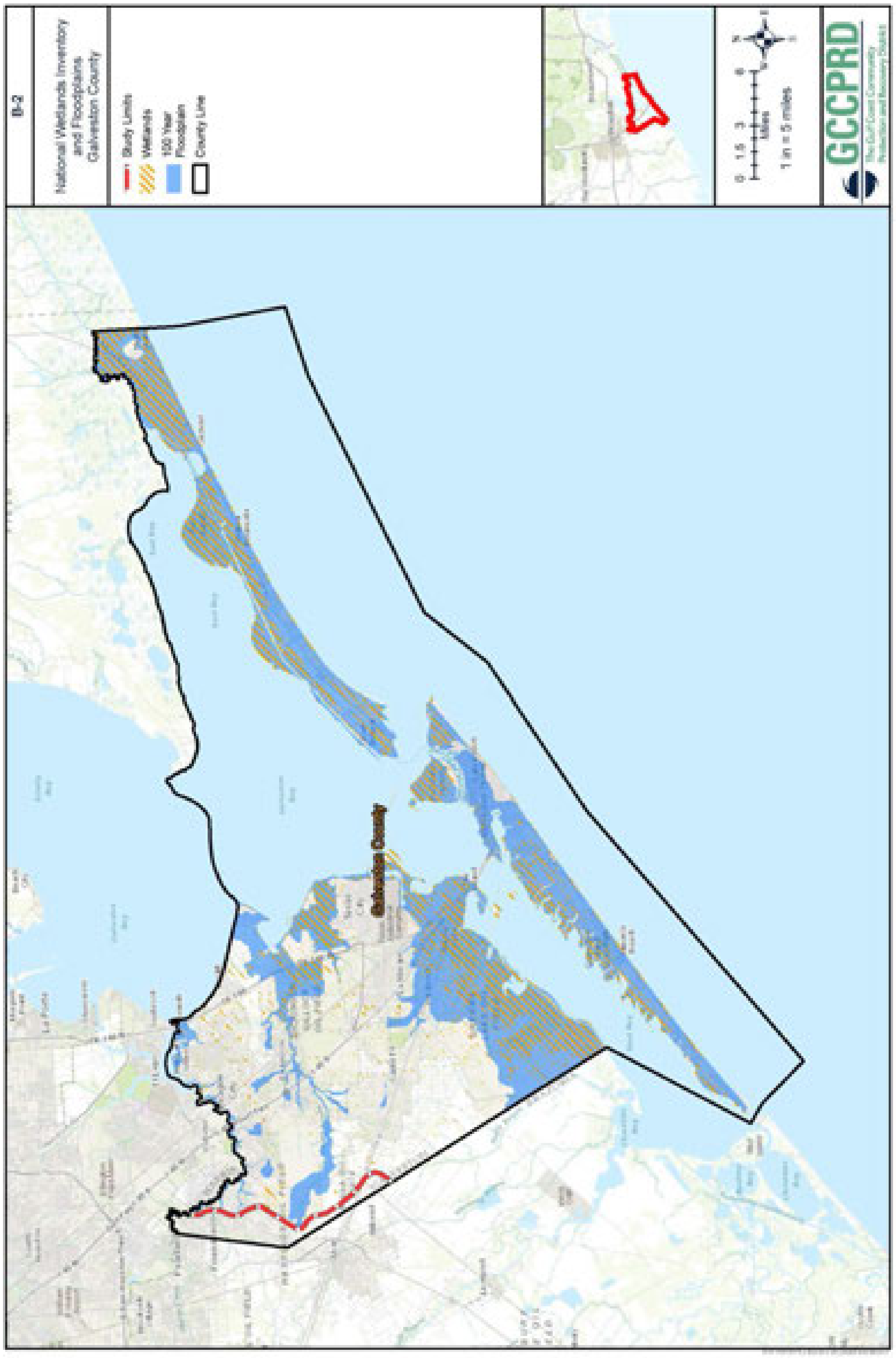


Figure 6 - National Wetlands Inventory and Floodplains - Galveston County

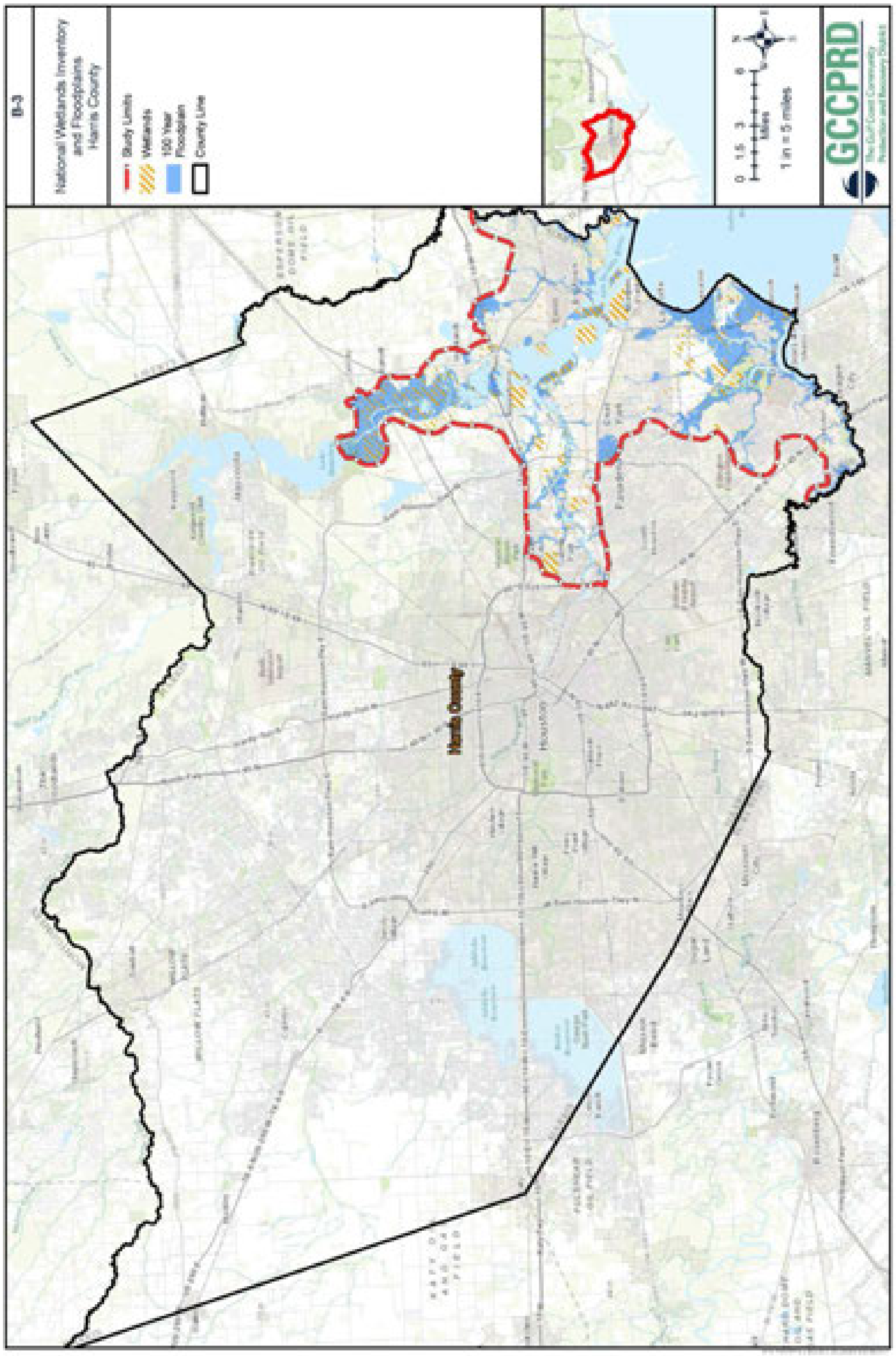


Figure 7 - National Wetlands Inventory and Floodplains - Harris County

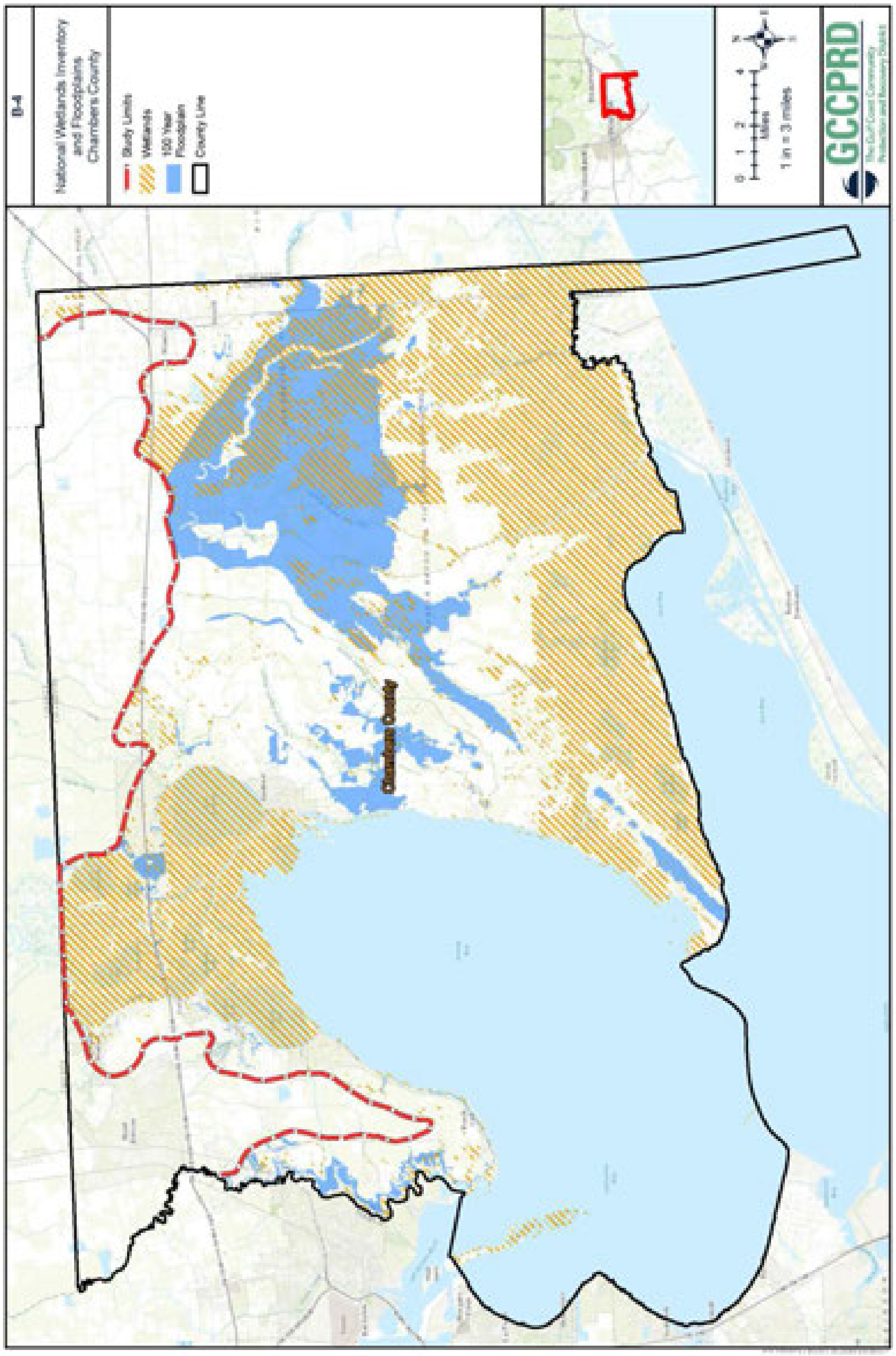


Figure 8 - National Wetlands Inventory and Floodplains - Chambers County

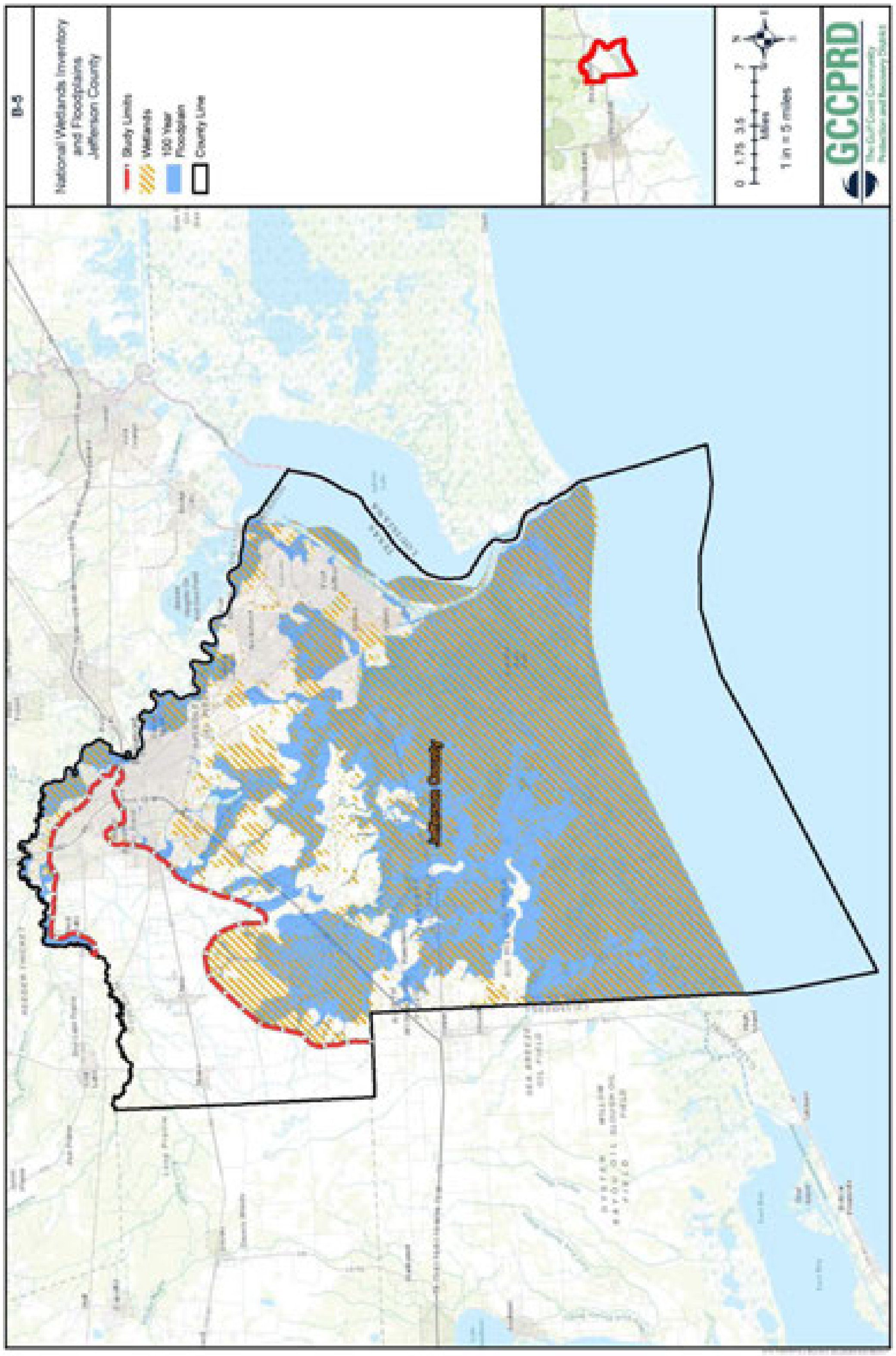


Figure 9 - National Wetlands Inventory and Floodplains - Jefferson County

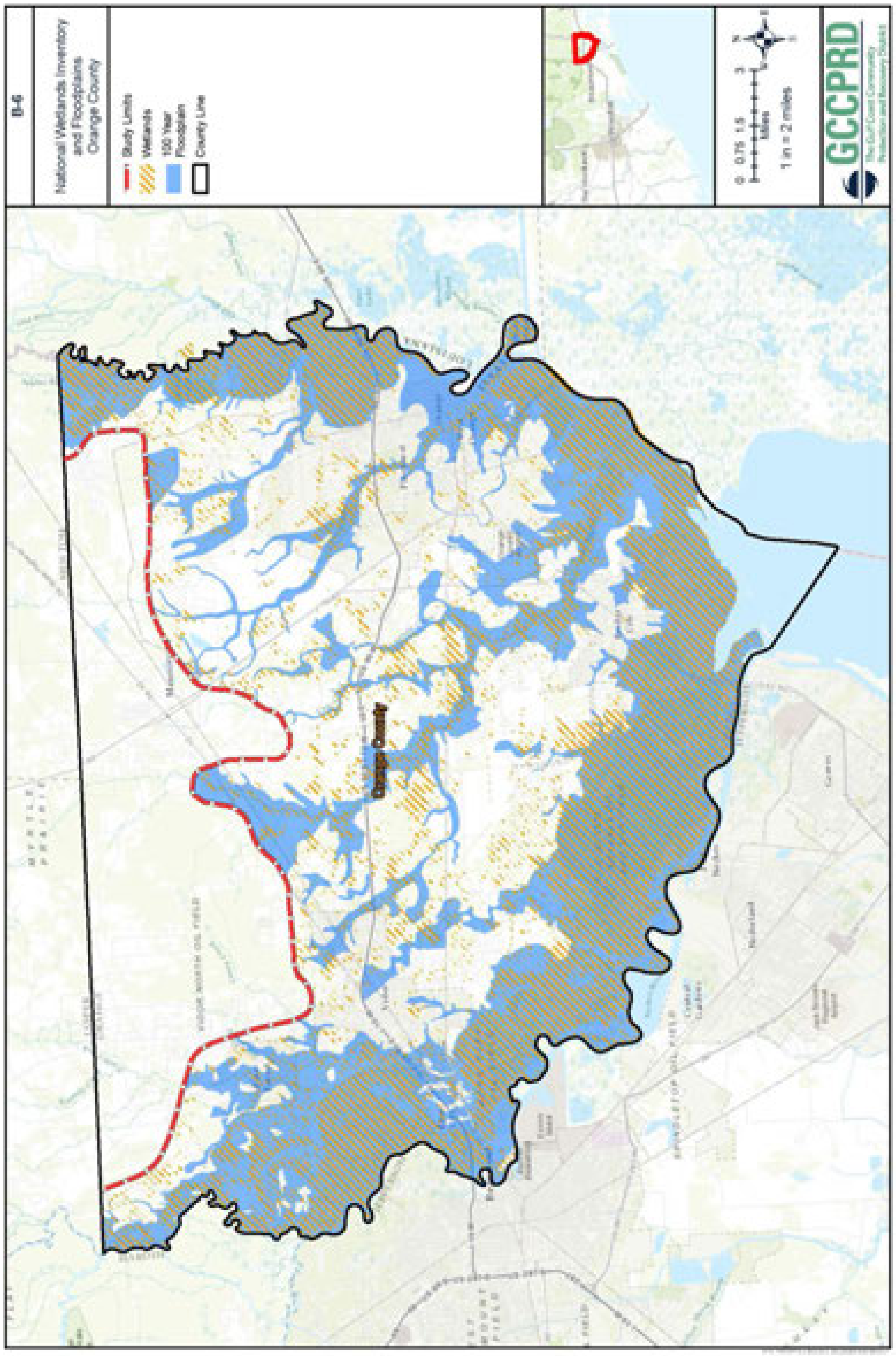


Figure 10 - National Wetlands Inventory and Floodplains - Orange County

2.4.3. Coastal Barriers

Coastal barriers are landscape features that protect the mainland, lagoons, wetlands, and salt marshes from the full force of wind, wave, and tidal energy. "Undeveloped coastal barriers" are defined by the Coastal Barrier Resources Act (CRBA) to include barrier islands, bars, spits, and tombolos, along with associated aquatic habitats, such as adjacent estuaries and wetlands. Composed of sand and other loose sediments, these elongated, narrow landforms are dynamic ecosystems and are vulnerable to hurricane damage and shoreline recession. Coastal barriers also provide important habitat for a variety of wildlife, and are an important recreational resource (USFWS, 2014). The following table identifies the total amount of coastal barriers per county within the GCCPRD study area (Figure 11):

Table 10 - Coastal Barriers in the GCCPRD Study Area

County	Area in Square Miles
Brazoria	49.5
Chambers	3.7
Galveston	33.7
Harris	--
Jefferson	126
Orange	--
TOTAL	**212.9**

Source: USFWS (16)

2.4.4. Threatened or Endangered Species Critical Habitat

Critical habitat for a threatened or endangered species is a specific geographic area that contains features essential for the conservation of a threatened or endangered species that may require special management and protection (USFWS, 2014). According to the USFWS Critical Habitat Portal online tool, one threatened species was identified to have critical habitat within the study area: the piping plover (*Charadrius melodus*). The piping plover is a small sand-colored, sparrow-sized shorebird that nests and feeds along coastal sand and gravel beaches in North America. These shorebirds forage for food on beaches, usually by sight, moving across the beaches in short bursts. Generally, piping plovers will forage for food around the high tide wrack zone and along the water's edge. They eat mainly insects, marine worms, and crustaceans. The following table identifies total critical habitat amounts for the piping plover per county within the GCCPRD study area (Figure 11):

Table 11 - Critical Habitat for the Piping Plover in the GCCPRD Study Area

County	Area in Square Miles
Brazoria	0.71
Chambers	--
Galveston	5.8
Harris	--
Jefferson	--
Orange	--
TOTAL	**6.51**

Source: USFWS (17)

Figure 11 - Biological Constraints

2.4.5. Vegetation Types

The "Vegetation Types of Texas" map, developed by the Texas Parks and Wildlife Department (TPWD), is a result of efforts by the Texas Parks and Wildlife Department (TPWD) to delineate and categorize existing vegetation and landcover types statewide using Landsat data, computer classification analysis, and systematic accuracy verification procedures. It represents information summarized from a mosaic of larger scale vegetation maps published by the TPWD (TPWD, 2014).

The great plant diversity and complex patterns of plant distribution in Texas developed in response to a matrix of complex environmental factors including geology, topography, climatic zones, rainfall belts, and soil types. There are more than 5,000 species of vascular plants (trees, shrubs, vines, wildflowers, grasses, and grass-like plants such as sedges and rushes). Of this number, about 400 are endemic. Nearly half (523) of the grass species indigenous to the U.S. occur in Texas. More than 500 species of vascular plants are introduced and considered invasive species. Unfortunately, many of these invasive species have degraded or destroyed habitat for native plant species (TPWD, 2014). The following table identifies the vegetation types per county within the GCCPRD study area (Figure 12 - Figure 17):

Table 12 - Vegetation Types within the GCCPRD Study Area

Vegetation Type*	Brazoria	Chambers	Galveston	Harris	Jefferson	Orange
Agriculture	27	115	3	1	22	8
Barren Land	2	1	4	3	2	1
Bottomland Forest and Shrub	292	--	--	--	--	--
Gulf Coast Prairies and Marshes	365	219	213	34	418	64
Invasive Vegetation	39	31	36	32	57	53
Pineywoods	3	37	2	19	53	125
Post Oak Savanna	--	--	10	3	--	--
Urban	42	12	85	107	107	35
Water	38	39	31	8	43	21
TOTAL	**808**	**506**	**384**	**207**	**702**	**308**

*Source: TPWD, 2014 *Area in square miles.*

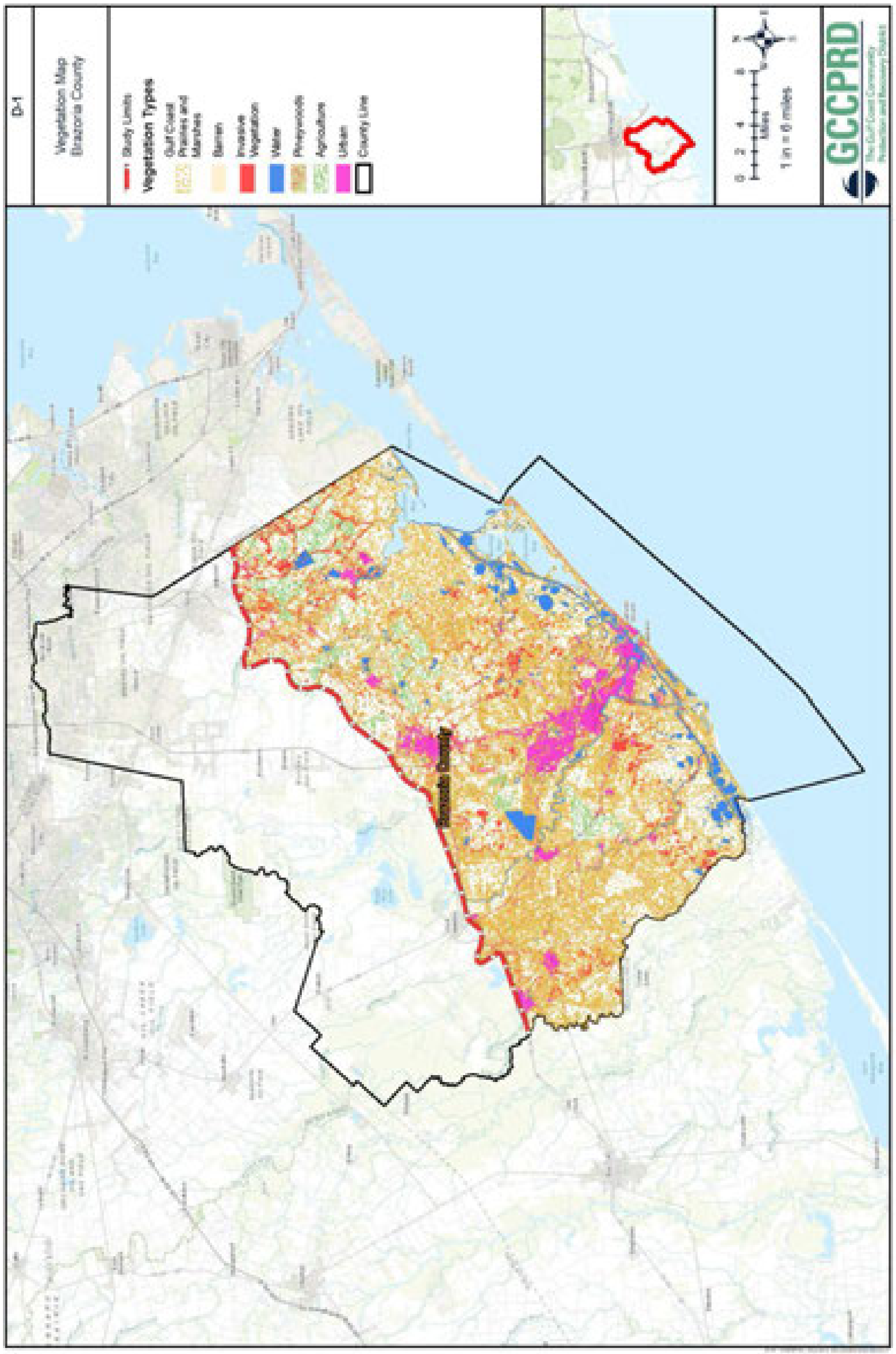


Figure 12 - Vegetation Map - Brazoria County

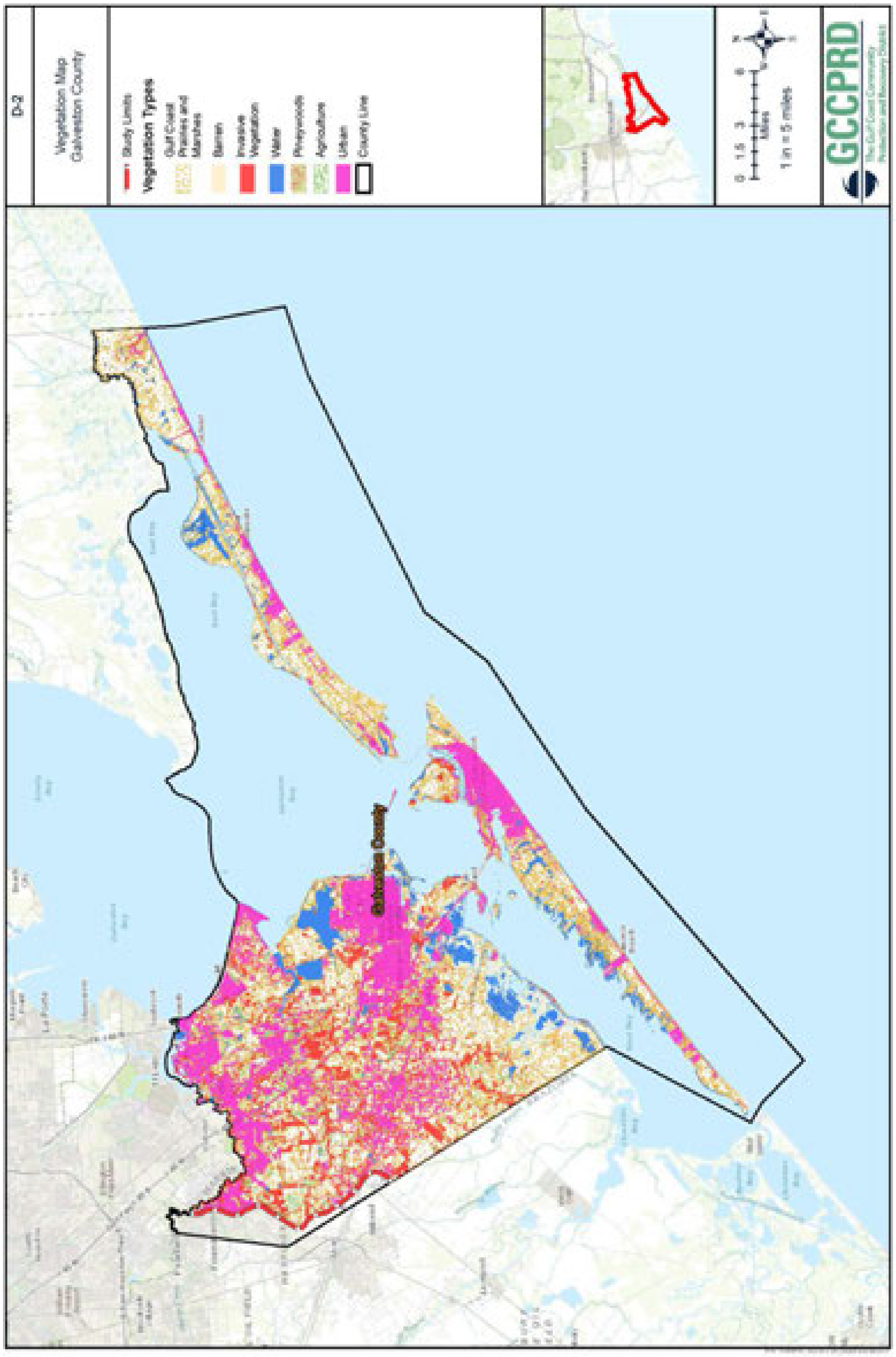


Figure 13 - Vegetation Map - Galveston County

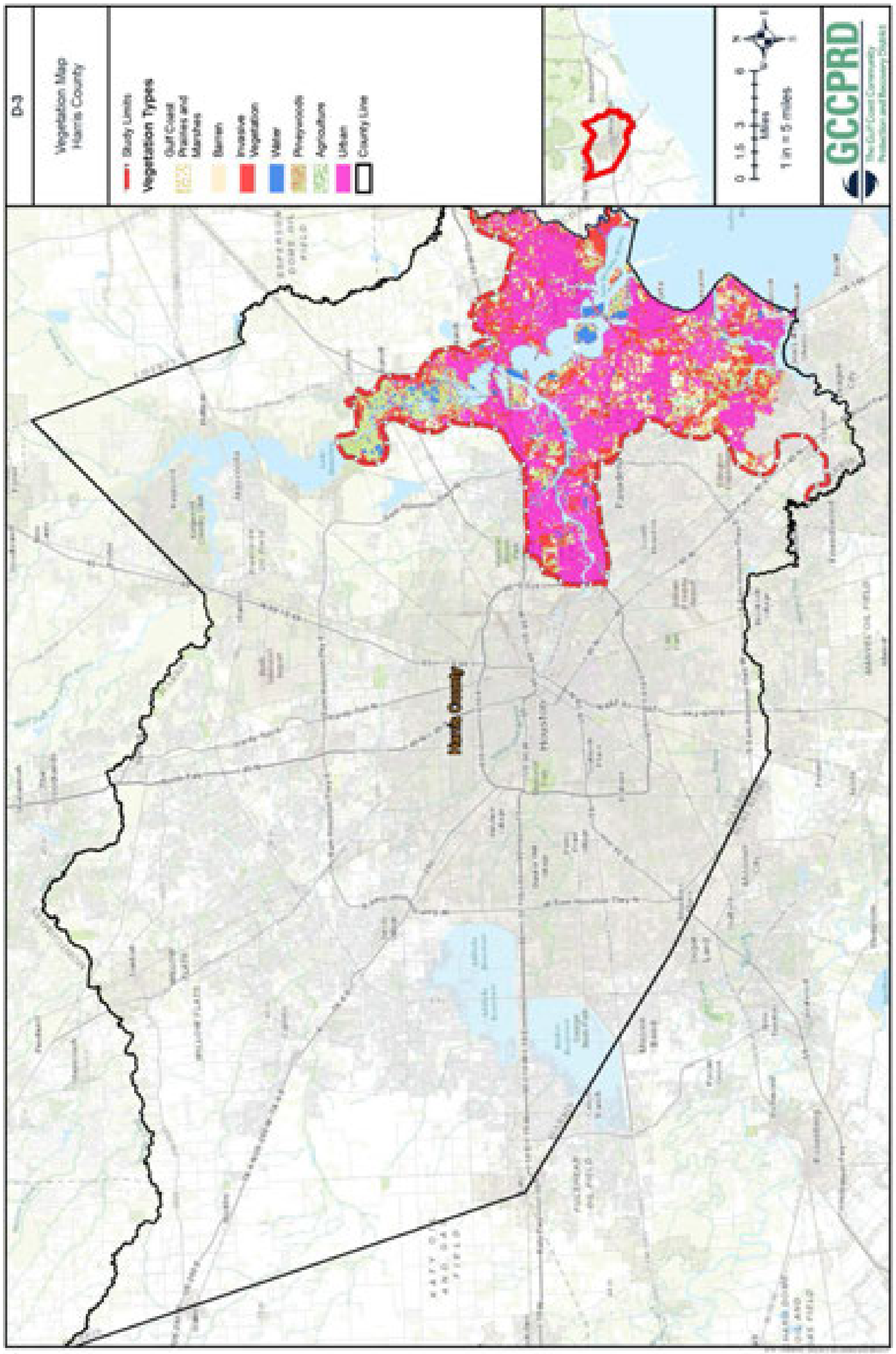


Figure 14 - Vegetation Map - Harris County

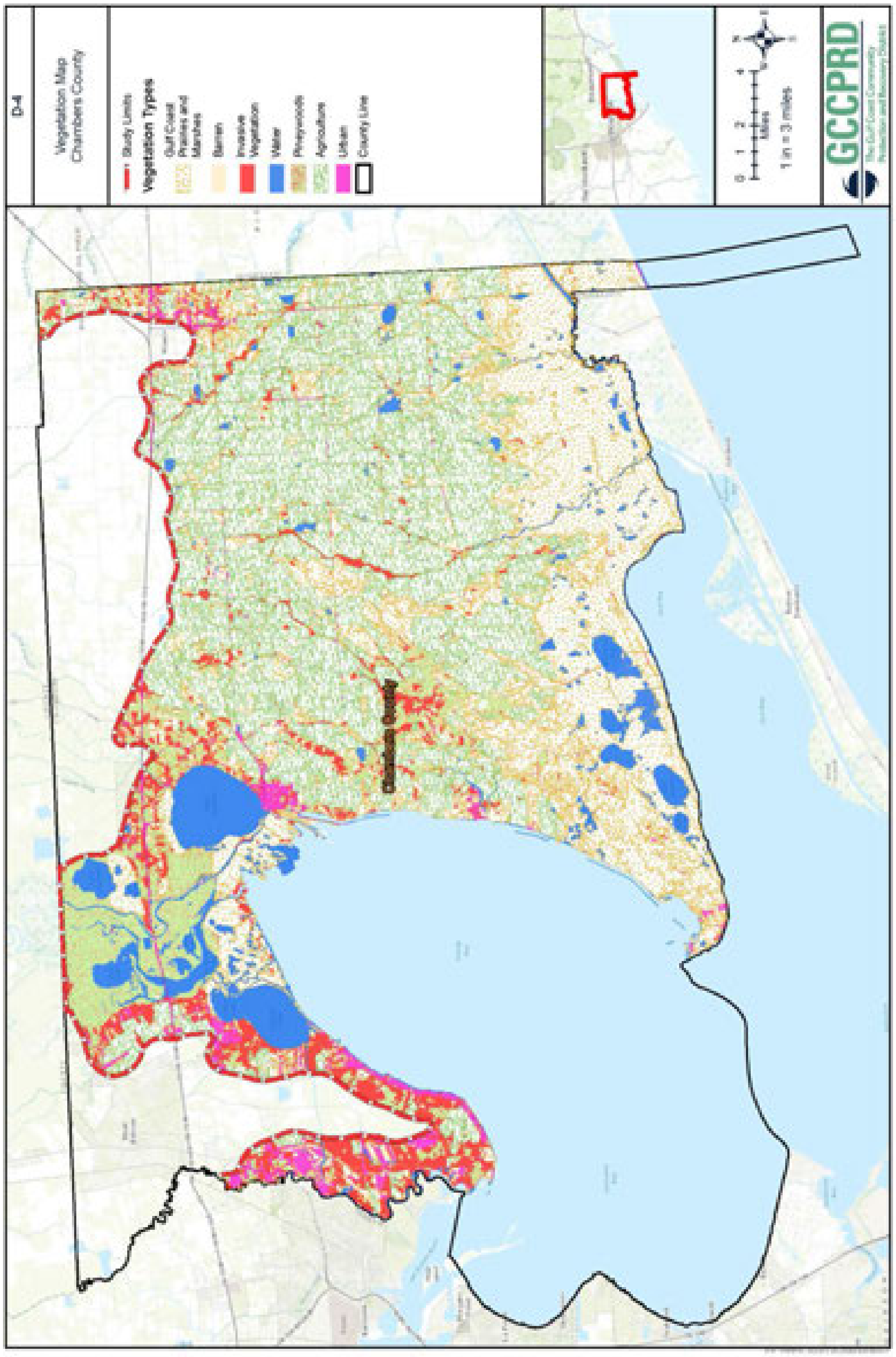


Figure 15 - Vegetation Map - Chambers County

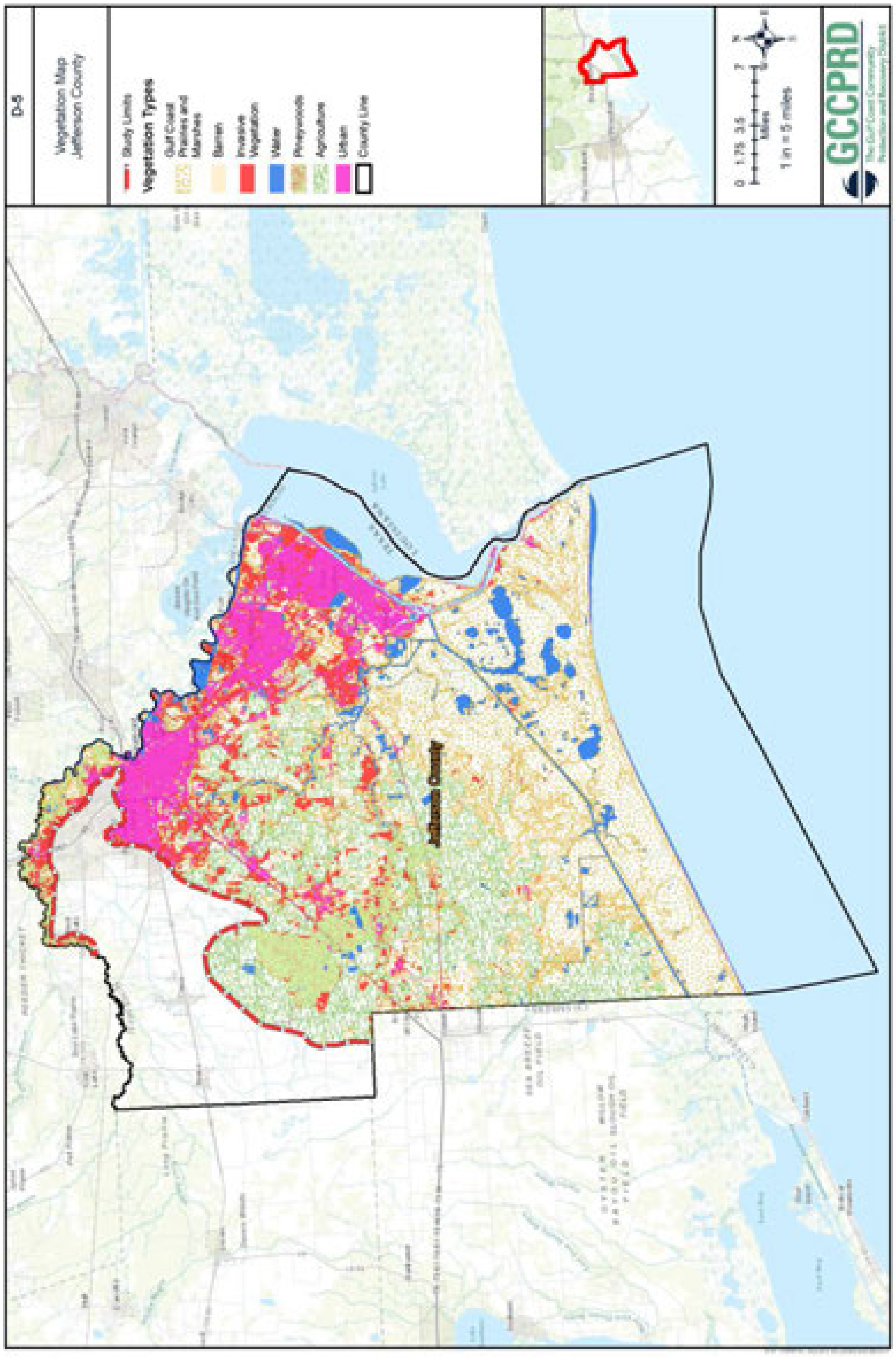


Figure 16 - Vegetation Map - Jefferson County

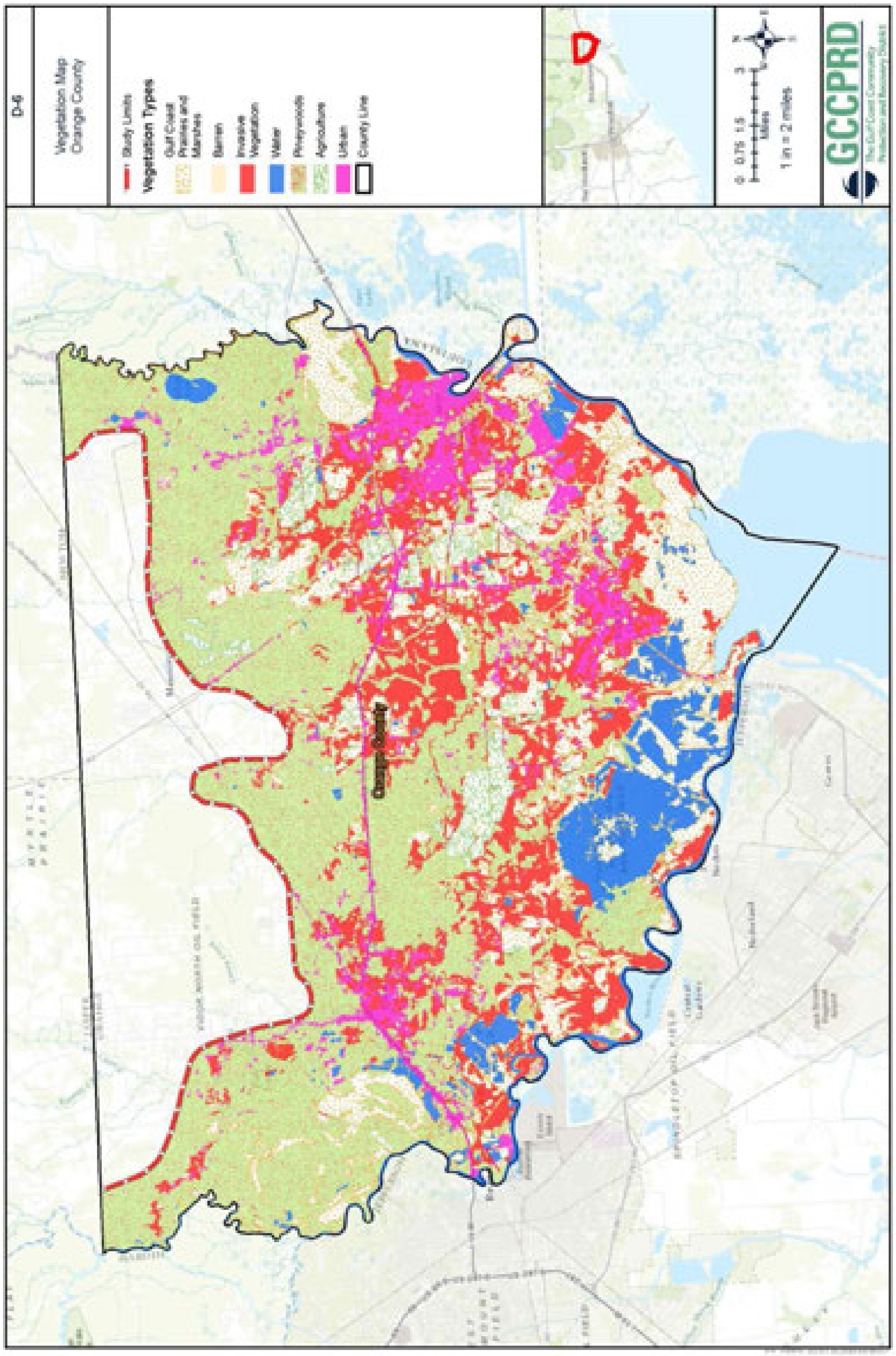


Figure 17 - Vegetation Map - Orange County

2.4.6. Essential Fish Habitat

Essential fish habitat (EFH) is defined as those waters and the material that rests at the bottom of those waters (i.e., Mud, sand, grave, structures, associated biological communities) that are necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (NOAA, 2014). The following habitat sites were identified within the study area for this report:

Red Drum: EFH for red drum (*Sciaenops ocellatus*) consists of all Gulf of Mexico estuaries; waters and substrates extending from Vermilion Bay, Louisiana to the eastern edge of Mobile Bay, Alabama out to depths of 150 feet; waters and substrates extending from Crystal River, Florida to Naples, Florida between depths of 30 and 60 feet; waters and substrates extending from Cape Sable, Florida to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council (SAFMC) between depths of 30 and 60 feet (NOAA, 2014).

Reef Fish: EFH for reef fish consists of Gulf of Mexico waters and substrates extending from the U.S./Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the SAFMC from estuarine waters out to depths of 600 feet (NOAA, 2014).

Shrimp: EFH for shrimp consists of Gulf of Mexico waters and substrates extending from the U.S./Mexico border to Fort Walton Beach, Florida from estuarine waters out to depths of 600 feet; waters and substrates extending from Grand Isle, Louisiana to Pensacola Bay, Florida between depths of 600 to 1,950 feet; waters and substrates extending from Pensacola Bay, Florida to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the SAFMC out to depths of 210 feet, with the exception of waters extending from Crystal River, Florida to Naples, Florida between depths of 60 and 150 feet and in Florida Bay between depths of 30 and 60 feet (NOAA, 2014).

The table below is a summary of the EFH sites along the coast of the GCCPRD study area (Figure 11):

Table 13 - EFH within the GCCPRD Study Area

EFH Type*	Brazoria	Chambers	Galveston	Harris	Jefferson	Orange
Red Drum	11.6	8.3	8.8	1.5	18.7	5.2
Reef Fish	12.2	8.3	9.5	1.6	19.3	5.2
Shrimp	12.1	8.4	9.6	1.4	19.3	5.1
TOTAL	**35.9**	**25**	**24.3**	**4.5**	**57.3**	**15.5**

*Source: NOAA, 2014 *Area in square miles.*

2.4.7. Historic Sites

The National Register of Historic Places (NRHP) is the official list of the nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources (NPS, 2014). The following table identifies the national historic sites per county within the GCCPRD study area (Figure 18 - Figure 23):

Table 14 - National Historic Sites in the GCCPRD Study Area

County	Historic Sites
Brazoria	6
Chambers	2
Galveston	68
Harris	8
Jefferson	18
Orange	7
TOTAL	**109**

Source: NPS, 2014

2.4.8. Hazardous Materials Sites

Hazardous materials sites in the U.S. are defined and regulated primarily by laws and regulations administered by the EPA, the U.S. Occupational Safety and Health Administration, the U.S. Department of Transportation, and the U.S. Nuclear Regulatory Commission. The following sites were identified within the study area for this report:

Hazardous Waste (RCRA): Hazardous waste information contained in the Resource Conservation and Recovery Act Information (RCRA) includes an inventory on all generators, transporters, treaters, storers, and disposers of hazardous waste that are required to provide information about their activities (EPA, 2014).

Water Dischargers (NPDES/PCS/ICIS): As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating sources, such as municipal and industrial wastewater treatment facilities, that discharge pollutants into waters of the U.S. The EPA tracks water discharge permits through the Permit Compliance System (PCS) and Integrated Compliance Information System (ICIS) databases, which include information on when a permit was issued and when it expires, how much the company is permitted to discharge, and the actual monitoring data showing what the company has discharged (EPA, 2014).

Toxic Releases (TRI): The Toxics Release Inventory (TRI) contains information on toxic chemical releases and waste management activities reported annually by certain industries as well as federal facilities. The database also contains links to compliance and enforcement information (EPA, 2014).

Superfund (CERCLIS): The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) provides information regarding sites under the Comprehensive Environmental Response, Compensation, and Liability Act, otherwise known as CERCLA or Superfund. CERCLA provides a federal "Superfund" to locate, investigate, and clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. The National Priorities List (NPL) is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the U.S. and its territories (EPA, 2014).

The table below is a summary of the hazardous material sites within the GCCPRD study area (Figure 18 - Figure 23):

Table 15 - Hazardous Materials Sites in the GCCPRD Study Area

County	RCRA	NPDES/PCS/ICIS	TRI	CERCLIS
Brazoria	218	175	46	1
Chambers	46	42	13	0
Galveston	359	247	35	3
Harris	990	700	221	6
Jefferson	758	303	97	3
Orange	212	104	25	2
TOTAL	**2,583**	**1,571**	**437**	**15**

Source: EPA(21)

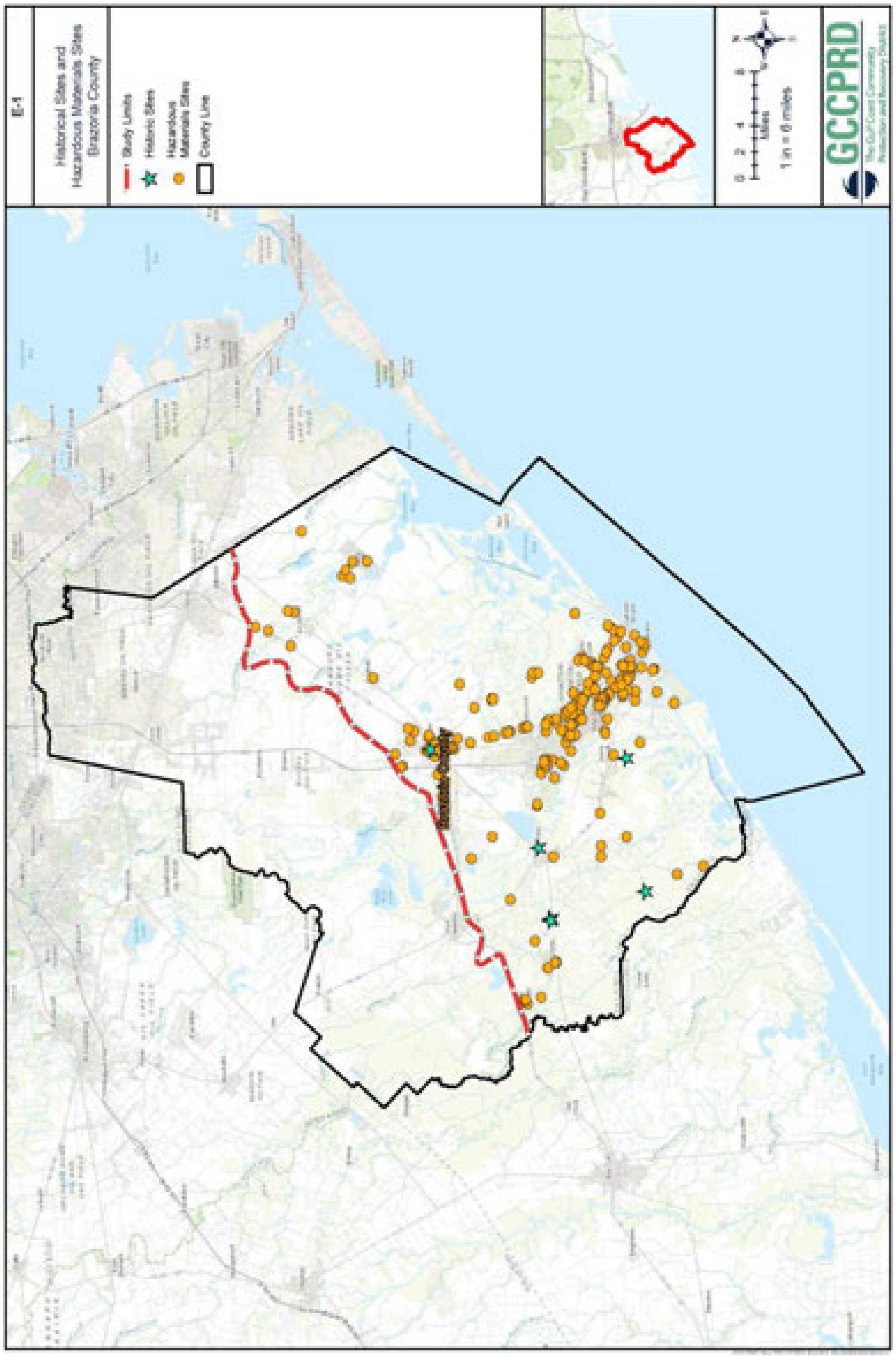


Figure 18 - Historical Sites and Hazardous Materials Sites - Brazoria County

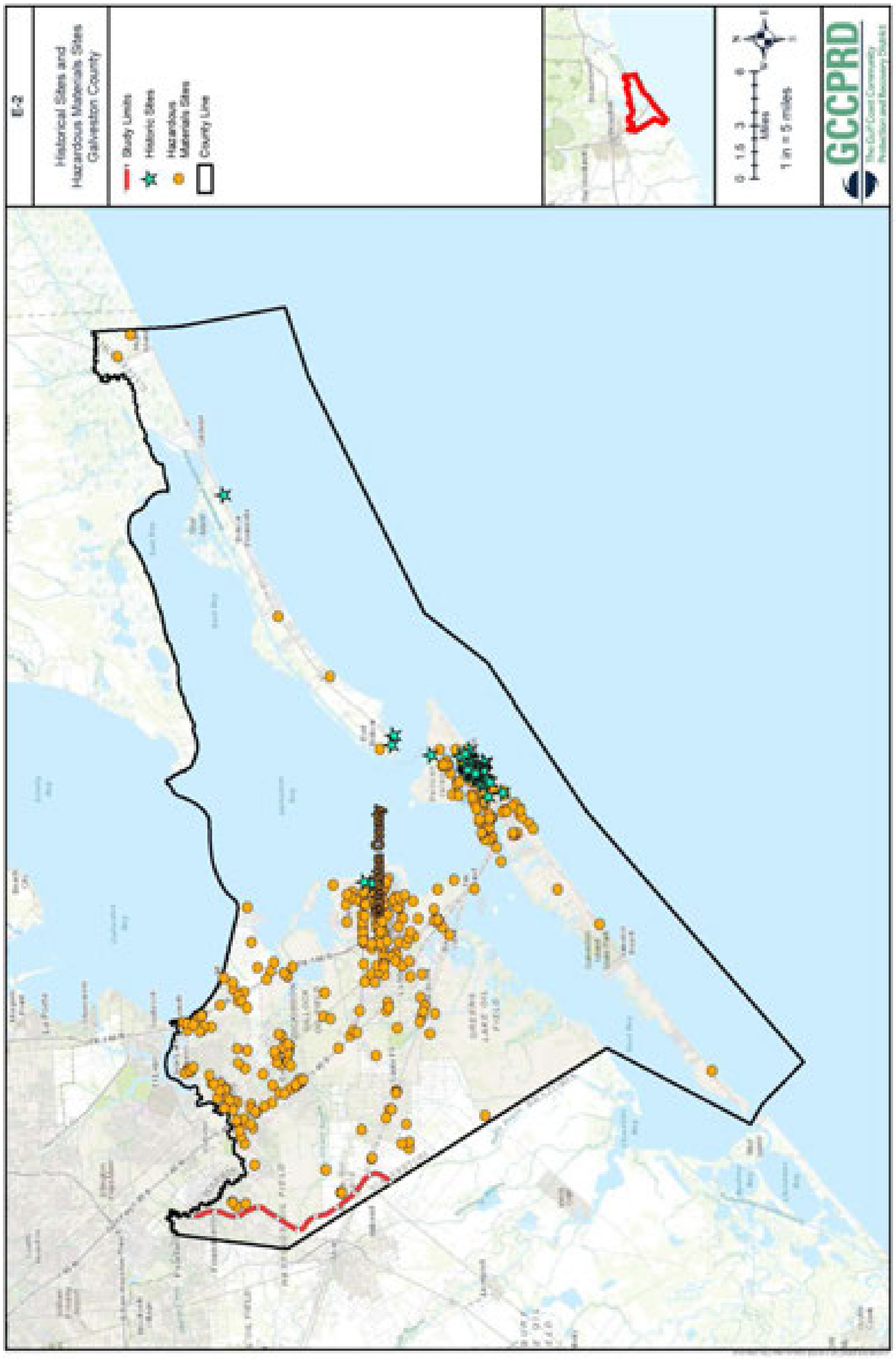


Figure 19 - Historical Sites and Hazardous Materials Sites - Galveston County

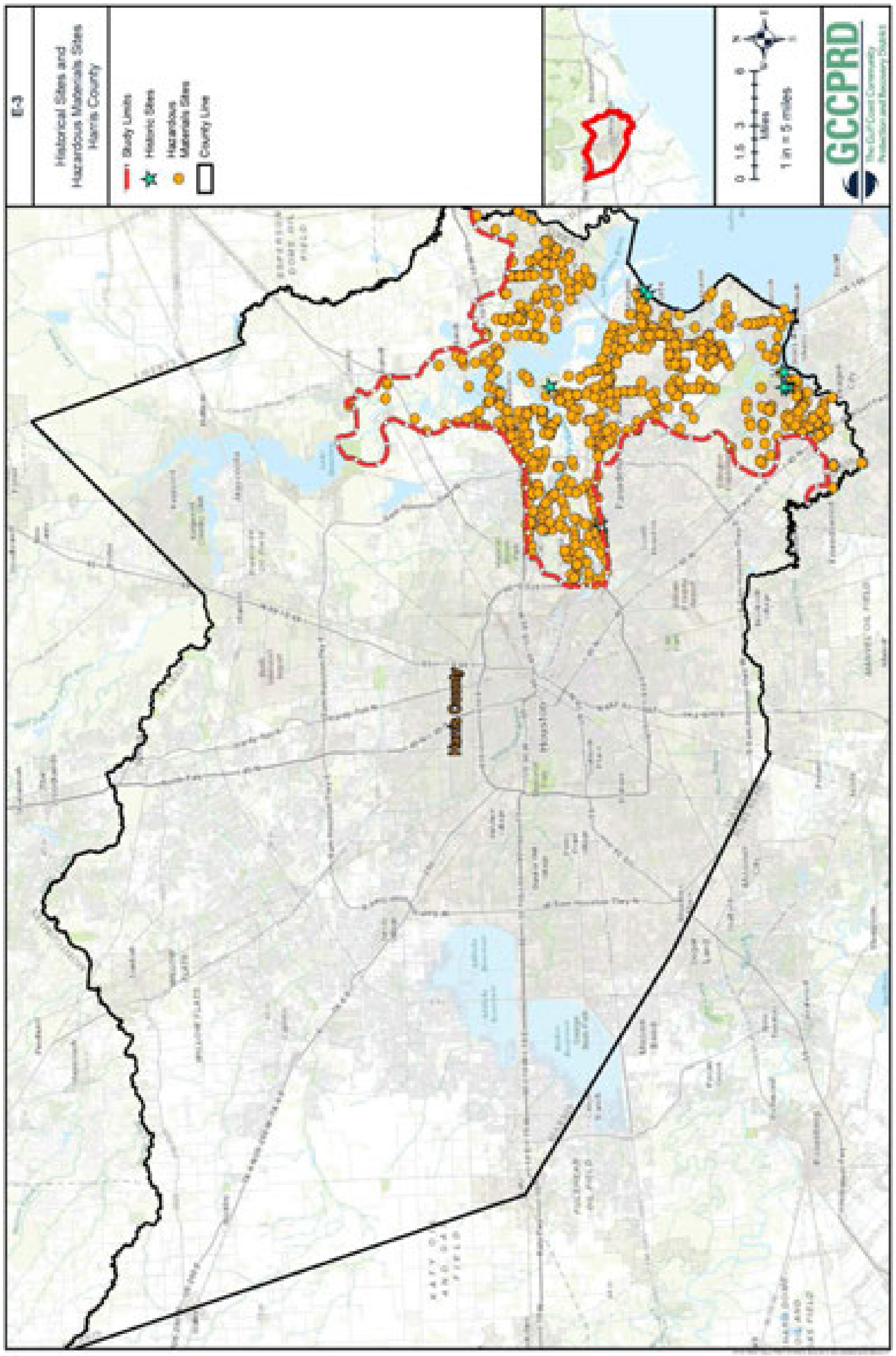


Figure 20 - Historical Sites and Hazardous Materials Sites - Harris County

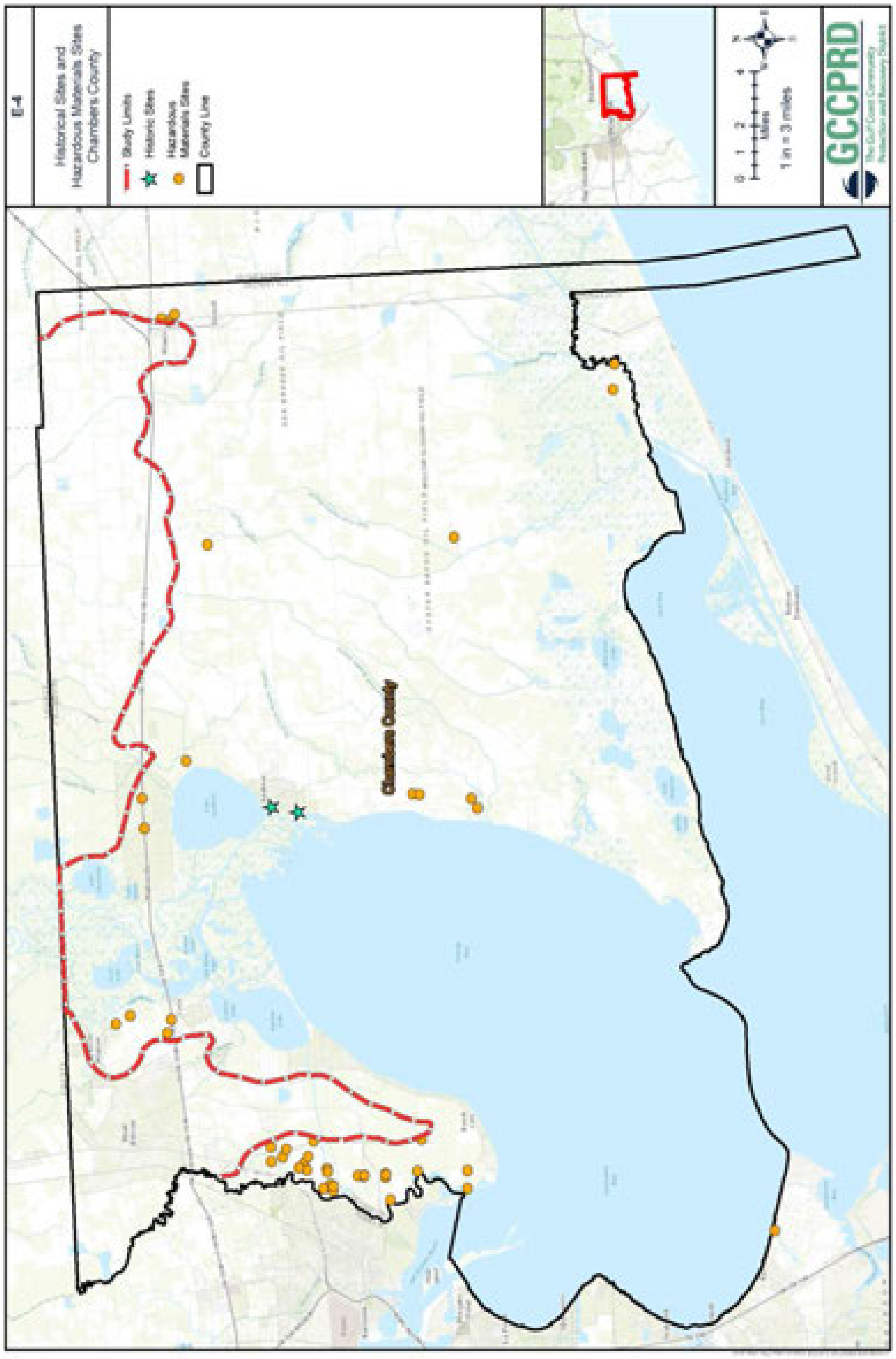


Figure 21 - Historical Sites and Hazardous Materials Sites - Chambers County

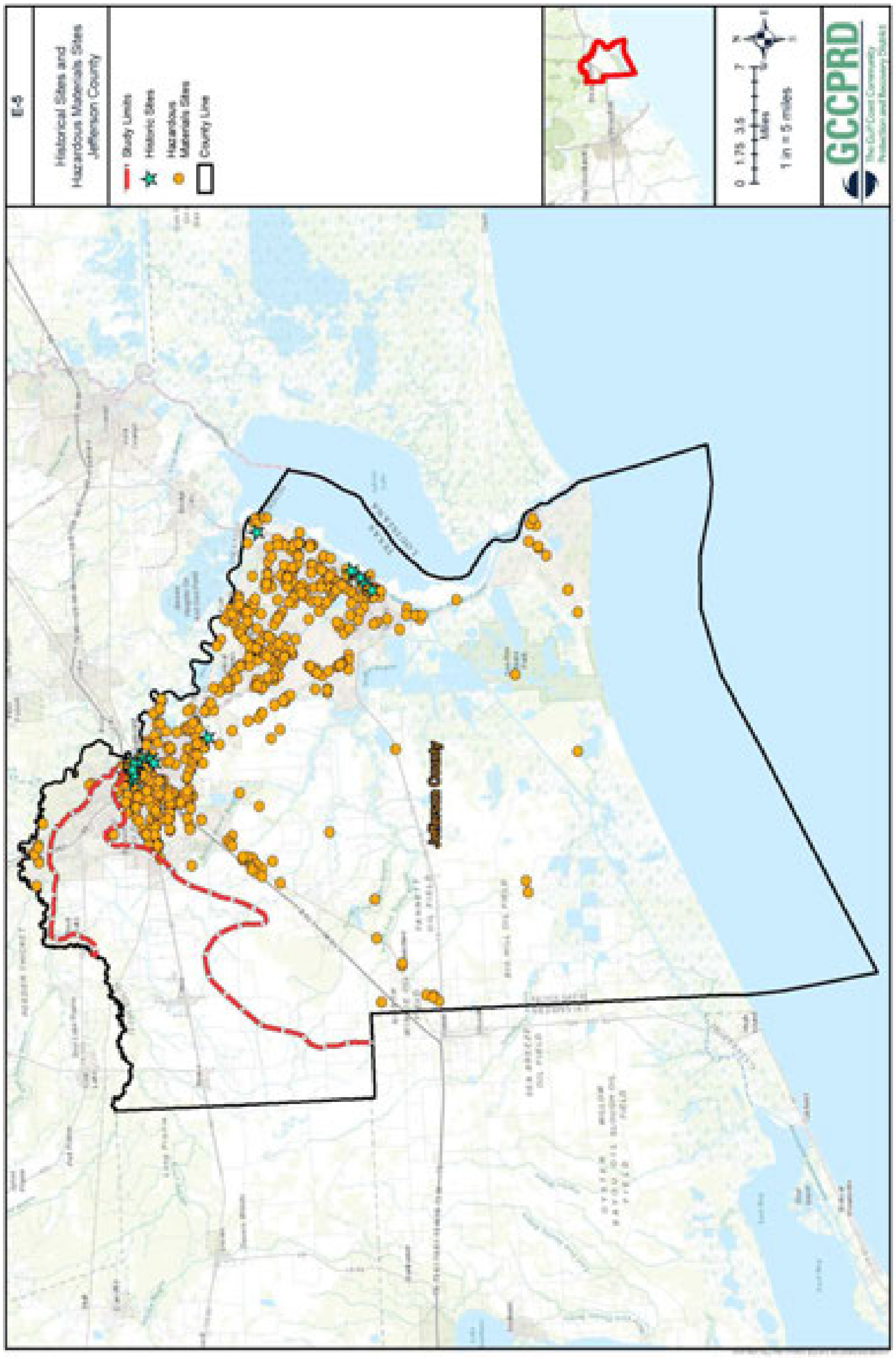


Figure 22 - Historical Sites and Hazardous Materials Sites - Jefferson County

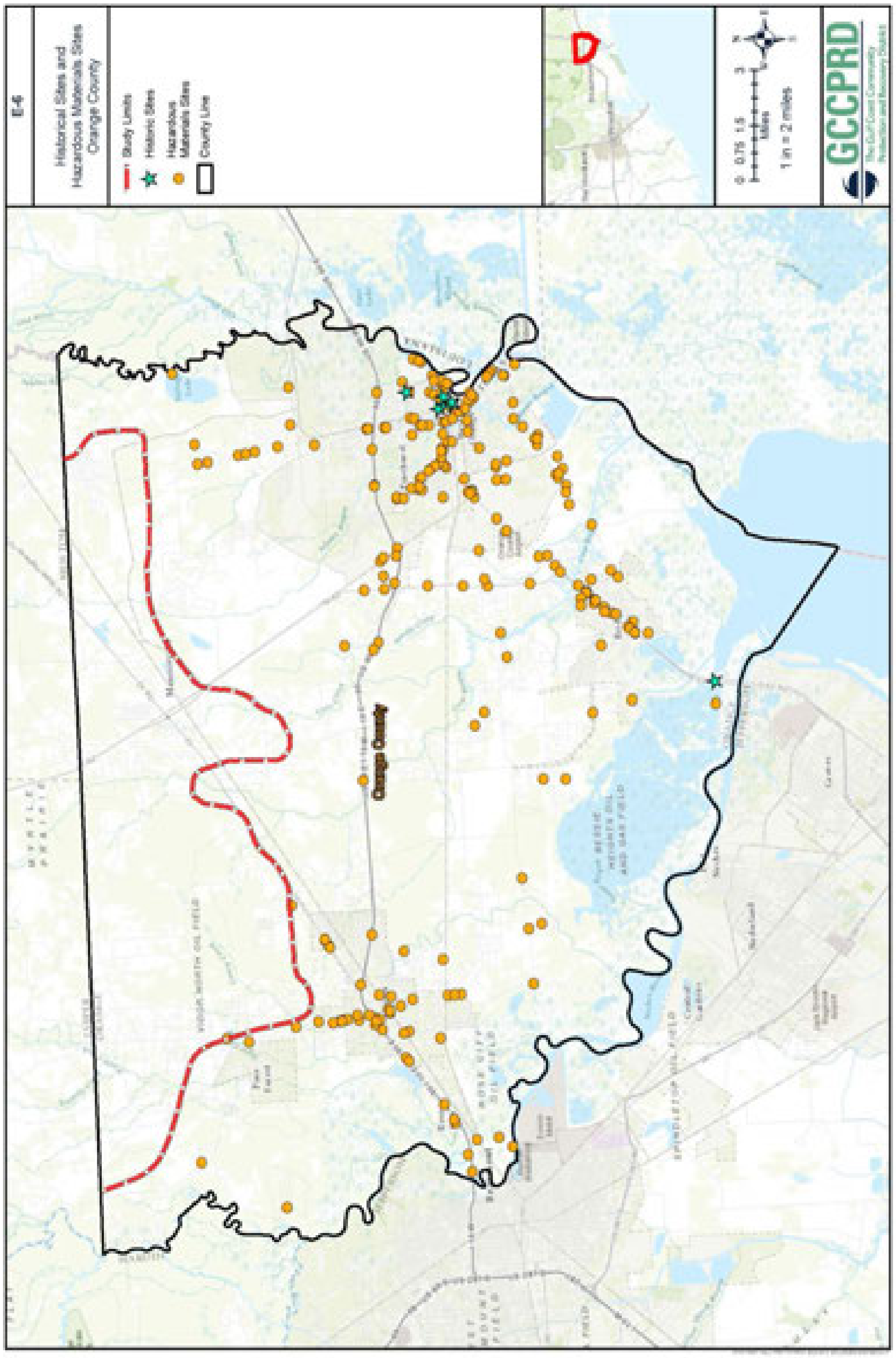


Figure 23 - Historical Sites and Hazardous Materials Sites - Orange County

2.5. Summary

Projects potentially carried out under the Storm Surge Suppression Study must take into consideration and be consistent with the National Environmental Policy Act (NEPA). Though the specific types and locations of projects are unknown at this time, the purpose of the study is to alleviate the vulnerability of the upper Texas coast to storm surge and flooding by improving the natural resources, ecosystems, and economic resiliency of the region. Proposed alternatives may potentially cause some short-term adverse impacts to natural resources through some environment-disturbing actions. Each proposed alternative will be reviewed and screened during Phase 2 of the study to identify which alternatives may result in substantial, enduring adverse impacts. It is unlikely that those alternatives would accomplish the study's priorities, goals, and objectives. Thus, it is unlikely that those alternatives would be recommended for further study as part of a regional storm surge suppression plan. In any case, adverse impacts associated with proposed projects will be avoided and minimized to the extent feasible, and unavoidable impacts will be mitigated, to maximize benefits to the human and natural resources. It is reasonably foreseeable that the proposed actions could result in improvements to Gulf Coast human and natural resources.

3. Define the Threat and Need

The Gulf Coast region is a humid, subtropical climate that is prone to heavy rainfall, tropical storms, and hurricanes. From a historical perspective, the Gulf Coast region experienced over 20 mainland U.S. hurricanes from 2001 to 2010, which is over three times the average number of hurricanes per decade since 1851 (Bedient 2012). From a statistical perspective, the six-county study region has a return period of nine years for a major hurricane. A return period, also referred to as a recurrence interval, is an estimate of the likelihood of an event – such as a hurricane – to occur. Figure 24 illustrates the return period of hurricanes in years for different coastal communities. The lower the return period, the greater the risk for the region. The six-county study region is particularly vulnerable to the threats associated with hurricanes. As seen in Figure 24, the return period of nine years associated with Galveston Bay is similar to that of parts of southeast Louisiana, as well as the coast of Mississippi and Alabama. The six-county study region also has the greatest hurricane-induced flooding risk in all of Texas.

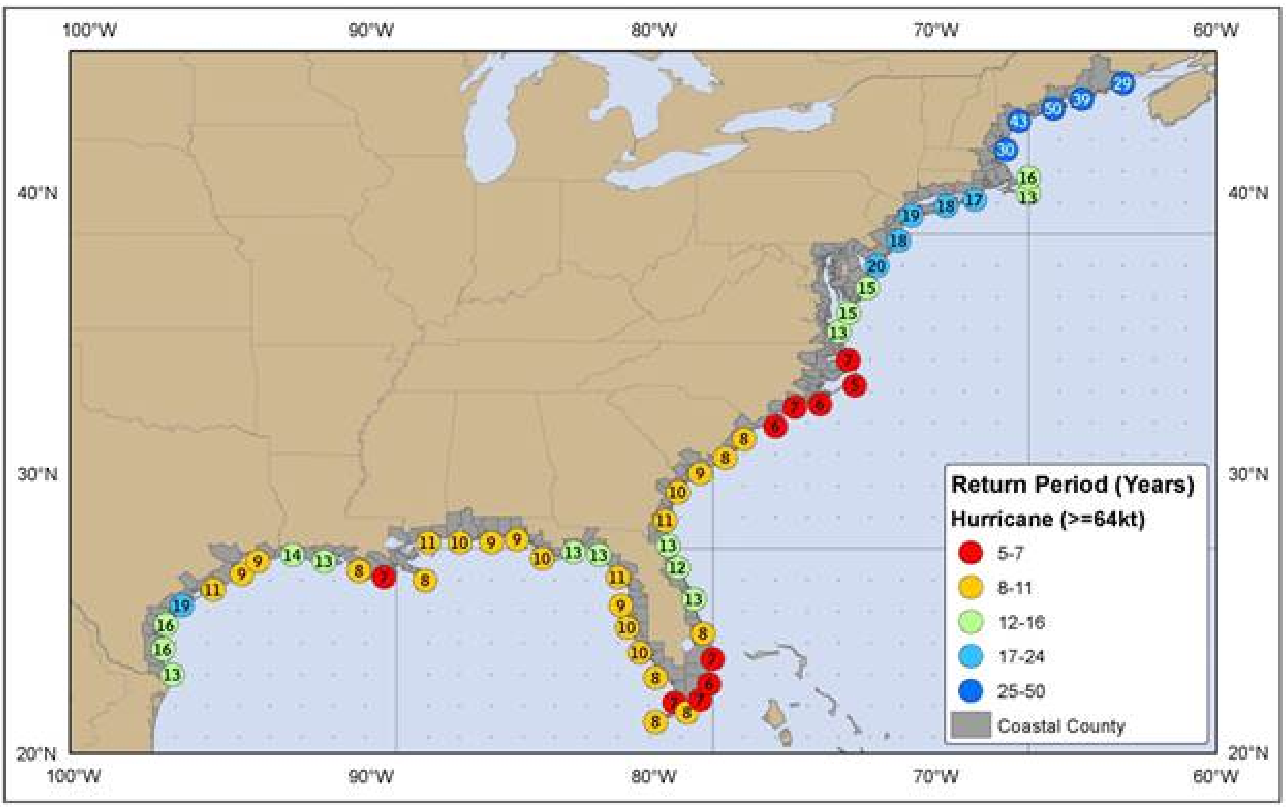


Figure 24 - Estimated return period in years for hurricanes passing within 50 nautical miles of various locations on the U.S. Coast (NOAA 2014)

Storm events can be deadly and disastrous, with events like Hurricane Ike resulting in 84 deaths and $28 billion in damages. To date, Hurricane Ike has been the most expensive storm (not adjusted for inflation) in Texas' history. To exacerbate matters, studies have shown that, had Ike made landfall 30 miles south, it could have easily resulted in $100 billion in total damage, and had it struck that location as a Category 4 storm, like Hurricane Carla, the results would have been calamitous (Boyd 2010).

3.1. Historical Storms

The six-county study region has experienced many significant severe storms over the past century. Most notably, the deadliest natural disaster in U.S. history occurred on September 8, 1900, when the 1900 Galveston Hurricane made landfall, resulting in a 20-foot storm surge and more than 8,000 fatalities (Lichter, 2014). Storm parameters and impacts resulting from significant storms that made landfall in or near the six-county study region are presented in Table 17. Common to all of these storms, the devastation and estimated property damage to the region was significant, as was the impact to the national economy. Only regional damages are captured in Table 17.

Table 16 - Historic Storms in the Six-county Region (Lichter 2014)

Hurricane	Year	Location at Landfall	Saffir-Simpson Category at Landfall[1]	Estimate property damage (2010 U.S. Dollars)*	Fatalities (Total)	Affects
Galveston Hurricane (unnamed)	1900	Galveston	4	104 billion	8,000	Greatest disaster in U.S. history; fatalities mainly from storm surge; 20+ foot storm surge (above mean sea level [MSL]) in Galveston Bay
Galveston Hurricane (unnamed)	1915	Galveston	4	71 billion	275	120 miles per hour (mph) winds in Galveston
Galveston Hurricane (unnamed)	1932	Galveston	4	110 million	40	
Surprise Hurricane (unnamed)	1943	Bolivar Peninsula	2	217 million	19	
Carla	1961	Port O'Connor and Port Lavaca	4	3 billion	46	175 mph gusts; 22-foot storm surge (above MSL) in Matagorda Bay
Claudette	1979	Beaumont	Tropical Storm (T.S.)	1.3 billion	2	30 to 40 inches of rain in areas South of Houston
Danielle	1980	Galveston	T.S.	70 million	3	17 inches of rain at Port Arthur, TX
Alicia	1983	Galveston	3	4.4 billion	21	12-foot storm surge (above NGVD in Seabrook; 23 tornadoes; greater than 11 inches rain in east side of Houston

[1] The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage, with Category 1 storms having sustained winds of 74-95 miles per hour (mph), Category 2 storms having sustained winds of 96-110 mph, Category 3 storms having sustained winds of 111-129 mph, Category 4 storms having sustained winds of 130-156 mph, and Category 5 storms having sustained winds of 157 mph or greater (NOAA 2013). Tropical Storm winds are less than 74 mph.

Hurricane	Year	Location at Landfall	Saffir-Simpson Category at Landfall[1]	Estimate property damage (2010 U.S. Dollars)*	Fatalities (Total)	Affects
Dean	1995	Freeport	T.S.	2.5 million	-	Greater than 15 inches of rain in Chambers County; 2 confirmed tornadoes
Allison	2001	Port Aransas	T.S.	11 billion	41	Beach erosion (tides 2 to 3 feet above normal); storm rainfall totals of 36.99 inches at Port of Houston; devastated southeast Texas
Rita	2005	Sabine Pass	3	13 billion	~100	Massive evacuation ahead of landfall; damage mainly due to sustained tropical storm force winds
Ike	2008	Galveston	2	28 billion	84	Destructive storm surge along the Bolivar Peninsula and across portions of Galveston Bay; wind damage across a large part of southeast Texas

**Total estimated property damage, adjusted for wealth normalization*

Specifically worthy of mention, the Galveston Hurricane of 1900, Hurricane Rita, and Hurricane Ike exemplify the threats posed to the region by severe storm events.

Galveston Hurricane of 1900

The Hurricane of 1900, which made landfall on September 8 in Galveston, Texas, is the deadliest natural disaster in U.S. history, with approximately 8,000 fatalities (though this estimate ranges from 6,000 to 12,000) (NOAA 2012). While the history of the hurricane's track and intensity is not fully known, it was a Category 4 hurricane by the time the storm reached the Texas coast south of Galveston. Storm surge of more than 20 feet above mean sea level (MSL) inundated all of Galveston Island, as well as other portions of the nearby Texas coast, as demonstrated in Figure 25.

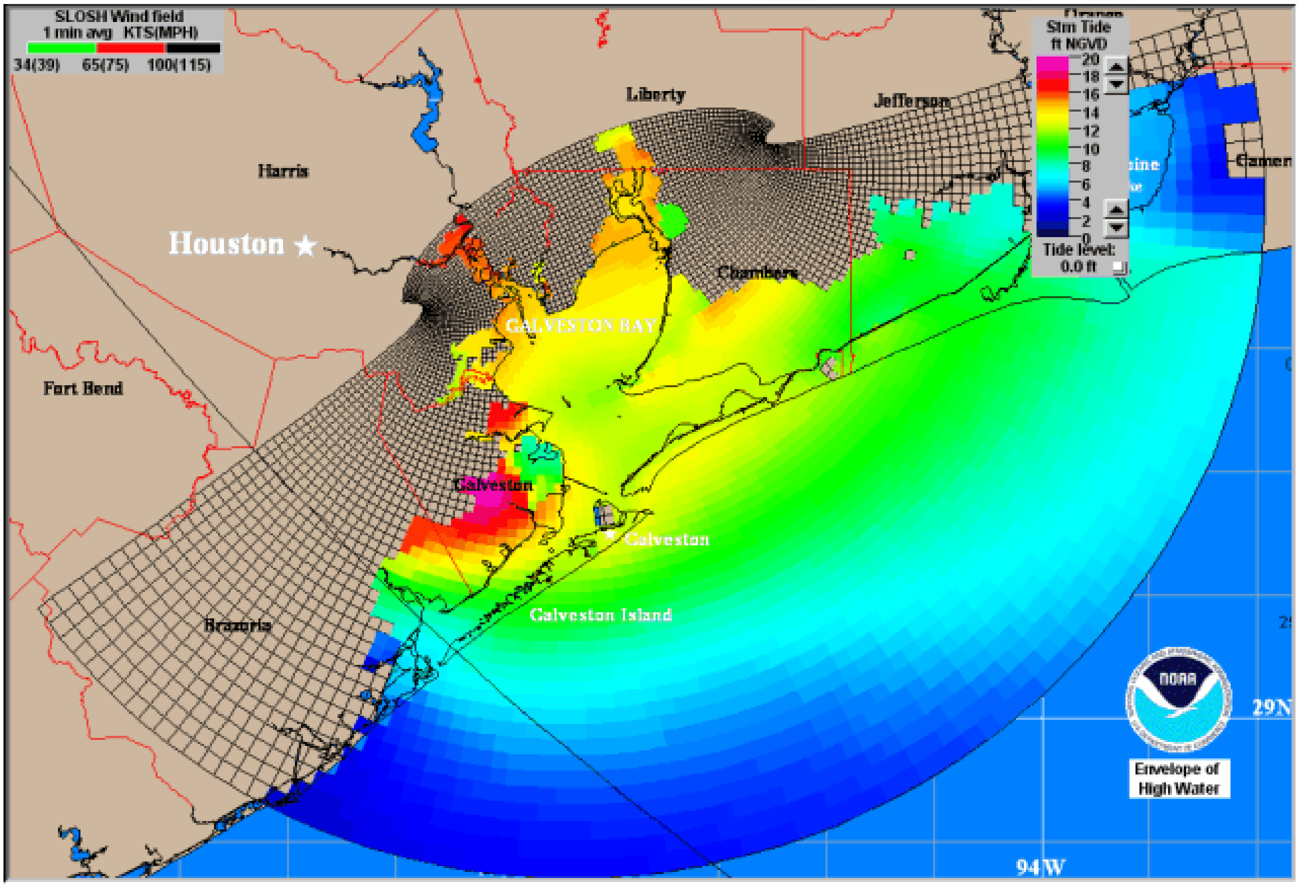


Figure 25 - Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model of Galveston Hurricane of 1900

Hurricane Rita

Less than a month after the devastation of Hurricane Katrina in New Orleans, LA, Hurricane Rita became the second hurricane that season to reach Category 5 intensity in the Gulf of Mexico.[2] Hurricane Rita was one of the strongest storms on record in the Atlantic Basin with peak sustained winds of 175 mph, and was the third most powerful hurricane on record in terms of central pressure (NOAA 2005; NASA 2005).

Rita made landfall near the Texas and Louisiana border, about 35 miles east of Beaumont, Texas. As Rita moved inland, the storm's heaviest rains fell in Louisiana. The heavy rains and the 15-foot storm surge along the Louisiana coastline caused massive flooding, which lasted for days (NASA 2005). However, what is most noteworthy of this storm is that, less than a month after Hurricane Katrina, the threat of another severe storm making landfall in the northern Gulf Coast caused much commotion in the region, including ordered mandatory evacuations and speculation of what effect another storm would have on petrochemical refineries (Blumenthal 2005). Luckily, Hurricane Rita did not have as severe of an impact as anticipated in the Houston-Galveston region, as the storm struck farther east; however, evacuation was a disaster for the region, with evacuees spending more than 12 hours in traffic jams on highways and over 100 deaths reported from the hurricane, car accidents, and health problems (Horswell and Hegstrom 2009). Prior to the

[2] before making landfall on September 23, 2005 as a Category 3 Hurricane

storm making landfall, meteorologists and economists worried that Rita was such a large and strong storm that it could affect refineries at Port Arthur, Texas and Texas City, Texas if it made landfall at either location.

If Rita had hit the Houston-Galveston region, or the Port Arthur-Beaumont region, it could have destroyed more than 3 million barrels of capacity of oil per day (Isidore 2005), which would have significantly impacted the petroleum industry and the national economy.

Hurricane Ike

As discussed in Section 1, Hurricane Ike became the third most costly hurricane to make landfall in the U.S. (Berg 2009). Ike made landfall on September 13, 2008, as a Category 2 storm near Galveston, Texas. While Ike brought little rainfall to the Houston-Galveston region in comparison to hurricanes such as Katrina and Rita, it was able to cause significant damage as a result of its storm surge. The highest storm surge value for Ike recorded by USGS sensors was 17.5 feet North American Vertical Datum (NAVD 88), located about 10 miles inland in Chambers County. Both Jefferson County, Texas and Cameron Parish, Louisiana recorded surge elevations of up to 17 feet (Bedient 2012; Berg 2009).

Hurricane Ike resulted in the near complete destruction of Bolivar Peninsula. Many homes were flooded on Galveston Island, and effects were strongly felt in downtown Houston, where the pressure and high winds from the storm destroyed the glass windows of many skyscrapers.

3.2. Storm Surge

A significant hazard associated with hurricane landfall in Texas's coastal communities is the associated storm surge. Storm surge results when low atmospheric pressures, onshore winds, and waves associated with a hurricane push water inland. The combined effects of tide and hurricane induced "build-up" of water result in the total storm surge. As the surge moves inland with the hurricane, costly flood induced damages and loss of life can occur.

In 2008, FEMA initiated a study to define the storm surge flood hazard to Texas's coastal communities. The flood hazards were defined in part from the combined observations of storm surge and hurricane parameters (i.e., storm track, pressure field, wind field, etc.) during historical storms that impacted the Texas coast. Based on regional data (e.g., topography, bathymetry, and land use) and historic storm observations, a regional, state-of-the-art Advanced Circulation (ADCIRC) storm surge model was created to define storm surge for the entire Texas coastline. The accuracy of the model was validated based on comparison of the regional storm surge model output to observations made during Hurricanes Allen, Bret, Carla, Ike, and Rita. With confidence from this validation process that the regional model was representing the storm surge physics of the Texas coastline, the model was then used to simulate a much larger range of potential hurricane scenarios. The storm surge output from a large range of hurricane scenarios was statistically compiled in order to define the storm surge risk throughout the study area.

This risk is represented on FEMA's flood maps as the elevation to which floodwater is anticipated to rise during the base flood (i.e., 100-year flood or base flood elevation (BFE)). The area inundated by the 500-year flood event is also presented. The storm-induced wave heights are included in these storm surge maps, depicted as V and A Zones. V Zones indicate that the storm surge risk scenarios are likely to be accompanied by waves greater than 3 feet, whereas A Zones are likely to include waves less than 3 feet.

The best available flood hazard data for the six-county region are the Preliminary Flood Insurance Rate Maps (PFIRMs) shown in Figure 26. The PFIRM map for Brazoria County is currently under review by FEMA and not available at this time. The Brazoria County map displayed represents FEMA's Effective Flood Insurance Rate Map.

The preliminary data presented is the best FEMA information available at this time. However, per FEMA's website:

> *Preliminary data are not for use, distribution or replication until the data are finalized and labeled as "effective". Preliminary data are for review and guidance purposes only. Preliminary data will be removed and replaced once effective data are available.*
>
> *Unlike preliminary data, effective data and maps are official and should be used for National Flood Insurance Program (NFIP) purposes and viewing risk premium zones applicable to a community.*

Note that PFIRMs for Orange, Jefferson, Harris and Galveston counties are based upon a study initiated in 2008, whereas the Brazoria County Effective FIRMs date back to studies from the 1980s.

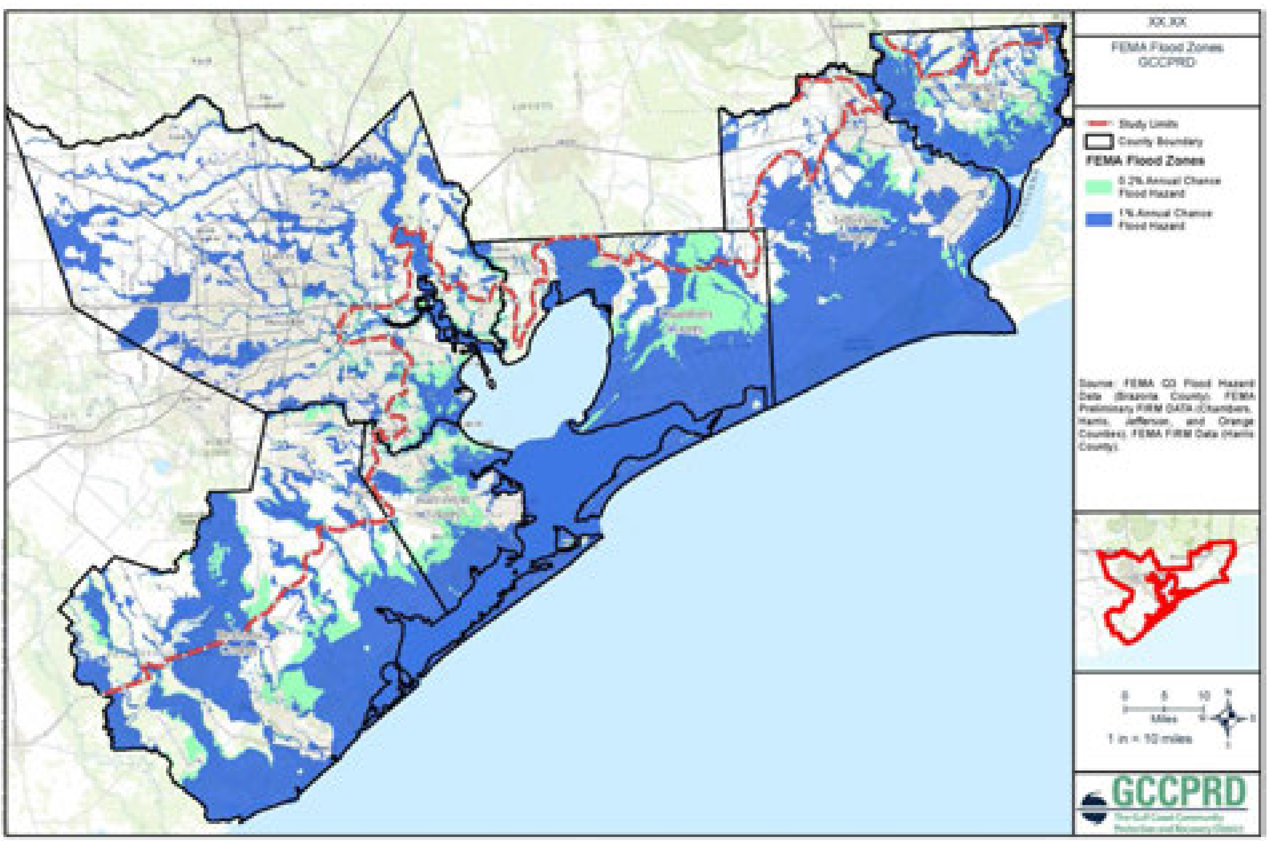


Figure 26 - FEMA Flood Zones

3.3. Rains and Flooding

Tropical storms and hurricanes are capable of producing extremely heavy rainfall and often produce severe flooding and flash flooding. Spatially, the heaviest rainfall associated with tropical storms usually falls along or near the coast and typically occurs slightly to the right of the track of the storm due to the circulation pattern of a hurricane. With regards to timing, there is about a 50 percent chance that the period of heaviest rainfall will occur 6 hours prior to landfall and end 6 hours after landfall (NOAA(a) n.d.).

Faster moving hurricane systems generally drop less total rainfall over a region. In order to estimate the total amount of rainfall associated with a given tropical system, divide 100 by the forward speed of the hurricane in miles per hour. Hurricanes like Hurricane Ike are not typically significantly large rainfall events for the region, with rain totals being comparable to that of a 10-year storm event.

Conversely, tropical storms, which are usually slower moving systems, have the ability to bring record amounts of rainfall. Tropical Storms Allison and Claudette both resulted in significant flooding and damage. While Tropical Storm Allison was moving very slow, or stalling, over Texas, it dropped very heavy rainfall across the state, as seen in Figure 27. Flash flooding continued for days, with rainfall amounts across the state peaking at just over 40 inches in northwestern Jefferson County. In the Port of Houston, a total of nearly 37 inches of rain was reported (NOAA(c) n.d.). Houston and the surrounding area experienced torrential rainfall in a short amount of time, with the six-day rainfall total amounting to nearly 39 inches of rain. This downpour flooded 95,000 automobiles and 73,000 houses throughout Harris County alone (Harris County Flood Control District n.d.).

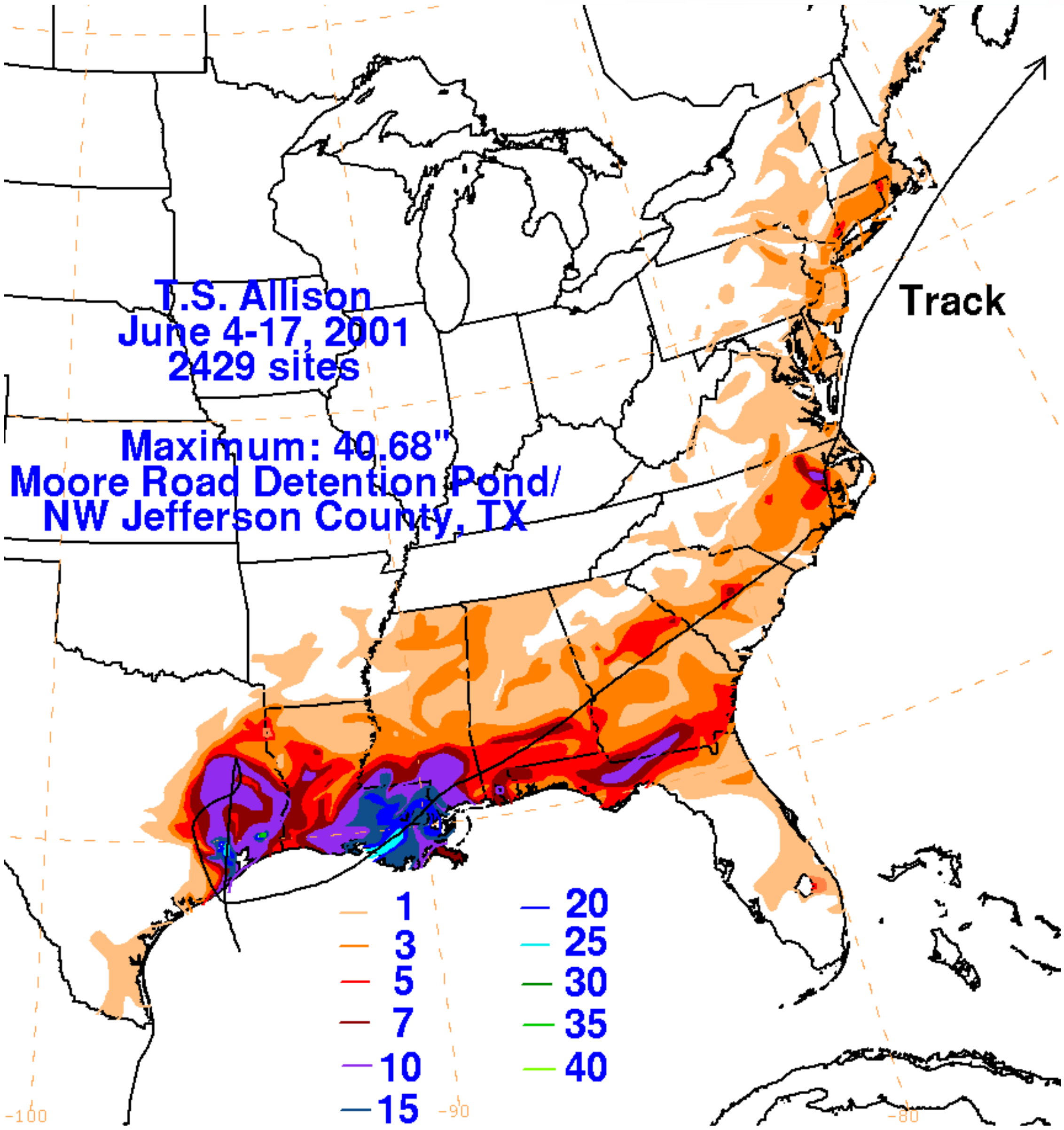


Figure 27 - Rainfall totals (inches) and track of Tropical Storm Allison (NOAA(c) n.d.).

Similarly, Tropical Storm Claudette, with rainfall totals shown in Figure 28, produced torrential rains in both eastern Texas and Louisiana when it made landfall, with the highest one-day total of 42 inches of rainfall reported near Alvin, Texas. Widespread flooding resulted, with many residents having to be rescued from low-lying flooded areas (NOAA(d) n.d.).

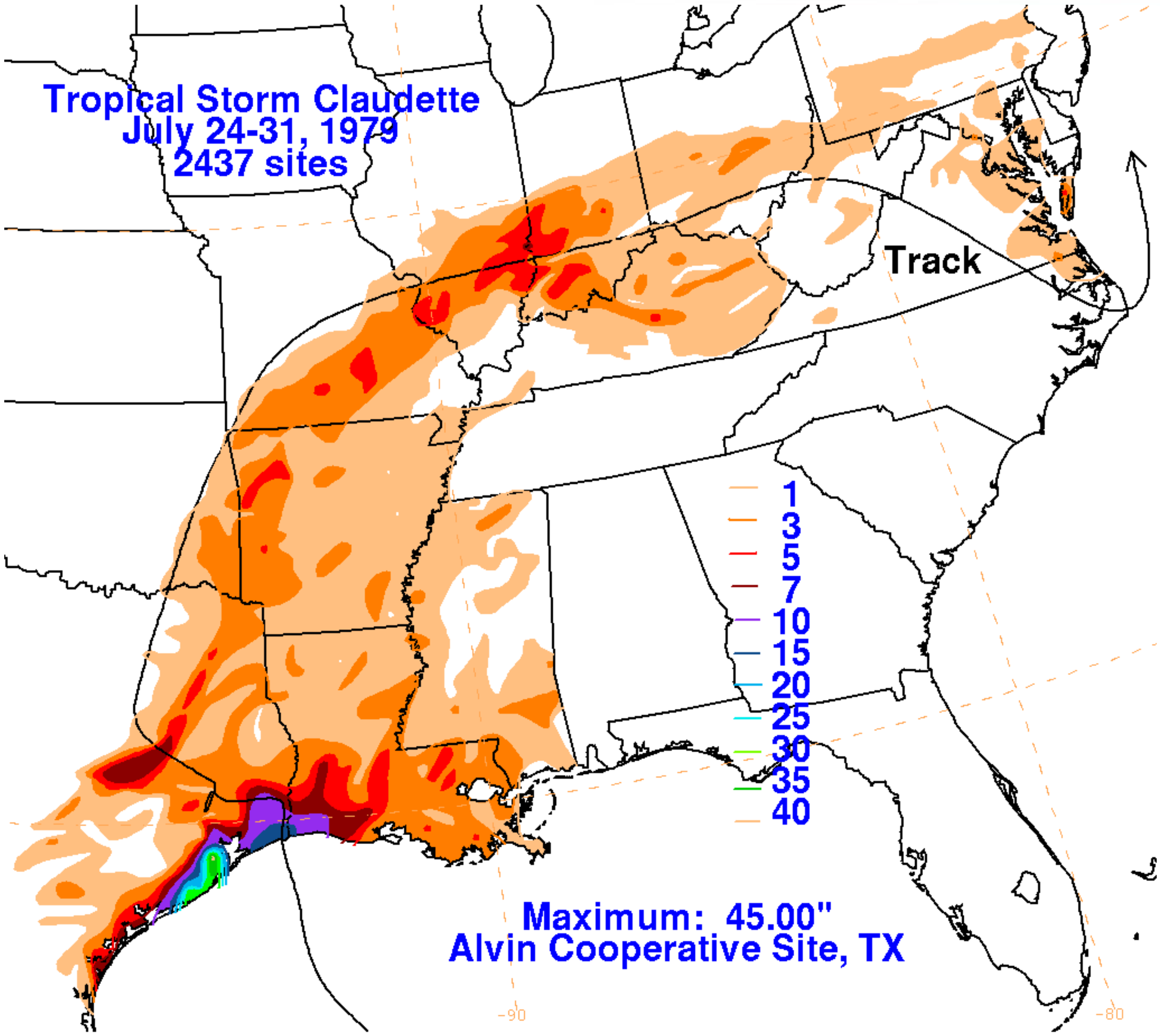


Figure 28 - Rainfall totals (inches) and track of Tropical Storm Claudette (NOAA (d) n.d.).

4. Types of Surge Protection

Storm surge suppression and flood risk management measures consist of three basic types: structural, non-structural, and natural or nature-based features. This study will yield a series of feasible storm surge suppression alternatives that may consist of a variety of natural, structural, and non-structural methods. From this, the study team will develop a cost-effective and efficient system of flood damage reduction and storm surge suppression measures to help protect the six-county region.

The study team will ultimately develop an integrated approach through a combination of natural, nature-based, non-structural and structural measures. Similar to the USACE planning approach, this approach would consider the engineering attributes of features and the dependencies and interactions among these features over both the short-and long-term (USACE (c), July 2013).

Structural measures have historically been the technique most desired by the general public, as these modify flood patterns and "remove floods away from people" through measures such as channels, levees, and dams. Non-structural flood damage reduction measures basically "remove people from floods" leaving stormwater to pass unmodified. Non-structural flood damage reduction measures consist of relocation, property acquisition, flood proofing, flood insurance, flood preparedness, flood warning systems, and public education.

- **Structural** flood risk management measures are man-made, constructed measures that counteract a flood event in order to reduce the hazard or to influence the course or probability of occurrence of the event. This includes gates, levees, and flood walls that are implemented to protect people and property.
- **Non-structural** flood risk management measures are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Nonstructural measures differ from structural measures in that they focus on reducing the consequences of flooding instead of focusing on reducing the probability of flooding.
- **Natural or nature-based** flood management measures work with or restore natural processes with the aim of reducing flood risk and delivering other benefits. In practice, this could include the creation, restoration, and maintenance of wetlands; management of floodplains; creation of woodlands in appropriate locations; creation of oyster reefs; management and restoration of lowland raised bogs; or the creation of buffer strips or natural barriers.

Table 17 - Types of Surge Suppression and Flood Risk Management Measures

Non-structural	Natural	Structural
Buy outs/acquisitions	Dunes	Gates
Elevation of structures	Marsh creation/restoration	Levees
Building codes	Shoreline protection	Flood walls
Zoning	Islands	Channels
Ordinances	Oyster reefs	Dams
Flood warning systems	Bank stabilization	
Evacuation plans	Barrier island restoration	
Flood proofing		

4.1. Non-structural Measures

The following nonstructural measures represent techniques commonly utilized in reducing flood risk and the damages associated with flooding and storm surge. These measures vary from removing an entire structure from the floodplain to insuring a structure that is permanently located within the floodplain. The costs associated with implementing a measure are variable, where reduction of flood damages is proportional to the cost of the measure (i.e., removal of a structure from the floodplain will eliminate all future damages associated with flooding; purchasing flood insurance for a structure will assist in making the structure whole after a flood event, but it does not eliminate future flood damages to that structure).

Elevation

This nonstructural technique lifts an existing structure to an elevation that is at least equal to or greater than the 1 percent annual chance flood elevation. In many elevation scenarios, the cost of elevating a structure an extra foot or two is less expensive than the first foot, due to the cost incurred for mobilizing equipment. Elevation can be performed using fill material, on extended foundation walls, on piers, post, piles, and columns. Elevation is also a very successful technique for slab-on-grade structures.

Relocation

This nonstructural technique requires physically moving the at-risk structure and purchasing the land upon which the structure is located. It makes most sense when structures can be relocated from a high flood risk area to an area that is located completely out of the floodplain.

Acquisition

This nonstructural technique consists of purchasing the structure and the land. The structure is either demolished or sold and relocated to a site external to the floodplain. Development sites, if needed, can be part of a proposed project in order to provide locations where displaced residents can build new homes within an established community.

Floodproofing

This nonstructural technique is applicable as either a stand-alone measure or as a measure combined with other measures such as elevation. As a stand-alone measure, all construction materials and finishing materials need to be water resistant and all utilities must be elevated above the flood elevation. Wet floodproofing is quite applicable to commercial and industrial structures when combined with a flood warning and flood preparedness plan. This measure is generally not applicable to large flood depths and high velocity flows.

Flood Warning System

This nonstructural technique relies upon stream gage, rain gages, and hydrologic computer modeling to determine the impacts of flooding for areas of potential flood risk. A flood warning system, when properly installed and calibrated, is able to identify the amount of time available for residents to implement emergency measures to protect valuables or to evacuate the area during serious flood events.

Flood Emergency Preparedness Plans

Local governments, through collaboration with USACE, FEMA, and other interested federal partners, are encouraged to develop and maintain a Flood Emergency Preparedness Plan (FEPP) that identifies flood hazards, risks, and vulnerabilities; identifies and prioritizes mitigation actions; and encourages the development of local mitigation. The FEPP should incorporate the community's response to flooding, location of evacuation centers, primary evacuation routes, and post-flood recovery processes.

Land Use Regulations

Land use regulations within a designated floodplain are effective tools in reducing flood risk and flood damage. The basics principles of these tools are based nationally in the National Flood Insurance Program (NFIP), which requires minimum standards of floodplain regulation for those communities that participate in the NFIP. For example, land use regulations may identify where development can and cannot occur, or to what elevation structures should locate their lowest habitable floor (USACE 2014).

4.2. Natural or Nature-based Features

The USACE identifies that natural and nature-based features can serve an important role in coastal risk reduction when combined with structural and nonstructural measures. As cited from the USACE, natural and nature-based features include a spectrum of features, ranging from those that exist due exclusively to the work of natural process to those that are the result of human engineering and construction. Natural coastal features take a variety of forms, including reefs (e.g., coral and oyster), barrier islands, dunes, beaches, wetlands, and maritime forests. The relationships and interactions among the natural and built features comprising the coastal system are important variables determining coastal vulnerability, reliability, risk and resilience.

Natural and nature-based features, outlined in Figure 29, can enhance the resilience of coastal areas challenged by coastal storms. Natural features are created through the action of physical, biological, geologic, and chemical processes operating in nature, whereas nature-based features are created by human design, engineering, and construction.

For example, beaches are natural and nature-based features that provide coastal storm risk reduction and resilience. Coastal wetlands can also provide coastal storm protection services through wave attenuation and sediment stabilization. Additionally, beach nourishment can be used to promote coastal risk reduction by introducing additional sand into the system to reinforce the natural protection to the upland afforded by the beach, and therefore reduces risk due to wave damage and inundation. Wave damage and flood risk reduction provided by beach nourishment is enhanced when dune construction or restoration is included (USACE (c) 2013).

Figure 29 - Natural and Nature-based Infrastructure at a Glance (USACE(c) 2013)

4.3. Structural Measures

When assessing the possibilities for developing a structural storm surge barrier in a coastal urban environment, many options are available. Experience thus far with developing and implementing barrier designs suggests that there is not one perfect structural solution. Often a tailor-made design that selects or combines the most favorable aspects of structural and other flood protection measures should be considered in order to find the best solution (Jansen and Dircke 2009). Coastal and, in particular, delta and estuarine cities are often surrounded by dynamic water systems where more than one gate type is required. Many factors including operations and maintenance, hydraulics, navigation and transport, reliability, durability, constructability, morphological impact, and environmental impact must be considered to ensure the most effective and economic solution is chosen for the study region.

4.3.1. Types of Flood Gates

Flood gate structures exist around various parts of the world, and each one is unique in its placement, motivation for construction, and constraints. They work by blocking potentially devastating tidal surge from inundating at risk areas. Flood gates can be a suitable solution for flood protection, but they must also be used in concert with other auxiliary barriers such as flood walls, levees, dikes, dunes, and nonstructural solutions. Due to their initial high expense, most flood gates studied were generally built in response to a disaster. For example; Barrier in the UK and the Delta Works in The Netherlands were developed after a major flood in 1953, and the current flood protection system in New Orleans was implemented after Hurricane Katrina in 2005.

When assessing the possibilities for developing a storm surge barrier in a coastal urban environment, many options are available. Experience thus far with developing and implementing barrier designs suggests that there is not one single perfect gate type, and often a tailor-made design that selects or combines the most favorable aspects of gates and other flood protection measures should be considered in order to find the best solution for a coastal city at risk of flooding (Jansen and Dircke 2009). Coastal and, in particular, delta and estuarine cities are often surrounded by dynamic water systems in which more than one gate type is required.

Many factors including operations and maintenance, hydraulics, navigation and transport, reliability, durability, constructability, morphological impact, and environmental impact must be considered to ensure the most effective and economic solution is recommended for the study region.

The following sections discuss general descriptions of different gate structures used in different locations across the world, including their properties and their favorable and unfavorable aspects. Only gates that are currently operational and were successfully closed at least once under stormy conditions are presented below. Project-specific information is discussed in the subsequent section. The suitability of a particular gate type for the study region was determined based on the following criteria, among others:

- Width of channel closure possible, considering hydraulics and environmental issues
- Sustainability due to high wave loading during storm conditions
- Capacity to handle high water elevation (reverse head) from the protected side due to internal flooding
- Capability to withstand barge or vessel traffic
- Ease of operation and maintenance

4.3.1.1. Miter Gates

Miter gates were common during the sixteenth and seventeenth centuries and are often used in shipping locks in canals. Miter gates are double-leaf gates that form an angle pointing upstream when the gates are closed. As a result, these movable gates must be strong enough to withstand the water pressure arising from the level difference between adjacent water levels.

Typically, the combined lengths of the leaves exceed the lock width by about 10 percent. When opened, the leaves are housed in lock wall recesses; when closed, after turning through about 60 degrees, they meet in the center line of the lock (Vrijburcht, 2000). The maximum width of a single gate currently built is about 82 feet (Dircke et al, 2011).

Table 18 - Favorable and Unfavorable Aspects of Miter Gates

Favorable	Unfavorable
Structural aspects, layout, and operation	
- Unlimited clearance height for shipping - Limited space requirement - Proven concept - Not susceptible to high wind condition	- Very little gate span (up to 100 feet) - Little or no controlled operation under flow and waves
Hydraulic and hydrodynamic aspects	
- Horizontal closure - Discharge of excess water through gate	- Sensitive to vibration as a result of flowing water - Sensitive to reverse head - Sensitive to waves

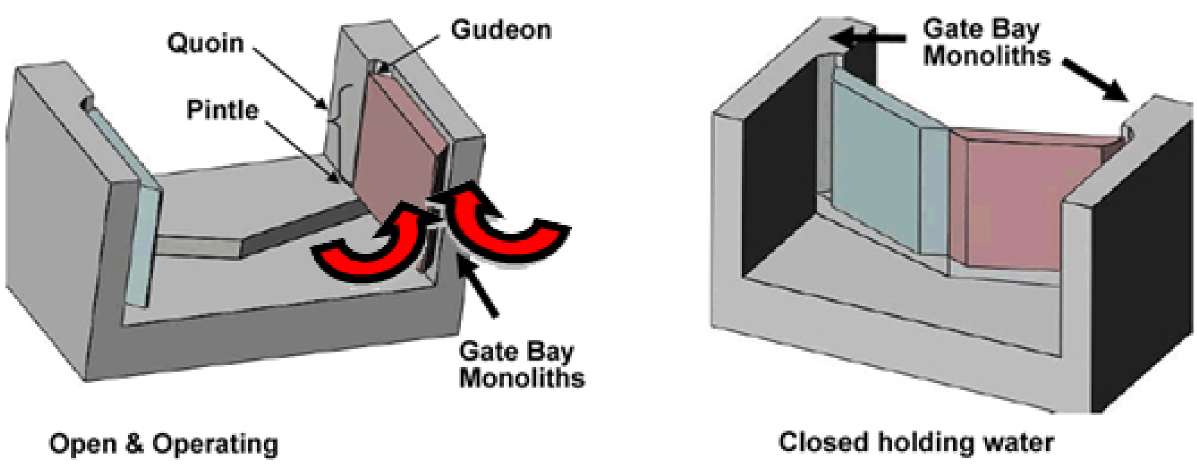


Figure 30 - (a) Miter Gate Open Position, (b) Miter Gate Closed

Since the maximum closure span is only about 100 feet and miter gates are very sensitive to wave action, they may not be considered as suitable storm surge gates in the study region. The potential primary closure width along the line of protection within this region would be substantially larger. Miter gates (Figure 30(a) & (b)) were studied because they are used in shipping locks, which are often used in conjunction with flood barriers.

4.3.2. Vertical Lift Gates

Vertical lifting gates are widely used and have a satisfactory record of operation. Because of their widespread use, much experience is available on construction techniques and on function and behavior under flow and wave conditions. The hoisting towers and the tower foundation are usually constructed within cofferdams, although concrete sills may be floated in and immersed on a gravel base or pile foundation that has been constructed underwater. The bed adjacent to the sill and the towers may be protected by riprap. A small leakage gap is kept open between the gate underside and sill. This leakage gap may sometimes cause flow-induced vibrations (de Jong and Jongeling, 1995).

Table 19 - Favorable and Unfavorable Aspects of Vertical Lift Gates

Favorable	Unfavorable
Structural aspects, layout, and operation	
• Large gate span (up to 300 feet) • Little space required • Controlled operation under flow and waves • Raised gate accessible for maintenance • Proven concept	• Little clearance height for shipping • Raised gate subject to wind load • Gate height increases proportionally with water depth • Mechanical items such as wheels for sliding are susceptible to wearing • Underwater growth may hinder smooth sliding of gate
Hydraulic and hydrodynamic aspects	
• Vertical closure does not cause any drag during operation • Can serve as flow control device to discharge excess water • Overflow and reverse flow acceptable • Limited vertical flow forces and wave loads	• Sensitivity to vibrations • No flexibility during operation, not much space to maneuver • Susceptible to pull-down flow forces and wave loads

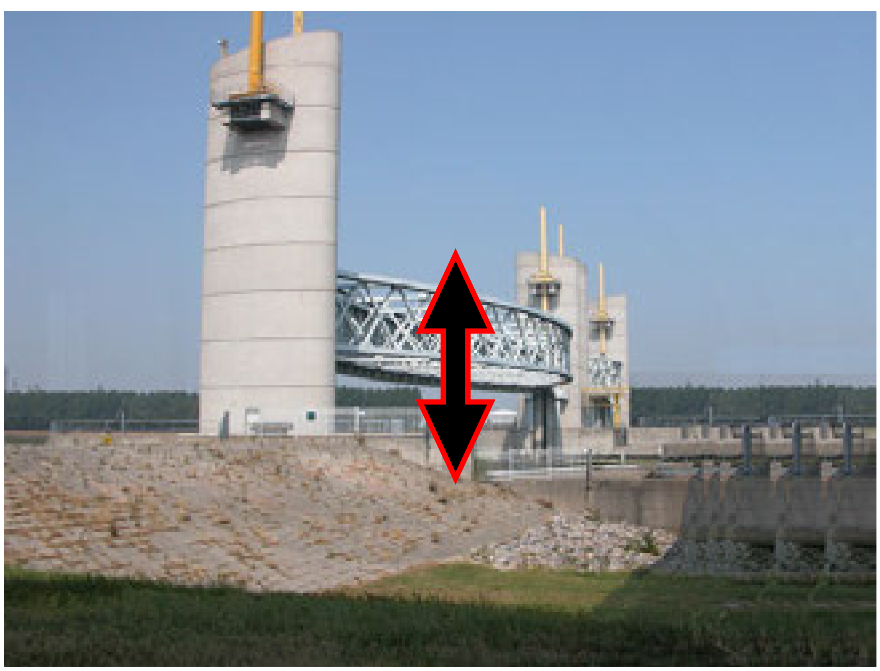


Figure 31 - Typical Vertical Lift Gate

Vertical lift gates (Figure 31) are a proven and effective solution for storm surge defense. They are usually easy to construct using cofferdams or, in certain cases, underwater. They can support a large gate span (up to 300 feet) and are easy to inspect and maintain when raised above the water. Lift gates are sometimes not a viable option due to aesthetic reasons (the high towers needed for operation displease some communities) and restrictive vertical clearance for large vessels.

Lift gates are used around the world and are a proven flood protection concept. This type of gate will be evaluated for the study area in locations where navigation is not the priority.

4.3.3. Flap Gates

Flap gates rest underwater when not in use, resulting in a channel open to vessel traffic. They are operated by an underwater hinge assembly, either by hydraulic force or pneumatically. Flap gates (Figure 32) are a viable option when the community wishes to restrict the visible construction, or when the opening is too large to support a large gate structure. Precast concrete caissons can be floated to the project site and sunk into place to expedite construction.

Table 20 - Favorable and Unfavorable Aspects of Flap Gates

Favorable	Unfavorable
Structural aspects, layout, and operation	
▸ No limitation of span ▸ Separate flaps; reduced failure risk ▸ No vertical clearance issue ▸ Little space required ▸ Suitable for deep waters ▸ Controlled operations flow and wave ▸ Not subjected to wind ▸ Hidden when not in use	▸ Natural frequencies low; small stiffness, large mass ▸ Pneumatic issues: not fully controlled ▸ Hydraulic: concentration cylinders ▸ Underwater problems: corrosion, growth ▸ Hinges may wear out in sand ▸ Maintenance is difficult
Hydraulic and hydrodynamic aspects	
▸ No strong confinement of horizontal flow ▸ Vertical closure single flap ▸ Excess water from the protected side can be discharged through one flap or lowering the gate crest	▸ Sensitivity to vibrations ▸ Small stiffness during operation; cannot withstand impact from vessels ▸ Susceptible to pull-down flow forces and wave loads

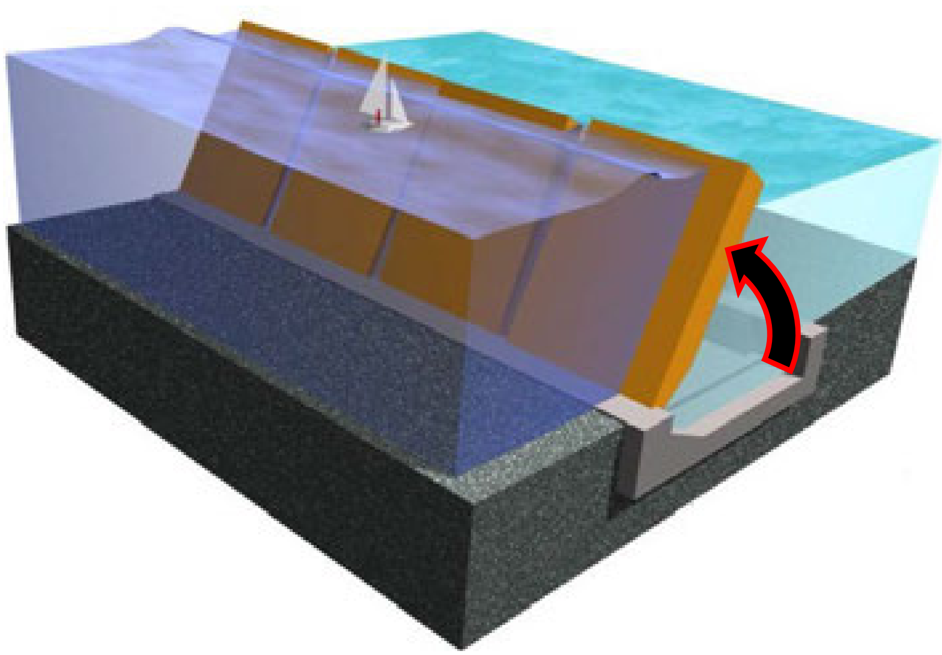


Figure 32 - Typical Flap Gate

Flap gates can have a very small footprint and have no restrictions on span length or clearance height. Since multiple flaps are usually used to close one span, the chance of a complete failure of the system is reduced.

However, they are difficult to repair because the moving parts are always submerged and can be difficult to access. Storage in brackish or saltwater increases the chance of corrosion and particle growth. Another drawback is excessive silt build-up on the gates during periods of inactivity, causing operational difficulties and the sensitivity of the system to high wave action.

Nevertheless, the flap gate barrier design also has some prominent advantages, such as the invisibility of the barrier, the distributed load transfer to the foundation, and the unlimited breadth of the flow opening. Concrete caissons, possibly also with the flap gates pre-installed, can be floated to the site and immersed on a prepared base of compacted soil with a gravel top layer or a pile foundation. The bed adjacent to the caissons may be protected by riprap.

4.3.4. Vertically Rotating Gates

Two types of radial gate exist for use as storm surge barriers: segment gates that are stored underwater in a foundation recess and radial gates that are stored above water level to allow the passage of small vessels. The foundation can be built in the dry surrounded by a cofferdam, or prefabricated offsite, floated to the site, and sunk into place to save time on construction. Usually, many of these gates (Figure 33) are built adjacent to one another for storm surge protection. Segment gates can be advantageous because they have no vertical clearance restrictions, but they can be difficult to maintain and operate due to silt build up. Radial gates are favorable when vessel clearance is not an issue, as these gates have a long and successful history against tidal surge.

Table 21 - Favorable and Unfavorable Aspects of Rotating Gates

Favorable	Unfavorable
Structural aspects, layout, and operation	
‣ Large gate span possible ‣ Limited space requirement ‣ Controlled operation possible under flow and waves ‣ Raised gate accessible for maintenance ‣ Immediately ready for operation ‣ Not subjected to wind ‣ Segment gate: no vertical clearance limitation	‣ Limited draft ‣ Gate height is proportional to water depth ‣ Mechanical items susceptible to wearing ‣ Underwater growth may hinder operation ‣ Load transfer and concentration ‣ Segment gate: high sill tolerance demands; vulnerable to silting, objects, and corrosion ‣ Segment gate: access and maintenance ‣ Radial gate: limited clearance height
Hydraulic and hydrodynamic aspects	
‣ Limited horizontal flow concentration ‣ Allows discharge of excess water from the protected side ‣ Suitable for reverse head and flow	‣ Open gates subject to pull-down flow forces and wave loads ‣ Segment gates: sensitive to oscillation in case of overflow

Figure 33 - Vertical Rotating Gate

After the location, alternatives, and requirements are further investigated in the next phase of this study, this type of gate will be investigated further for portions of the study area, along with other possible options.

4.3.5. Horizontally Rotating Gates

Two major types of horizontally rotating gates are covered in this section: floating sector gates (Figure 34) and non-floating sector gates (Figure 35). Sector gates provide unlimited vertical clearance and can have a large span. They require much more space than similarly sized vertical lift gates or flap gates due to the storage docks. The operation may be more complicated than other gates, but sector gates have a strong history of storm surge protection around the world.

Floating sector gates are used when a very large span (300 feet to 1200 feet) needs to be closed off. Constructability is one of the main issues facing the feasibility of floating sector gates. The hinges must rest on dry land; the barrier is floated into place and sunk when a storm event is imminent.

Table 22 - Favorable and Unfavorable Aspects of Floating Sector Gates

Favorable	Unfavorable
Structural aspects, layout, and operation	
• Large gate span possible • No vertical clearance limitation • Shallow dry dock is easy to inspect and maintain, provides collision protection to gate • Vertically immersed gate creates turbulence to clear out deposits on sill • A perfectly flat sill is not required	• Large space required for gate and dry dock • Gate radius, hence the closure width, needs to be substantial to make operation viable • Operation complicated; in-flowing water may not be controlled • A negative differential head may cause problems (pull-up forces ball hinges) • Heavy objects on sill can cause damage • Excessive load concentration such as forces on hinges • Mobilization time including filling of dry docks, rotating gates and sinking them is substantial
Hydraulic and hydrodynamic aspects	
• Vertical closure of flow opening (no strong horizontal flow contraction) • Separate sluice opening may be applied to reduce differential head and discharge excess water	• Sensitivity to flow-induced oscillations • Sensitive to dynamic wave forces • Limited resistance to reverse head • Closure is not leak proof; some water is always allowed to flow inside.

Figure 34 - Floating Sector Gate

This type of gate will be studied along with other possible options for a possible gate structure around Galveston Bay.

Non-floating sector gates are more common and close off smaller channel openings (less than 300 feet). The leaves are submerged at all times and are moved into position during a storm event. Sector gate sizes can vary greatly in height and width and are used in flood control applications around the world. Since they are usually dewatered to perform maintenance, shipping operations in the area can be disrupted unless an alternate solution is considered during this time.

Table 23 - Favorable and Unfavorable Aspects of Non-Floating Sector Gates

Favorable	Unfavorable
Structural aspects, layout, and operation	
• Large gate span feasible • No vertical clearance limitation • Not subjected to wind • Suitable for deep waters • Closing operation requires minimal time • Stable structure; no load concentration • Dry docks provides easy maintenance and protection from vessel collision	• Large space and deep excavation required for chambers • Silting may hamper operation • Load transfers to hinges and pintle which require regular maintenance against corrosion and underwater growth
Hydraulic and hydrodynamic aspects	
• Limited differential head and horizontal flow contraction in the last stage of closure • Suitable for reverse head and flow • Not sensitive to flow vibrations	• Susceptible to siltation in side chambers • Underwater pintle may jam due to debris hindering operation

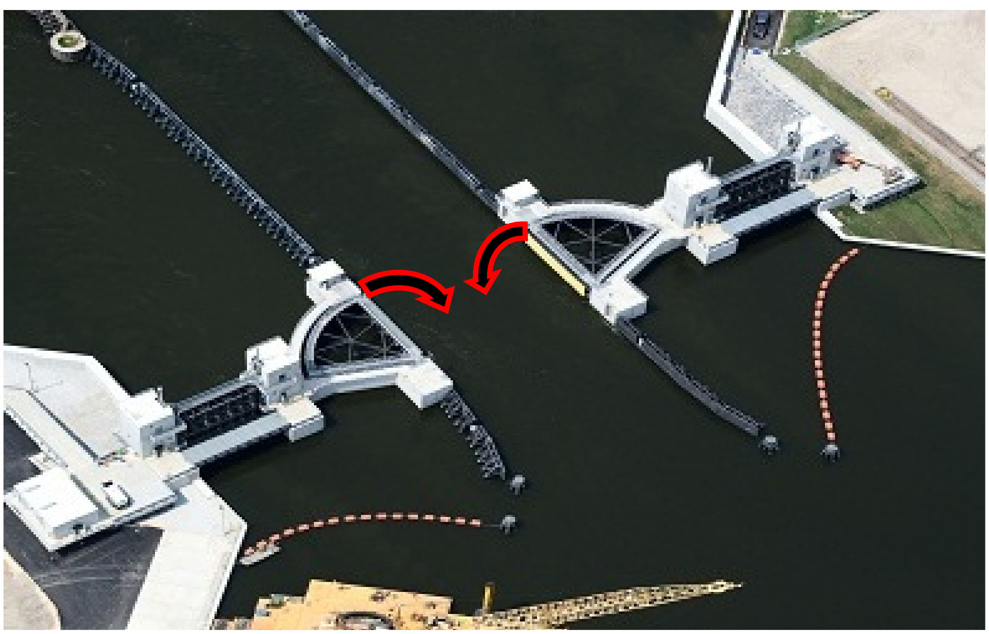


Figure 35 - Non-floating Sector Gate

This gate will be studied along with other gate options for possible gate structures around Cow Bayou and Sims Bayou.

4.3.6. Barge Gates

Barge gates (Figure 36) are floating gates that are floated into place and then sunk to the proper depth to ensure protection during storm events. These gates are made of high-performance lightweight concrete (HPLC) and ballast tanks that are filled with water to help sink the gate onto the foundation slab in the closed position. Usually, the barge floats out of the way and sits parallel to the channel in the open position, but some barge gates can move parallel to the gate opening itself. The use of high-durability concrete is crucial to protect the concrete and reinforcement from the corrosive effect of sea water. Lightweight concrete must be used to meet operational requirements. The hinge assembly can simply be a mooring point, and the operating machinery can be anything that has the means to move barges. Typically, some system of rope and capstan or winch and cable are used for operation. They are inexpensive and have a relatively short construction period, but the operating difficulty of larger gates makes them undesirable for flood protection. Barge gates in the New Orleans area have performed well against storm surge, but the operating (opening and closing) has proved problematic. The Inner Harbor Navigation Canal (IHNC) barge gate takes up to 9.5 hours to close and must be closed when the tidal flow is less than 0.5 miles per hour. This speed requirement means that the gate must be closed well in advance of any tropical storm activity that may affect the tidal flow rate. The concrete is prone to cracking if not installed, maintained, and operated properly.

Table 24 - Favorable and Unfavorable Aspects of Barge Gates

Favorable	Unfavorable
Structural aspects, layout, and operation	
Large gate span feasible	Large space and deep excavation required
Quick construction time	Flat and smooth sill required
No vertical clearance limitation	Silting and debris may hamper operation
Suitable for deep waters	
Closing operation requires minimal time	
Stable structure; no load concentration	
Hydraulic and hydrodynamic aspects	
Suitable for reverse head and flow	Susceptible to vessel collision and siltation in open chambers
Not sensitive to flow vibrations	Sensitive to flow during opening and closing

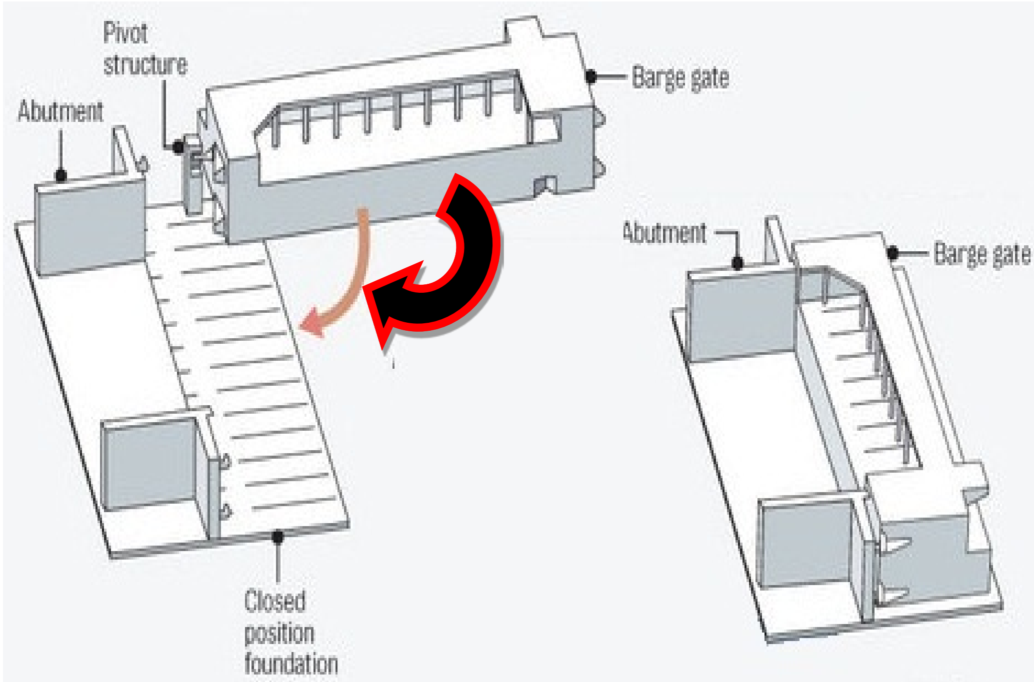


Figure 36 - Barge Gate

After the location, alternatives, and requirements are further investigated in the next phase of this study, this type of gate will be investigated further for portions of the study area, along with other possible options.

4.3.7. Inflatable Rubber Dam

Rubber dams are barriers that resemble rubber bladders (Figure 37). In the open position, they lie on the seabed. When a storm surge event is imminent, they are inflated with air while a gravity-feed system allows water to flow in. Once the threat of flooding is over, the water is pumped out and the air is released from the dam. Inflatable rubber dams are not widely used in storm surge protection and are more commonly used for river engineering and water control applications. They are desirable because there is no clearance height limitation, are not subject to wind, do not need a lot of space for construction, and are stored out of view when not in use. The foundation requirements are less than that of other flood gates because the overall weight of the structure is much lower than a steel gate of comparable size. They cannot be constructed in deep water, and the rubber sheet is difficult to inspect and maintain on a regular basis. If not carefully monitored, the rubber is an easy target for vandalism. The difficulty in fabricating large reinforced rubber sheets limits the size of the dam.

Table 25 - Favorable and Unfavorable Aspects of Inflatable Rubber Dams

Favorable	Unfavorable
Structural aspects, layout, and operation	
No limitation of span	Flexible structure, low frequencies, small stiffness, large mass
No vertical clearance limitation	Internal pressure determines stability
Not subjected to wind	Storage and immersion of rubber sheet causes problem
Space requirement is limited	Not suitable for deep water
Direct transfer of hydraulic load	Difficult inspection, maintenance, and replacement of rubber sheet
Hidden when not in use	Vulnerable to vandalism
No need for hinges and driving system	
Hydraulic and hydrodynamic aspects	
Vertical closure of the flow opening	Susceptible to ships or objects collision
Not sensitive to silting of sill	Strong flow contraction in last stage
	Considerable vibration due to wave loads
	No spill of excess water; overflow vibrations

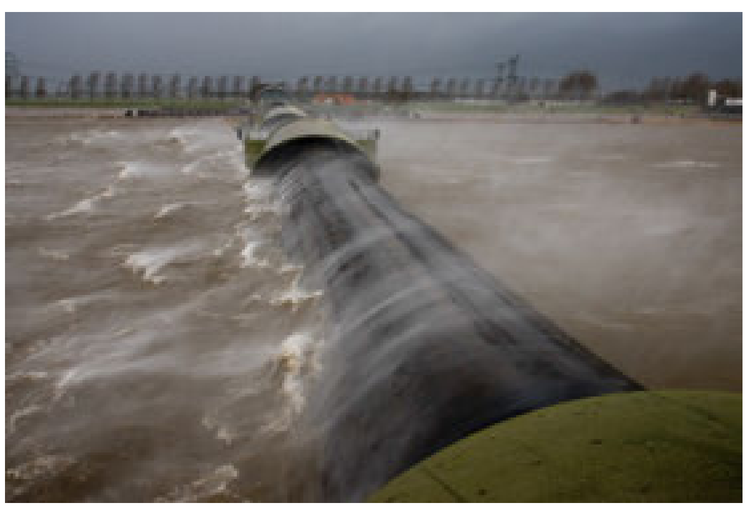


Figure 37 -Inflatable Rubber Dam

If large ships have to pass the barrier without any hindrance or delay, as will be required for a busy entrance channel to a large harbor, design options such as a rubber dam or miter gates, may be ruled out.

4.4. Ancillary Structures

All around the world, the basic infrastructure of a flood control system consists of some ancillary structures that tie in the control structures like gates, locks, dams, etc. to higher grounds. These are essential parts of the entire line of defense against flooding or storm surge that are of relatively lower height and are comparatively less expensive to construct. In large flood barrier projects with substantial lengths, it is judicious to form the majority of the line of defense using these ancillary structures while using the control structures at higher channel depths or at locations where navigation needs to be accommodated.

Examples of ancillary structures in flood and storm surge control systems may include, but are not limited to the measures discussed in the following sections.

4.4.1. Levees

Levees are earthen mounds that prevent flood water from passing toward the protected side. The height of the levee is determined based on the design of flood elevation particular to the terrain. The earthen fill generally slopes down from this elevation in both directions (Figure 38) using suitable slopes. The top of the levee is generally flat and sometimes accommodates roadways or recreational areas. The sloped surfaces on both sides are sometimes underlain using geotextile that prevents washout of the earthen material. In many instances the levee sides are armored using riprap if higher wave or tidal action is anticipated. If not armored, the slopes of the levee are seeded with grass, which prevents erosion of levee material. Levees are typically easy to construct. If borrow pits can be identified nearby, a levee provides a good solution as an ancillary structure. Otherwise, materials need to be hauled from distance to the project site. A major disadvantage of the levee is that the footprint required is very large, which entails added cost of right-of-way (ROW) acquisition. Another deficiency that levees present is that since they are constructed by depositing earthen materials, considerable settlement maybe expected.

Figure 38 - Typical Levee Section

4.4.2. I-Wall

I-walls are extensions of a levee height that help to reduce the footprint of the levee system. I-walls serve to raise the barrier elevation compared to the top of levee elevation. Using an I-wall system, a cut off sheet pile that protrudes beyond the top of the levee is embedded within the center of the levee. That exposed part of the sheet pile is then capped with concrete that has small embedded portions within the levee top. This concrete cover on top, forming a vertical wall, is known as an I-wall (Figure 39). I-walls are generally not very tall. The USACE recommended maximum height of an I-wall is 4 feet. Nevertheless, an I-wall on top of the levee reduces the cost of the protection compared to a levee-only solution. Also due to the reduced footprint of such a levee, substantial benefit is achieved in terms of lesser ROW requirement.

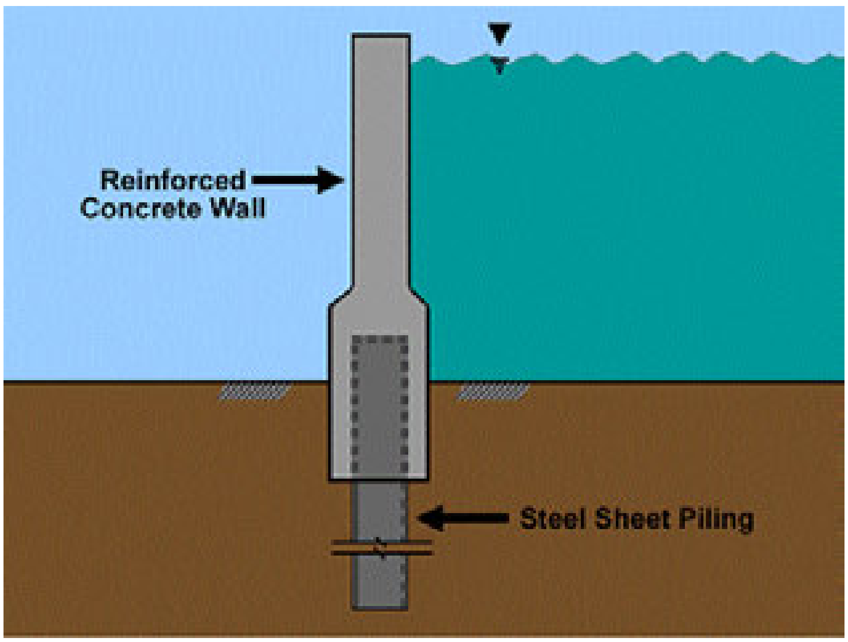


Figure 39 - Typical I-wall Section

4.4.3. T-Wall/L-Wall

T-wall and L-wall are purely structural solutions built of reinforced concrete. In the case of T-wall (Figure 40(a)), the structure is in the shape of an inverted T, where the bottom horizontal portion is known as the base and the vertical element is known as the stem. The stem forms a wall or barrier against the flood water or storm surge and transfers the hydrodynamic load to the base slab, which is generally founded on piles of soft soils. Depending on the hydrostatic load and the presence of sandy soil, T-walls may be designed without any deep foundation. In many such cases, T-walls generally have a small extension below the base slab, which is known as the shear key. The purpose of this element is to generate enough passive earth pressure that would contribute against sliding of the T-wall monolith due to horizontal water pressure from the flood side.

An L-wall (Figure 40(b)) is designed on the same concept except the shape of the monolith is similar to an upright L. T-walls/L-walls are very effective solutions against hydraulic loads. Within the New Orleans area, T-walls as high as 30 feet or more have been successfully constructed. This type of structure requires much less footprint compared to levees of similar height. However, being made entirely out of concrete, T-walls/L-walls may not have the aesthetic appeal of the levees that are armored with grass and blend well with the natural environment.

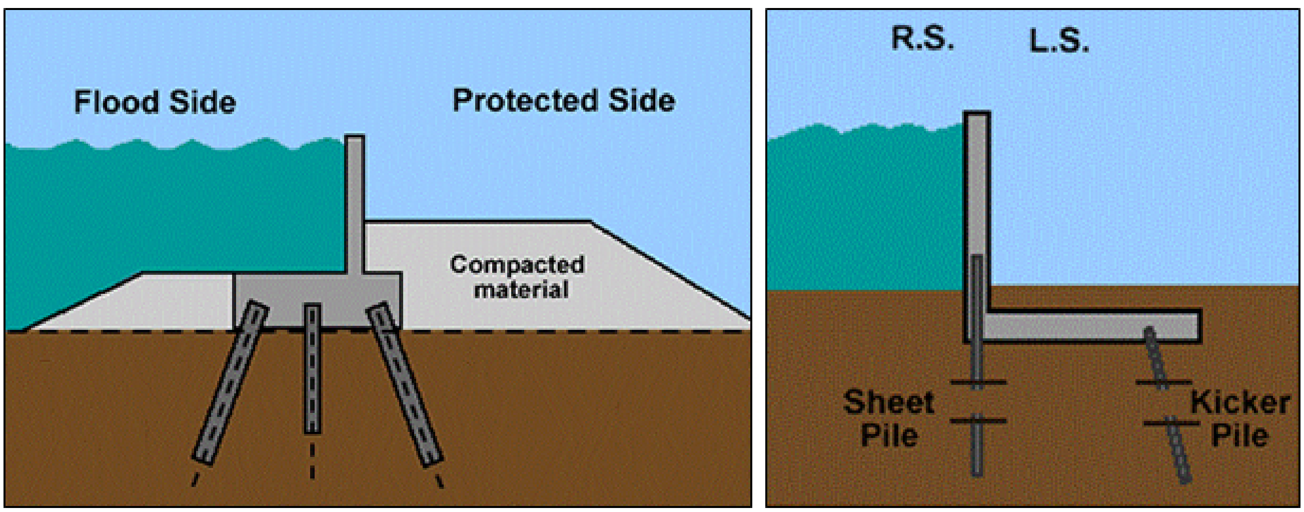


Figure 40 - Typical (a) T-wall & (b) L-wall Sections

4.4.4. Combi-wall system

Combi-walls (Figure 41) are built from a combination of spun cast piles, closure piles, and steel battered piles. The spun cast piles are placed closely near one another and the voids between the piles are sealed with closure piles and grout bags. Jet grout is often used to ensure a watertight connection to hold head and control seepage. The spun cast piles are braced with steel battered piles and then integrated with a concrete cap beam. This pile cap incorporated a roadway that allows access to the gates for vehicular maintenance traffic.

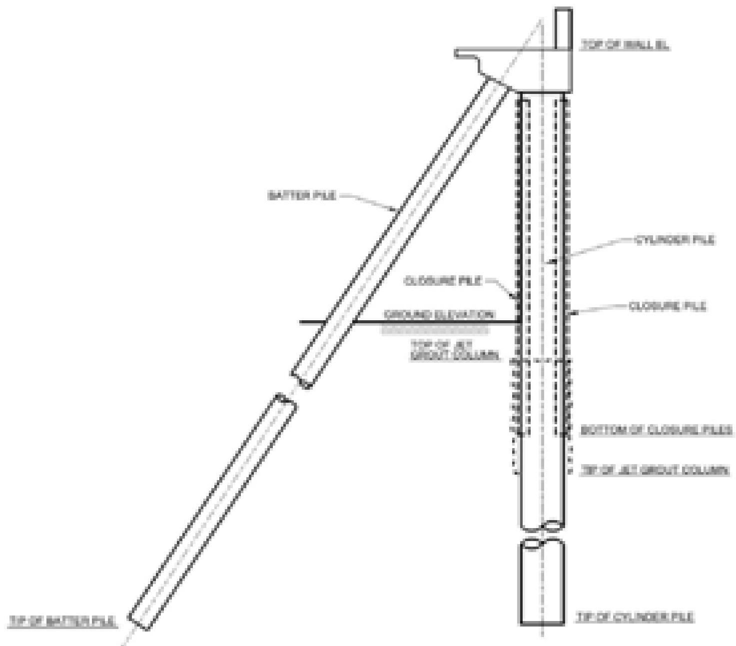


Figure 41 - Typical Combi-wall Section

For this phase of the study, ancillary structures surrounding and supporting different notable flood control and storm surge barriers have not been studied. These need to be investigated in the future to understand their applicability to the main control structures. Also, further investigation may be needed to identify different types of similar ancillary structures that have not been discussed in detail within this section, but are noteworthy.

5. Analysis of International Projects

As part of the Phase 1 data collection, the study team conducted a review of existing gate structures that are currently in operation around the world. The purpose of this review was to gain an understanding of how other nations have addressed their storm surge and flooding issues, and to gather information on the various types of structures and their function, design criteria, and cost. This review will enable the study team to apply current and best practices during alternatives scoping and development.

5.1. International Gates

5.1.1. *Marina Barrage – Singapore*

The barrier is located in the Marina Channel, between Marina East and Marina South. It was opened in November 2008. The barrier consists of nine crest gates, each measuring 100 feet wide and 16.5 feet high. This dam (Figure 16) converted Marina Bay and Kallang Basin into a new freshwater reservoir. It provides a new fresh water supply and flood control to the surrounding low-lying areas. The structure is only navigable for small pleasure craft. During periods of heavy rain, the crest gates open to allow excess rainwater to flow into Marina Bay. Under normal conditions, the gates stay closed and protect the low-lying areas of the city such as Chinatown, Jalan Besar, and Geylang from high tide. If the tide is high and rainfall is severe, excess rainwater can be expelled using pumps that lie under the gates.

Since the water level is controlled by gates and pumps, the reservoir level remains steady and calm year round allowing for water sports like kayaking or dragon-boat racing. The Marina Barrage is a popular recreation area, providing green space for other non-water activities. The complex has also used its construction as an opportunity to show off Singapore's drive to become "greener". All of the electricity needed for lighting around the barrage is provided by over 400 solar panels in a nearby park. This barrier, like others in Singapore, is designed to prevent flooding due to high tides and rainfall, not storm surge events. This type of gate would not be suitable for the study area and will not be studied further.

Figure 42 - Marina Barrage

5.1.2. *Fudai Flood Gate – Japan*

The barrier is located near the fishing village of Fudai in northeast Japan. The adjacent floodwall was built in 1967, and the gate construction was completed in 1984. The system consists of four 51-foot-high by 80-foot-wide vertical lift gates and the adjacent seawall. The seawalls tie into the two mountainsides that flank the town. The barrier prevents storm surge and tsunami waves from entering the village. The village has a small fishing port that lies outside of the protection area. This gate complex (Figure 43) is considered non-navigable, and since it is in a rare position between two mountains, it will not be explored further. It should be noted, however, that this gate was built prior to a catastrophic event, not in reaction to one. At the time of its construction, the mayor of the town was widely ridiculed for wasteful spending. The gate proved essential to the survival of the village as nearby towns were flooded and experienced major damage and loss of life during the 2011 tsunami.

Figure 43 - Fudai Flood Gate

5.1.3. Ramspol Storm Surge Barrier – Netherlands

The Ramspol Storm Surge Barrier (Figure 44) is an inflatable rubber dam that protects the nearby land from storm surge from Ijssel Lake. Construction was completed in 2002. It is the only inflatable dam that is a major flood protection barrier. The barrier consists of three 246-foot-long sections. While most inflatable dams are filled with only water or air, this dam uses a combination of the two. This allows for a smaller rubber body and reduces the inflation and deflation time. First, the dam is filled with water; the water flows in automatically and air compressors are used to fill the dam with air to the desired elevation. When inflated, the dams stand about 27 feet from the top of the sill. The dam can be operated in flowing water and is very resistant to wave loading. These types of dams are not widely used for storm surge protection, and are very vulnerable to vandalism.

Figure 44 - Ramspol Storm Surge Barrier

5.1.4. Maeslant Barrier – Netherlands

The Maeslant Barrier (Figure 45) is a storm surge barrier that is essential to the Delta Works project in the Netherlands. Initially, the plan to protect Rotterdam involved raising and reinforcing the existing dikes around the area. It was realized that the cost and construction time of such a project would far exceed that of a movable barrier in the river that connects the Rotterdam harbor with the North Sea. The harbor is very important to the economy of the region, so vessel access needed to remain unimpeded. The winning plan was chosen because it did not restrict the existing opening and most of the construction could take place in the dry docks that sit on each side of the channel. When the barrier is open, the gates remain in the dry so maintenance can be easily done without having to close any part of the channel.

Construction began in 1991 and was completed in 1997. The barrier consists of a 72-foot-high floating sector gate with a 1,180-foot opening. The 788-foot-long gates are stored in dry docks on the adjacent shore. Under normal conditions, the gates are kept fully open, allowing for boat traffic to access the nearby ports. When storm surge above 10 feet is expected, the gates close automatically by computer. The docks are flooded and the gates are floated into the closed position using a small train to move the gates to the middle of the channel. When they are properly situated, they are then flooded with water to force them to the bottom concrete sill. When they are a few feet above the sill, the flooding process is halted to allow the increasing current to wash away the accumulated silt on the sill. About one hour later, the gates can be completely submerged into position.

Figure 45 - Maeslant Barrier

5.1.5. Hartel Barrier – Netherlands

The Hartel Barrier is a storm surge barrier that is part of the Delta Works project in the Netherlands. Construction was completed in 1997. The barrier consists of two vertical lift gates (Figure 46) – the short gate spans 162 feet across the channel and the long gate spans 322 feet across the channel. A shipping lock sits adjacent to the vertical lift gate complex. When lowered to their closed position, the gates provide protection for about 10 feet above sea level of storm surge. In the open position, the gate bottoms rest about 46 feet above sea level. The same computer program that determines the actions of the Maeslant Barrier also controls when the Hartel Barrier closes. The design of the barrier allows for it to be overtopped in extreme storm surge situations. This allows the gate to limit the horizontal hydraulic load while maintaining storm surge protections. In the closed position, the gate actually sits about 0.65 feet above the sill, leaving a leakage gap open.

While the barrier is in a coastal region, it is farther into the channel than most of the other gates that are presented here. This type of gate may be further investigated for areas in the study region that are more inland and subject to less wave action and have less height restrictions on vessel traffic.

Figure 46 - Hartel Barrier

5.1.6. Thames Barrier – United Kingdom

The Thames Barrier (Figure 47) is a storm surge barrier that protects central London from tidal surges. Potentially dangerous weather conditions are forecasted up to 36 hours in advance using information from the Met Office, tide, wind and pressure gauges, and integrated computer analysis. The decision to close the gate is based strongly off of a matrix of three factors: 1) the height of the tide in the estuary; 2) the height of the tidal surge; and 3) the river flow entering the tidal Thames River, measured as is passes over Teddington Weir. Each gate can be closed in 10 to 15 minutes, but it takes about one hour to close the entire barrier. As of March 2014 the barrier has been closed 174 times. The barrier spans 1,700 feet across the Thames River and includes 10 steel gates that divide the river into four 200-foot and two 100-foot navigable spans. The other four openings are non-navigable. The main gates are 66 feet high and protect London from tidal surge up to EL +23.6 above sea level. In the open position, the vertical sector gates in the navigable spans sit under the water to allow boat traffic access without height restrictions. In the maintenance position, the gates sit above the water to eliminate the need for dewatering procedures in the gate bays. The falling radial gates in the non-navigable spans remain above the water in the open position. This barrier is the centerpiece of a larger system of defenses that protect London from flooding, including flood walls, the Barking Barrier, and the King George V flood gate.

Flooding had always been a problem along the banks of the Thames River, but it was not until the Thames River Prevention of Floods Act of 1879 that legislation was finally enacted to address the problem. Flooding in 1928 (which killed caused 14 deaths) and surge tides combined with higher spring water levels in 1953 (which caused over 300 deaths) led to renewed focus on a flood protection barrier in the Thames. Until the barrier was proposed, the preferred method of flood control in London was to erect higher and higher flood walls. It was realized that this solution, though effective and easy to maintain, was not ideal. Construction of the barrier began in 1974 and took eight years to complete.

Figure 47 - Thames Barrier

5.1.7. Eider Barrier – Germany

The barrier is located at the mouth of the Eider River near Tönning on Germany's North Sea Coast. Construction was completed in March 1973, in response to the North Sea flood of 1962. According to early records, as many as 15 floods in the fourteenth century, 13 in the seventeenth, and 17 in the eighteenth can be attributed to the North Sea. Initial design of a flood control structure began as early as 1957. Five years later, after much planning and modeling, the decision was made to dam the Eider River at the mouth rather than place a barrier closer inland or raise the existing dikes in the area. The barrier prevents storm surge from entering the Eider River during severe storm events. The barrier is comprised of two separate rows of five radial gates (Figure 48). This provides a double layer of protection as well as redundancy in case of a gate failure. Each gate spans 130 feet and is 28 feet above sea level in the closed position. The gate complex works in conjunction with the nearby dike system. A shipping lock sits adjacent to the barrier. The barrier is not navigable by shipping vessels and all traffic must travel through the lock. The barrage has become a tourist attraction, and guided tours are available at no charge.

Figure 48 - Eider Barrage

5.1.8. St. Petersburg Dam – Russia

The barrier is located in Neva Bay in the Gulf of Finland. St. Petersburg has a long history of flooding, with the occurring being a mere three months after the city's founding in 1703. Over the following years, the city has been flooded over 200 times, with three of the floods being categorized as catastrophic (flooding above 10 feet as measured at the National Mineral Resources University). The worst flood occurred in 1824 and caused several hundred deaths. Construction of the dam began in 1978, but due to political strife the entire system was not completed until 2011. The barrier consists of a series of 11 separate dams measuring 16 miles. It stands 26 feet above sea level, and contains two gate openings for shipping vessels. The large gate opening (Figure 49) is 650 feet wide with a channel depth of 52.5 feet. This opening contains a floating sector gate. The smaller opening is 360 feet wide with a channel depth of only 23 feet. This opening contains a vertical lift gate. The rest of the structure consists of 11 earth-and-rock embankments along with six sluice gate facilities measuring a total of approximately 5,500 feet. The sluice gates provide tidal surge protection during a storm event and allow water flow from Neva Bay into the rest of the Gulf of Finland during normal conditions. The entire dam system also includes a six-lane highway running over the majority of the dam along with a tunnel that runs under the large sector gate opening.

Initially there were concerns that during heavy rainfall, the barrier would trap the water in Neva Bay and cause flooding. It was determined that the size of Neva Bay is large enough to allow excess water to pool like a reservoir.

Figure 49 - St. Petersburg Dam

5.1.9. Venice Flood Barrier (MOSE Project) – Italy

The barriers are located at the Lido, Malamocco, and Chioggia Inlets and separate the Venetian Lagoon from the rest of the Adriatic Sea. Construction of the barriers began in 2003 and is currently ongoing. The system consists of a total of 78 flap gates that rest submerged during normal conditions and rise out of the sea during storm events. The Lido inlet (Figure 50) contains two rows of gates – 21 on the northern side and 20 on the southern side – linked by an artificial island in the center and a small lock for fishing boats and emergency vessels.

Figure 50 - Lido Inlet Barrier

The Malamocco Inlet (Figure 51) contains one row of 19 gates along with a lock for large shipping vessels.

Figure 51 - Malamocco Inlet Barrier

The Chiaoggia Inlet (Figure 52) contains one row of 18 gates and two small locks for fishing boats and emergency vessels.

Figure 52 - Chioggia Inlet Barrier

The gate panels vary in size, the smallest being 61 feet long and the largest being 97 feet long along the length of the channel. These panels rise up in a tilted position when in service. Each of the panels blocking the channel is approximately 65 feet wide. They are designed to protect against a tidal surge of 10 feet. Due to the lack of a rigid connection at the bottom, this type of gate may not be suitable to sustain repetitive impacts from a barge or vessel. Since its inception, the Experimental Electromechanical Module (MOSE) project has been met with fierce opposition from political and environmental groups. These groups argue that the cost of the project has been much higher than alternative systems used in other places such as England and the Netherlands. They also express concern about environmental aspects of the project, namely that the leveling of the inlets and the reinforcement of the lagoon bed will upset the hydrogeological balance and ecosystem of the entire lagoon. The project is still not completed, and it is unclear at this time what kind of long term operational and maintenance problems will arise.

5.1.10. Nieuwpoort Storm Surge Barrier – Belgium

The Nieuwpoort Storm Surge Barrier (Figure 53) is a gate that is currently under construction. It will protect the coastal city of Nieuwpoort in Belgium. Construction is expected to be completed in 2016. The 125-foot gate is stored underwater in the open position. When closed, the gate rises about 28 feet above sea level. The depth of the channel is 15 feet and the total height of the gate is 43 feet to protect against a tidal surge of up to 25.75 feet. The local populace uses the surrounding area for recreational purposes and did not want a gate structure to be visible and intrusive.

Figure 53 - Nieuwpoort Storm Surge Barrier

5.2. Domestic Gates

5.2.1. Seabrook Floodgate Complex – Louisiana

The Seabrook Floodgate Complex (Figure 54) is located at the north end of the IHNC near Lake Pontchartrain. Construction was completed in 2012. The barrier protects New Orleans against storm surge from Lake Pontchartrain during hurricanes. A number of alternatives were considered, but ultimately a sector gate was chosen because of its long history of flood protection and the USACE's familiarity with this type of structure. When bathymetric data was analyzed, it was discovered that a large scour hole existed in the center of the channel. By narrowing the channel, the water velocity would increase thereby increasing the potential for scour in the future. To combat this, vertical lift gates were placed on each side of the sector gate to maintain adequate flow during normal conditions. The complex consists of a 95-foot-wide navigable sector gate and two 50-foot-wide, non-navigable vertical lift gates. The sector gate and vertical lift gates are 34 feet high; they extend from a sill elevation of 18 feet below sea level to 16 feet above sea level. The gates tie into the surrounding protection system through a series of T-walls that also stand 16 feet above sea level.

Figure 54 - Seabrook Floodgate Complex

5.2.2. IHNC-Lake Borgne Surge Barrier – Louisiana

The IHNC Surge Barrier is located near the intersection of the Gulf Intracoastal Waterway (GIWW) and the Mississippi River Gulf Outlet. Construction was completed in 2013. The barrier protects New Orleans and St. Bernard Parishes against storm surge from the Gulf of Mexico and Lake Borgne during hurricanes. The total length of the barrier is 1.8 miles. It consists of a 150-foot-wide sector gate that is adjacent to a barge gate with a 150-foot opening in the GIWW (Figure 55(a)). The sector gate is 42 feet high while the barge gate is 44 feet high. The sector gate allows for shallow draft vessels. A combi-wall system of steel and concrete piles connects these gates to a 56-foot-wide by 34-foot-high vertical lift gate (Figure 55(b)) at Bayou Bienvenue. This gate allows small fishing vessels access to the nearby marsh. The combi-wall also extends from the Bayou Bienvenue vertical lift gate to the LPV 145 T-wall system. [LPV 145 is a levee segment located between Lake Borgne Barrier (Bayou Bienvenue) and LPV-144 (Bayou Dupre), approximately 30,300 linear feet in length.] The entire surge barrier structure protects against a tidal surge of 25 to 26 feet above sea level.

During installation of the barge gate, a large crack was produced when the gate was being sunk into position. The operators have encountered problems during the closing of the barge gate. It must be opened and closed in tandem with the adjacent sector gate, otherwise the strength of the current will not allow the gates to open and close properly. Since the majority of the material is concrete, cracking proved to be a major issue during construction and mobilization to the project site.

Figure 55 - (a) Sector Gate & Barge Gate, (b) Bayou Bienvenue Vertical Lift Gate

5.2.3. Fox Point Hurricane Barrier – Rhode Island

The barrier is located near the confluence of the Providence River and the Seekonk River in Providence, Rhode Island. Construction was completed in 1966. The barrier protects low-lying areas of Providence against tidal surge due to hurricanes and other severe storm events. It consists of three tainter, or radial, gates (Figure 56) that are 40 feet wide and 40 feet high. In the open position the gate bottoms sit 25 feet above sea level to allow fishing boats and small pleasure craft through. The barrier is designed to protect against tidal surge that is 25 feet above sea level. A pump station containing five pumps capable of pumping 3.15 million gallons of water per minute sits adjacent to the gates. These pumps are activated when the river level increases during a storm event. Vehicular gates under Interstate 195 and a 25-foot-high dike close off the rest of the area during a storm event.

Providence has been a very important port city to Rhode Island since the dawn of America. Located near the port, the downtown area is nestled in a shallow basin that is closer to sea level than its surrounding area. A hurricane in 1938 inundated the entire downtown area, causing millions of dollars in damage and 250 deaths in the region. Another storm, Hurricane Carol, hit the area in 1954 and was a wake-up call to the local residents and politicians. The passing of the Flood Control Act of 1958 spurred the construction of the Fox Point Hurricane Barrier.

Figure 56 - Foxpoint Hurricane Barrier

5.2.4. Stamford Hurricane Barrier – Connecticut

The barrier is located in Stamford Harbor in Connecticut. The city of Stamford has a long history of flooding, dating back to 1635. A hurricane in 1938 flooded the area and caused about $6 million in damages. In 1954, Hurricane Carol caused an additional $3.4 million in damage and spurred the local residents to take action against flooding. Construction started in May 1965 and was completed in January 1969. The barrier (Figure 57) protects against tidal surge during hurricanes and severe weather events. It consists of three components. The first is a 2,850-foot-long earthfill dike along with a navigable steel flap gate with a 90-foot opening, both of which are designed to protect against a tidal surge of 17 feet above sea level. In the open position, the gate rests on the bottom of the 18-foot-deep channel. A pump station to expel water during an event is also part of this leg segment. The second component consists of a 1,350-foot-long concrete wall, a 2,950-foot-long earthfill dike, and a pump station. This section also protects against a tidal surge of 17 feet above sea level. The third component is a 4,400-foot-long earthfill dike and two pumping stations. This component protects against a tidal surge of up to 19 feet above sea level. The barrier protects about 600 acres of land including manufacturing plants, commercial districts, and residential neighborhoods. The USACE maintains and operates the navigational gates, while the city maintains the rest of the barrier.

During the design phase of this project, the local engineers reached out to the U.S. Weather Bureau and the Beach Erosion Board affiliated with the Texas Research Foundation of Texas A&M University. In order to design for the worst case scenario, the engineers looked at the strongest hurricane in recorded history along the Atlantic coast – a category 4 storm off the coast of the Carolinas in September 1944. The storm conditions were transposed onto the New England coast in order to calculate the anticipated tidal surge.

Figure 57 - Stamford Hurricane Barrier

5.2.5. GIWW West Closure Complex – Louisiana

The barrier (Figure 58) is located near the confluence of the Harvey Canal and the Algiers Canal. Major construction was completed in 2011. The barrier protects portions of Orleans, Jefferson, and Plaquemines Parishes on the west bank of the Mississippi River from tidal surge due to hurricanes and severe storm events. Initially, a tandem of two sector gates was thought to be the best solution, with one being able to stay open in the event that the other would need to undergo maintenance. Ultimately, the USACE decided on one large gate in order to reduce costs and construction time. The complex consists of a 225-foot navigable sector gate, an 11-bay pumping station, five 16-foot-by-16-foot sluice gates, 4,200 feet of T-wall, and a water control structure with two 8-foot-by-8-foot gates. The sector gate is 32 feet high and can protect against a tidal surge of 16 feet above sea level. The pumping station is capable of expelling water at approximately 150,000 gallons per second. One of the challenges in design and construction was to not disturb the nearby wetlands that are protected by the EPA's Bayou aux Carpes Clean Water Act (CWA).

Figure 58 - GIWW West Closure Complex

5.2.6. New Bedford Hurricane Protection Barrier – Massachusetts

The barrier is located within New Bedford and Fairhaven Harbor. Construction was completed in 1966. The barrier (Figure 59) protects areas in New Bedford, Fairhaven, and Acushnet from tidal surge due to hurricanes and severe storm events. The protected area encompasses about 1,400 acres and is home to densely inhabited industrial and commercial properties. This area was severely flooded during the September 1938 Hurricane and Hurricane Carol in 1954. Hurricane Carol caused approximately $8.3 million in damages.

The barrier consists of a 150-foot-wide sector gate and 4,500 feet of earthfill dike with stone slope protection. The barrier is designed to protect against tidal surges of 20 feet above sea level. In the open position, the barrier is accessible to vessel traffic. The gate is operated and maintained by the USACE, while the rest of the barrier is maintained by the city.

Figure 59 - New Bedford Hurricane Protection Barrier

5.2.7. Bush Canal Floodgate – Louisiana

The Bush Canal Floodgate is located at the confluence of Bush Canal and Bayou Terrebonne in Terrebonne Parish. It is part of the Morganza to the Gulf Protection Project, and construction was completed in 2011. It was built in response to the flooding caused by Hurricane Ike in 2008. The gate works in conjunction with the Placid Canal Floodgate and the adjacent 6.5 miles of levees. Although Congress had authorized $550 million in 1992 and again reauthorized the available money in 2007 for flood protection along the Morganza to Gulf area, the federal government has yet to contribute any funding toward construction. The costs have been covered on the local and state level. The 56-foot-wide barge gate (Figure 60) protects the communities of Chauvin, Dulac, Grand Caillou, and Little Caillou during a storm event. The barrier is designed to protect against tidal surge of 18 feet above sea level.

Figure 60 - Bush Canal Floodgate

5.3. Summary Table of Gates

Barrier	Location	Gate Type	Gate Opening	Channel Depth Compared to MSL	Notes
Venice Storm Surge Barrier	Italy	Flap gate	Multiple gates, 65.6' wide each	Maximum depth of approximately 40'	Not visible when open, difficult to maintain. May not withstand vessel impact. Larger footprint at the channel bottom may disrupt ecology.
Maeslant Storm Surge Barrier	Netherlands	Floating sector gate	1180'	56'	Suitable for large opening. No vertical clearance issues; supports must be able to be placed on dry land. Gate radius (arm) is substantially large.
Hartel Barrier	Netherlands	Lifting gate	162' and 322'	21'	Limited vertical clearance; barrier is not designed for complete water tightness.
Stamford Hurricane Barrier	Connecticut	Flap gate	90'	12'	Not visible when open; potential maintenance issues.
IHNC New Orleans Hurricane Protection Barrier	Louisiana	Sector Gate	150'	16'	Barge and sector gate together may present operation issues
Seabrook Gate Complex	Louisiana	Sector gate + lift gate	95'	18'	Good solution if vessel beam size is less than 100' and total opening is relatively small.
Thames Barrier	UK	Segment gate	4-200' and 2-100'	19'	Fits well in rivers, can add as many additional bays as needed to protect the entire area.
Fox Point Hurricane Barrier	Rhode Island	Radial gate	3-40'	15'	Not suitable for areas with a great deal of boat traffic.
Nieuwpoort Storm Surge Barrier	Belgium	Segment gate	125'	15'	Suitable for areas with not too large opening and where the local population does not want the gate to be visible.
New Bedford Hurricane Protection Barrier	Massachusetts	Rolling sector gate	150'	30'	Standard gate design, but environmental concerns will arise if the rest of the bay is closed off.
GIWW West Closure Complex	Louisiana	Sector gate + pump station	225'	16'	Combination gate and pump station good solution for low-lying areas.
St. Petersburg Dam	Russia	Lift gate + floating sector gate	650' and 360'	52.5' and 23'	Example of barrier that protects a very long stretch of bay.
Eider Barrier	Germany	Radial gate	5-130'	18'	Non-navigable solution that is suitable for shallow waterways with little vessel traffic.
Bush Canal Floodgate	Louisiana	Barge gate	56'	6'	Suitable for smaller closures.

6. Public Coordination and Outreach

Public coordination and outreach activities for Phase 1 of the Storm Surge Suppression Study included development and maintenance of stakeholder databases, including public comment and feedback documentation; maintenance and updates to the study website; development of collateral materials and public communication tools; and coordination and execution of media and public outreach events. Public coordination and outreach activities for Phase 1 of the Storm Surge Suppression Study culminated with a series of public scoping meetings in early December 2014. Public coordination and outreach activities are outlined in the following section, and comprehensive documentation of outreach activities is included in **Appendix C**.

6.1. Stakeholder Information and Feedback Databases

The study team built upon existing databases used for similar studies in the region to develop the stakeholder information and feedback database for the GCCPRD Storm Surge Suppression Study. In addition to interested stakeholders, the stakeholder database also contains contact information for elected officials on the local, state, and federal levels within the six-county study region. The stakeholder database is comprised of contact information including name, mailing address, organizational affiliation, telephone number, and e-mail address. The stakeholder database also contains a transcription of all public feedback received through various methods including comment forms returned at public scoping meetings or mailed to the project manager, comments submitted through the website, and formal letters mailed to the project manager.

The following information is tracked and documented by the study team:

- Media relations efforts and study-related news (i.e., a media archive)
- Public meeting attendance
- Public comments, response tracking, and follow-up
- Original feedback documents

6.2. Study Website

The study website (www.gccprd.com) serves as a single, prominent source of study information. The website maintains background information including "About the District," "About the Study," and "Frequently Asked Questions." During Phase 1 of the study, the website was updated to include a "Get Involved" section that features a feedback submittal tool through which users can submit comments, as well as an online portal to sign up for the study stakeholder mailing list. An "Announcements" section was also added to the study website, which presents upcoming outreach events such as the public scoping meetings and important study updates. The study

Figure 61 - The gccprd.com website

website also features the video introduction to the study, which provides study background information and announces the public scoping meetings. In addition to providing study information, the website clearly announced meeting locations and times in the month and weeks preceding the three public scoping meetings.

6.3. Communication Tools and Collateral Material Development

6.3.1. Study Guide

An informational handout providing history and context of the study was developed as a "study guide" for stakeholders and the general public. The study guide communicates the goals and process of the study and includes some educational information. The study guide was distributed at the media briefing and at public scoping meetings. These outreach events are further discussed in the sections that follow.

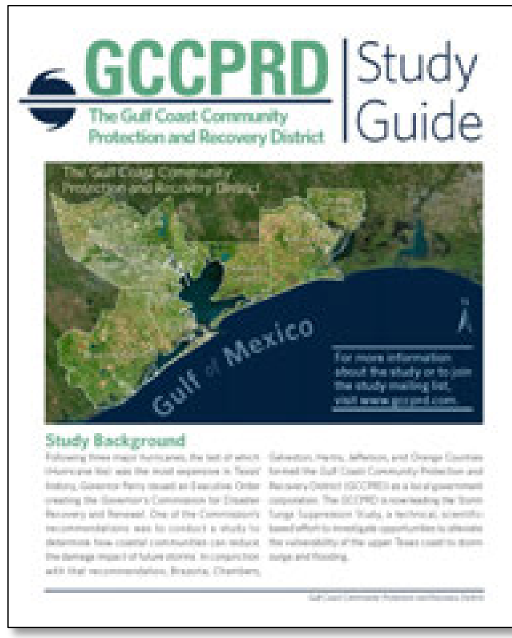


Figure 62 – Study Guide

6.3.2. Study Video Introduction

A brief video introduction for the study was produced to provide a point of consistent, targeted communication in a professional and easily distributed format. The video introduction is approximately 5 minutes in length and informs the viewer of the creation of the GCCPRD, the goals of the Storm Surge Suppression Study, and how the public can be involved in the study. The video introduction was made available through the study website, was distributed to the study mailing list through mass e-mail, and was featured as the primary presentation at the public scoping meetings. Specific uses of the video introduction tool are further discussed in each corresponding section of this report.

6.4. Noticing Activities

Public scoping meetings were noticed using a variety of methods intended to reach the known stakeholders as well as the general public. Noticing methods included mailed letters to known stakeholders and elected officials; direct e-mail to known stakeholders and elected officials; published notices in regional newspapers; announcements on the study website; and press releases to regional media outlets.

6.4.1. Notices on the Study Website

The study website clearly announced meeting locations and times in the month and weeks preceding the three public scoping meetings. It features an online portal to sign up for the stakeholder database and a feedback submittal tool through which users can submit comments. The website also features the video introduction to the study, which provides study background information and announces the public scoping meetings.

6.4.2. Mailed Letters of Notice

A total of 600 formal letters to local, state, and federal elected officials were mailed approximately 35 days prior to the first meeting. A total of 265 mailed notices announcing the public meetings were sent to key stakeholders approximately 30 days prior to the first meeting. Mailing lists and copies of the letters are included in **Appendix C, Section 1**.

6.4.3. Mass E-mails

Mass e-mails were sent to each individual who provided an e-mail address on the stakeholder database. E-mails were sent on November 10, 19, and December 3, 2014, to notice stakeholders of the upcoming public scoping meetings. The e-mail distribution list and a copy of the e-mail notice are included in **Appendix C, Section 2**.

6.4.4. Newspaper Advertisements

The study team utilized published notices in local newspapers to advertise the December 2014 public scoping meetings. Notices were published in English in the *Houston Chronicle*, the *Orange Leader*, the *Baytown Sun*, *The Facts* (Brazoria County), the *Galveston Daily News,* and the *Port Arthur News*, and a Spanish notice was published in *La Voz*. Affidavits of publication and copies of the notices are included in **Appendix C, Section 3**.

Table 26 - Summary of Published Notices for Public Scoping Meetings

Newspaper	Publish Date
The Facts (Brazoria County)	Thursday, November 6
Galveston Daily News	Thursday, November 6
The Orange Leader	Saturday, November 8
Port Arthur News	Thursday, November 6
Beaumont Enterprise	Thursday, November 6
The Houston Chronicle	Thursday, November 6
The Baytown Sun	Thursday, November 6
La Voz (Spanish)	Sunday, November 9

6.4.5. Press Releases

Press releases were sent to local media outlets to announce public outreach events and generate awareness about the study. Copies of the press releases and a list of media outlets that received them are included in **Appendix C, Section 4**.

6.5. Outreach Events

6.5.1. Public Information Session

A public information session was conducted on Thursday, October 9, 2014, and was hosted by Harris County Judge Ed Emmett and GCCPRD President Robert Eckels. The information session provided attendees with background and introductory information for the GCCPRD Storm Surge Suppression Study.

6.5.2. Media Briefing

A media briefing was conducted on December 1, 2014, at 10 a.m. at the Harris County Commissioners Court Courtroom on the 9th floor of the Harris County Administration Building, 1001 Preston Avenue, Houston, Texas. The purpose of the media briefing was to disseminate key messages and set the tone for open communication surrounding the study prior to the large-scale public meetings. Members of the media were provided with an informational presentation from the project manager, and a study guide containing study background information.

6.5.3. Public Scoping Meetings

Open-house style meetings were held in League City, Baytown, and Beaumont on December 4, 9, and 11, 2014, respectively, from 6 p.m. to 8 p.m.

Public scoping meetings were hosted at the following locations on the following dates:

Thursday, December 4, 2014	Tuesday, December 9, 2014	Thursday, December 11, 2014
6 p.m. to 8 p.m.	6 p.m. to 8 p.m.	6 p.m. to 8 p.m.
League City Civic Center	Harris County Precinct 2	Jefferson County Courthouse
400 West Walker St.	J.D. Walker Community Center	Jury Impaneling Room
League City, Texas 77573	7613 Wade Rd.	1001 Pearl St.
	Baytown, Texas 77521	Beaumont, Texas 77701

The purpose of the meetings was to introduce the Storm Surge Suppression Study to the public and gather public comments regarding the scope of the study. Upon arrival, attendees were asked to sign in and were provided with a study guide, an informational handout explaining the meeting format, and a written comment form. Copies of these public meeting materials are included in **Appendix C, Section 6**. Photographs documenting the scoping meetings are included in **Appendix C, Section 7**.

Figure 63 - The public scoping meeting in League City on December 4, 2014

A total of 118 people, including 20 elected officials or their representatives, attended the public scoping meetings. Copies of attendee cards are included in **Appendix C, Section 5**.

The study video introduction was featured as the primary presentation at the public scoping meetings and played continuously throughout the duration of each meeting. Copies of the video script translated to Spanish were made available at each meeting. Informational display booths containing both print and electronic content were arranged around the open-house meeting space. All display information was presented in both English and Spanish. Display content was identical at each public scoping meeting. Copies of display materials and photographs of the public scoping meetings are included in **Appendix C, Section 6**.

Large-scale regional maps were available at the public scoping meetings for the public to indicate their input regarding areas of vulnerability or areas where previous storms have caused severe damage. Feedback provided on the input maps was not limited or censored to any specific topic – the public was invited to provide input related to the study. A map incorporating public input received at the public scoping meetings is included in **Appendix C, Section 9**.

6.5.4. Additional Outreach Activities

Additional outreach activities were carried out by Christopher Sallese, project manager, and David Hagy, deputy project manager. These activities included smaller meetings with existing community organizations and collaborative meetings and discussions with other researchers. A copy of the PowerPoint presentation used for additional outreach activities is included in **Appendix C, Section 8**.

Table 27 - Summary of Additional Outreach Activities

Date	Organization
April 8-9, 2014	USACE Surge Suppression Scoping Meeting
May 21, 2014	SSPEED Symposium –Rice University
June 2, 2014	Presentation to Deer Park Community Advisory Meeting
August 1, 2014	University of Houston Hurricane Symposium- Panel Discussion
August 4, 2014	Texas Joint Interim Committee on a Coastal Barrier System
August 5, 2014	City of La Porte Community Advisory Meeting
September 9, 2014	Civil Engineering Conference- Panel Discussion
October 6, 2014	Collaboration meeting with SSPEED
October 9, 2014	Harris County Public Information Session
October 15, 2014	Collaboration meeting with SSPEED
November 4, 2014	Presentation to Velasco Drainage District
November 10, 2014	H-GAC and American Institute of Architect Panel Discussion
November 12, 2014	Collaboration meeting with USACE
December 10, 2014	Presentation to Seabrook Community Advisory Panel Meeting
December 15, 2014	TAMU Ike Dike Symposium

6.6. Phase 1 Pubic Comments

Public comments were received at public scoping meetings, through mail, email (info@gccprd.com), and the comment portal available through the study website (www.gccprd.com). A database of public comments received, as well as a copy of each public comment document, is available in **Appendix C, Section 9**.

A general summary of comments expressed includes the following:

- In support of the study. (6)
- In disagreement with the study. (0)
- Gratitude for public outreach. (2)
- Federal funds should be allocated to assist the Texas Gulf Coast. (2)
- Implementation of a storm surge suppression plan as soon as possible. (3)
- Request for regular newsletters/updates on the study. (1)
- Concern for public safety. (1)
- Concerns regarding dredging material accumulating in the bay (Increasing the depth of the channel at the expense of the community). (1)
- Importance of this region on a national level (refineries, chemical plants, ports, industries, medical facilities, research facilities). (1)
- Acknowledgment that there are serious challenges to mitigating and increasing efficiency to protect a rapidly growing population that is changing culturally, economically, and topographically. (1)
- Recognition of the diversity in our region and the lack of public experience with hurricanes. (1)
- Request for prioritization and expedited delivery of highway expansion projects on thoroughfares that serve as evacuation routes. (1)
- Request for public education for and sensitivity to the people who have no hurricane experience. (1)
- Concern about who will be responsible for paying for implementation of the storm surge suppression plan. (1)
- Protect to a 100-year-storm level. (1)
- Consider storm drainage in addition to storm surge suppression. (1)
- Close storm surge conveyance path (due to historical HL&P cut) in Southeastern Baytown. (1)
- Prefer storm surge protection over an aesthetic view. (1)

Proposed storm surge suppression methods for consideration:

- Proposed structural methods
  - Request for movable barriers that allow water to drain quickly following a storm event.
  - Portable “Super Bag Network” (http://youtu.be/ry7eoP1PIV4; inventor’s name is James "Jim" Jackson, 269-598-2351).
  - Raise Highway 87 and 3005 about 15 feet.
  - Install seawall structure (with Archimedes screw pumps) around Galveston Bay.
  - Install Scandinavian-style swing gates at the mouth of the Houston Ship Channel.
- Proposed nonstructural methods
  - Require critical infrastructure (schools, hospitals, retirement homes, police, fire, etc.) to be built to withstand category 4 hurricane surge and wind. (Example: Monroe County, FL)
- Proposed “Building with Nature” methods/Man-made natural methods
  - Permanent natural barriers can contain stormwater and slow drainage.

6.7. Continued Public Outreach

Public feedback and participation will be encouraged throughout the duration of the study, and presentations to and meetings with interested stakeholders will continue. Periodic study updates will be delivered to the stakeholder database contacts by email throughout Phase 2 of the study. A second series of public meetings will be held in spring 2016 to receive feedback about potential alternatives included in the region-wide storm surge suppression plan. Interested members of the public are encouraged to submit questions or comments online or by mail or email.

7. Phase 1 Data Collection Results

7.1. Digital Database Library

7.1.1. Design and Use

The study team is utilizing Bentley's ProjectWise commercial software to manage document storage, retrieval, and version control. The study data library is accessible to the team through the Internet using a secure login that is password protected.

In order to streamline data organization, an automated index tool was developed to automatically catalog data by type, source, vintage, storage location, and other attributes in real time as data is uploaded. This is accomplished by requiring individuals to complete a digital metadata form describing the data attributes that is automatically recorded in a Microsoft Excel table. The index also automatically updates edits to metadata and file deletions in the study data library.

7.1.2. Data Library – Organization

The GCCPRD study data library is organized by three main categories to include:

- **INDEX** – Master list of all documents in the data library
- **MANAGEMENT** – Program management files to include contracts and invoices
- **DATA LIBRARY** – Documents collected to be used in supporting the study

Documents stored in the data library for use in supporting the study analysis are organized by geographic region and data type. The regions include Brazoria, Chambers, Galveston, Harris, Jefferson, Orange, and Region (this category includes data that span the study area or greater). Each region is organized by data type, which includes Computer Aided Design (CAD), Document (Word, PDFs, etc.), GIS, and Model.

Data Library - Index Field Descriptions

- **Type** – Data categories such as CAD, Document, GIS, and Model
- **Application** – Software application of the data files
- **Name** – File name
- **Description** – Description of the data files
- **Notes** – Additional data description information
- **Publication Date** – Dates of data publications by sources
- **Publication Source** – Names of source public agencies and private stakeholders
- **Publication Contact** – Names of source personnel contacts
- **Publication Address** – Addresses of source contacts
- **Publication Phone** – Phone numbers of source contacts
- **Acquisition Contact** – Names of individuals who acquired the data files
- **Location** – Hyperlinks to file locations in the Data Library

7.1.3. Data Library - Index Collection Results

The results of data collection produced over 350 data files for use in the study. These files were collected from various federal, state, and municipal agencies, as well as other public and private stakeholders. Please refer to **Appendix B** for a detailed listing and description of each file stored in the data library. Additional files will be added to the data library throughout each phase of the study. The data library will be made available to the public during Phase 2.

7.2. Data Library Summary

7.2.1.1. Appraisal District Data

In order to effectively determine probable financial losses from a potential surge event, appraisal district parcel data was acquired. Each of the six county appraisal districts were contacted to acquire a copy of their latest parcel dataset, with the purpose being to acquire a robust set of data containing land and structural value assessed per tract. Five of the six counties were able to provide Geographic Information System (GIS) Shapefiles. Chambers County provided their data in a CAD format. This data is convertible to a Shapefile through manipulation Shapefile, but the raw CAD version of this data is available in the project database.

7.2.1.2. LiDAR Data

Analyzing the topographic features over the coastline of six counties requires the use of Light Detection and Ranging (LiDAR) data. LiDAR data have been collected over several years by various agencies and was acquired for the six county region.

2006 LiDAR

LiDAR data for Brazoria, Chambers, Galveston, Jefferson, and Orange Counties were acquired from the Texas Natural Resources Information System (TNRIS). TNRIS is the state repository of the LiDAR data. The LiDAR data were collected in 2006 with funding from FEMA to support their Map Modernization (MapMod) program.

2008 LiDAR

In conjunction with the Geographic Data Committee, the Houston-Galveston Area Council (H-GAC) maintains LiDAR data collected by Merrick & Company in mid-2008 for Harris County and its watersheds. The LiDAR data provided by H-GAC consist of 5-foot pixel resolution bare-earth digital elevation model grids and surface elevation model grids, 1-foot contour lines, breaklines, and bare-earth and surface hillshades. In addition, raster digital elevation model (DEM) and hillshade mosaics were included for use in GIS processing.

2012 LiDAR

A portion of the study area, approximately a 1,500- to 2,000-foot swath along the Gulf shoreline, was flown to collect LiDAR data in February 2012 by the GLO. This GLO dataset is of significant importance for two (2) primary reasons:

- It captures topography changes along the coastline resulting from Hurricane Ike.
- It captures subsidence changes along the coastline. The greater Houston area, possibly more than any other metropolitan area in the U.S., has been adversely affected by land subsidence. Extensive

subsidence, caused primarily by ground-water pumping, has increased the frequency of flooding; caused extensive damage to industrial and transportation infrastructure; motivated major investments in levees, reservoirs, and surface-water distribution facilities; and caused substantial loss of wetland habitat. Although regional land subsidence is often subtle and difficult to detect, there are locations in and around Houston where the effects are quite evident. In this low-lying coastal environment, as much as 10 feet of subsidence has shifted the position of the coastline and changed the distribution of wetlands and aquatic vegetation.

7.2.1.3. Roadway Data

TxDOT urban data from 2003 were included in the database for all of the counties, and an updated statewide roadway layer was also included for 2014 data. These data primarily contain road centerlines for roads in the state of Texas.

7.2.1.4. Velasco Drainage District Data

The Velasco Drainage District (VDD) plays an important role in the flood management of the Brazos port area. The VDD is tasked with maintaining the drainage channel, levees, and pump stations. The VDD provided Portable Document Format (PDF) documents with detailed drawings of the levee system that it manages within the district.

7.2.1.5. Hydrologic and Hydraulic Studies

Several publicly available Hydrologic and Hydraulic (H&H) studies that have been completed were also provided to the study team. The studies cover local watersheds and larger master drainage plans. The master drainage plans are for Brazoria and Chambers Counties. The smaller watershed studies are for the Chocolate Bayou Watershed and the City of La Porte City Wide Drainage Study.

The Chambers County Master Drainage Plan (MDP) was developed to address existing drainage and flooding problems and to provide for drainage needs expected to occur in the coming years, particularly the coming decade, as development continues. The Chambers County MDP was developed for a study area encompassing Chambers County lying to the west of the Trinity River. That study focuses on the approximately 100-square-mile (sq-mi) Working Study Area, a subset of the larger study area.

Flooding is frequent and widespread in the 155-square-mile Chocolate Bayou Watershed located predominately in Brazoria County. A watershed-wide study was undertaken to identify possible flood control projects to significantly lessen flooding.

The City of La Porte prepared a City Wide Drainage Study (CWDS) to identify, develop, and recommend drainage improvements to address drainage problems and lessen flooding and its impacts across the city. Reasons for existing drainage and flooding problems include:

- Insufficient flow capacity in ditches and channels
- Ponding of water in streets and adjacent properties
- Undersized storm sewers
- Temporary blockage of storm water inlets by debris

- Backup of storm water in sewers
- Lack of overland or sheet flow paths

Also contributing to the drainage problems in La Porte are natural effects common to coastal areas; relatively small ground slopes making it difficult to rapidly drain away runoff waters; tides and storm surges causing rising water levels that impede drainage; and frequent, but severe storm events with large amounts of rain falling in short periods of time. Flooding is a fact of life in coastal areas, including La Porte, and control of flooding in coastal areas presents significant challenges.

The City of La Porte commissioned a Master Drainage Plan (MDP) the Brazoria County MPD. The plan focuses on each of the 18 watersheds in the county and was made possible through funds provided from Brazoria County Commissioners Court and through a grant from the TWDB. Representatives of Brazoria County, the TWDB, Brazoria County Commissioners, and the seven drainage districts all worked together to provide input into this MDP. This MDP does not propose improvements that would completely eliminate flooding during a 100-year rainfall event. Such improvements would greatly exceed the funding capacity of the drainage districts and the county. The report and the accompanying H&H models can be used to discern the effects of proposed developments or drainage improvements within the watersheds.

Although these studies do not relate directly to surge protection, they are valuable in the understanding of drainage infrastructure, proposed improvements, and flooding-related issues within our six-county study area. Because flooding from a surge event can inundate local stormwater outfalls, hurricane surge events cause a backwater effect that can flood areas not directly affected by the storm surge. These studies are helpful in determining potential effects of a storm surge to local infrastructure.

7.2.1.6. FEMA Flood Insurance Studies

A Flood Insurance Study (FIS) is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community. When an FIS is completed for the National Flood Insurance Program (NFIP), the information and maps are assembled into an FIS report. The FIS report contains detailed flood elevation data in the form of flood profiles and data tables. The FIS' that have been completed for the study region were acquired from FEMA's Flood Map Service Center. The FIS' that were downloaded are the ones currently in effect and include all the communities in the study area.

7.2.1.7. Facility Registry System

The Facility Registry Service (FRS) provides quality facility data to support the EPA's mission of protecting human health and the environment. This data set was acquired from the EPA and consists of all publicly available FRS facilities that have latitude/longitude data.

7.2.1.8. National Flood Hazard Layer

The National Flood Hazard Layer (NFHL) is a computer database that contains FEMA's flood hazard map data. The NFHL contains all of the currently effective floodplain data in a GIS form. Depending on when the analysis of the GCCPRD study takes place, a new version should be downloaded to ensure any map updates are being used.

7.2.1.9. National Wildlife Refuge

The National Wildlife Refuge and Hatchery Boundaries datasets depict the USFWS-approved acquisition boundaries and USFWS-managed lands. The intended application of these data layers is as a cadastral framework for use with other data layers in GIS and mapping applications. It is not intended to be used as a land survey or representation of land for conveyance or tax purposes.

7.2.1.10. Coastal Mangroves

This dataset consists of the current distribution (2000s) of mangrove forests in the southeastern U.S. This dataset was created from the current best available mangrove data on a state specific basis. Mangrove presence in Texas was studied from maps produced by Sherrod & McMillan (1981) and the NOAA Benthic Habitat Atlas of Coastal Texas (Finkbeiner et. al. 2009).

7.2.1.11. Four Marsh Types

Detailed information on the extent and distribution of marsh vegetation zones throughout the northern Gulf Coast has been historically unavailable. In response, the U.S. Geological Survey (USGS), in collaboration with the Gulf Coast Joint Venture, the University of Louisiana-Lafayette, Ducks Unlimited, Inc., and Texas A&M University-Kingsville, has produced a classification of marsh vegetation types for Texas, Louisiana, Mississippi, and Alabama. This study incorporates approximately 8,800 ground reference locations collected via helicopter surveys in coastal Texas and Louisiana marsh areas.

7.2.1.12. National Land Cover Database (2006 & 2011)

The National Land Cover Database (NLCD) serves as the definitive Landsat-based, 30-meter resolution, land cover database for the nation. NLCD provides spatial reference and descriptive data for characteristics of the land surface such as thematic class (for example, urban, agriculture, and forest), percent impervious surface, and percent tree canopy cover. NLCD supports a wide variety of federal, state, local, and non-governmental applications that seek to assess ecosystem status and health, understand the spatial patterns of biodiversity, predict effects of climate change, and develop land management policy. NLCD products are created by the Multi-Resolution Land Characteristics (MRLC) Consortium, a partnership of federal agencies led by the USGS. All NLCD data products are available for download at no charge to the public.

7.2.1.13. Environmental Sensitivity Index Maps

Environmental Sensitivity Index (ESI) maps provide a concise summary of coastal resources that are at risk if an oil spill occurs nearby. Examples of at-risk resources include biological resources (such as birds and shellfish beds), sensitive shorelines (such as marshes and tidal flats), and human-use resources (such as public beaches and parks). An ESI atlas has been developed for the marine and coastal areas of upper Texas (from Sabine Lake to East Matagorda Bay). The ESI atlas is a compilation of information from three main categories: shoreline habitats, sensitive biological resources, and human-use resources.

7.2.1.14. Red Drum Essential Fish Habitat

Essential Fish Habitat (EFH) for red drum consists of all Gulf of Mexico estuaries; waters and substrates extending from Vermilion Bay, Louisiana to the eastern edge of Mobile Bay, Alabama out to depths of 150 feet; waters and substrates extending from Crystal River, Florida to Naples, Florida between depths of

30 and 60 feet; waters and substrates extending from Cape Sable, Florida to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the SAFMC between depths of 30 and 60 feet.

7.2.1.15. Reef Fish Essential Fish Habitat

EFH for reef fish consists of Gulf of Mexico waters and substrates extending from the U.S./Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the SAFMC from estuarine waters out to depths of 600 feet.

7.2.1.16. Coastal Migratory Pelagic Essential Fish Habitat

EFH for coastal migratory pelagic resources consists of Gulf of Mexico waters and substrates extending from the U.S./Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the SAFMC from estuarine waters out to depths of 600 feet.

7.2.1.17. GLO Oil & Gas Leases

The GLO regulates the activities of oil and gas companies on state lands through a series of permits designed to allow companies to explore and/or develop state minerals while protecting state lands. State lands requiring permits include submerged lands in bays, lakes, islands, bayous, and the Gulf of Mexico out to 10.3 miles. Oil and gas leases managed by the Texas GLO are included in this dataset.

7.2.1.18. Vegetation Areas (Phase 2 & 3 ESMT)

The Ecological Mapping System of Texas (ESMT) was acquired from the TPWD. The ESMT maps the existing vegetation of Texas at fine spatial and thematic resolution (more mapped vegetation types). The latest dataset is from 2013, but was created over a six-year period (2008-2013) in phases. These vegetation maps are used for planning and analysis purposes statewide by various federal, state, and local agencies.

7.2.1.19. Ferry Ports

This map layer includes global map data showing ferry ports in the U.S. and Puerto Rico. The data are a modified version of the National Atlas of the U.S. 1:1,000,000-scale ports of the U.S. This is a revised version of the 2013 map layer.

7.2.1.20. Major Ports

This map layer shows major ports in the U.S., Puerto Rico, and the U.S. Virgin Islands. A port is a city, town, or urban area with a harbor where ships load or unload. This is a revised version of the July 2012 map layer.

7.2.1.21. GWDB Well Locations

The TWDB Groundwater Database (GWDB) contains information on water wells, springs, and oil/gas wells with geologic information. This information has resided in file folders for decades at the TWDB, at one of its predecessor agencies, or as original copies in agencies such as the USGS. All of these data were collected for specific projects that may have included recommendations for particular local or state entities to continue with systematic monitoring in the future, although monitoring at most sites has not continued. TWDB initiated the first effort to monitor, systematically, representative sites in all of the major and minor aquifers beginning in 1988. All users of the data should be aware that although the GWDB includes the best information available to TWDB's knowledge, some of the data are provided by cooperators of TWDB, and a large percentage of all the data was collected from sites that are not part of TWDB's or cooperators' routine monitoring programs.

7.2.1.22. SDRDB Well Locations

The TWDB Submitted Driller's Reports Database (SDRDB) is a cooperative effort with the Texas Department of Licensing and Regulation (TDLR) Water Well Drillers and Pump Installers Program. The SDRDB contains well construction information submitted by licensed water well drillers. TDLR requires drillers to submit well construction reports within 60 days of drilling completion. While the regulations have been in place for many decades, the SDRDB only began collecting these data in 2001. Be aware that the locations of the wells in this database are not verified by State staff and may be inaccurate

7.2.1.23. County Boundaries

The StratMap boundaries delineate county, city, parks, and landmarks such as airports, universities, wildlife refuges, and military bases. They are derived from various sources such as TxDOT, TPWD, and local jurisdictions. StratMap boundaries are primarily used for cartographic display, but are also useful in preliminary right-of-way determination, highway planning and maintenance, real estate, public services, jurisdiction maintenance, and other administrative assessments.

7.2.1.24. Critical Habitat

The dataset contains information regarding threatened or endangered species in critical habitat designations across the U.S.. Critical habitat is the specific areas within the geographic area, occupied by the species at the time it was listed, that contain the physical or biological features that are essential to the conservation of threatened or endangered species and that may need special management or protection. Not all critical habitat data designated by the USFWS is available in this Shapefile.

7.2.1.25. Coastal Barrier Resources System

The Coastal Barrier Resources System (CBRS) data set, produced by the USFWS, contains areas designated as undeveloped coastal barriers in accordance with the Coastal Barrier Resources Act (CBRA), 16 U.S.C. 3501 et. seq., as amended. The boundaries used to create the polygons herein were compiled between April 1, 2007 and December 6, 2013 from the official John H. Chafee Coastal Barrier Resources System (CBRS) maps.

7.2.1.26. Models

7.2.1.26.1. Brazoria County Models

The USACE Hydrologic Engineering Center-River Analysis System (HEC-RAS) models for the major streams and tributaries for Brazoria County were requested from the FEMA Engineering Library. Klotz Associates, Inc. specifically requested models used in determining the FEMA Effective Floodplain maps for Brazoria County for the streams shown in Table 28. Once the request was submitted with the required fee, FEMA returned models for the requested flooding sources. Although Hydrologic Engineering Center-River Analysis System (HEC-RAS) or the Hydrologic Modeling System (HEC-HMS) models were requested, HEC-2, an older form of

HEC-RAS, was the only available data for Brazoria County. Unfortunately, the HEC-2 data were also only available in a microfiche format, essentially PDF print outs of the output (i.e., most of the actual HEC-2 models were not available).

Table 28 - Brazoria County Acquired Data from FEMA

Flood Source	Model Type	Format	Comments
Austin Bayou	HEC-2	Hard Copy	---
Bastrop Bayou	HEC-2	Scan from Microfiche	Cross Sections A thru I
Bastrop Bayou	HEC-2	Hard Copy	Cross Sections J thru U missing input data summary output only
Brazos River	HEC-2	Scan from Microfiche	Data is hard to read
Cedar lake Creek	HEC-2	Hard Copy	---
Chocolate Bayou	HEC-2	Scan from Microfiche	Most of the input data is missing
Clear Creek	HEC-2	Digital	---
Halls Bayou	HEC-2	Scan from Microfiche	The data is extremely difficult to read
Mustang Bayou	HEC-2	Scan from Microfiche	---
Oyster Creek	HEC-2	Scan from Microfiche	Data is hard to read
San Bernard River	HEC-2	Scan from Microfiche	---
Varner Bayou	---	---	No data was located for this flooding source
Chocolate Bayou LOMR 10-06-1185P	---	digital	LOMR covers cross sections AC thru AN

7.2.1.26.2. Chambers County Models

HEC-RAS models for the major streams and tributaries for Chambers County were requested from the FEMA Engineering Library. The study team specifically requested models used in determining the FEMA Effective Floodplain maps for Chambers County for the streams shown in Table 29. Much like Brazoria County, only microfiche HEC-2 formats were returned by FEMA and included in this database.

Table 29 - Chambers County Acquired Data from FEMA

Flood Source	Model Type	Format	Comments
Barrow Slough	HEC-2	Scan from Microfiche	---
Cedar Bayou	HEC-2	Scan from Microfiche	Some input data is missing
Cedar Gully	HEC-2	Scan from Microfiche	---
Cotton Bayou	HEC-2	Scan from Microfiche	---
Double Bayou West Fork	HEC-2	Scan from Microfiche	---
Double Bayou East Fork	HEC-2	Scan from Microfiche	---
Hackberry Gully	HEC-2	Scan from Microfiche	---
Horsepen Bayou	HEC-2	Scan from Microfiche	---
Lee Gully	HEC-2	Scan from Microfiche	---
Sawpit Gully	HEC-2	Scan from Microfiche	---
Spring Branch	HEC-2	Scan from Microfiche	---
Whites Bayou	---	---	No data was located for this flooding source
Turtle Bayou	HEC-2	Scan from Microfiche	---
Cotton Bayou	HEC-2	Scan from Microfiche	---
Trinity River	HEC-2	Hard Copy	---

Hydraulic models acquired from the Chambers County Master Drainage plan were also acquired. Although these models were not used to determine the FEMA Effective Floodplain, they do provide accurate stream models for various streams in Chambers County. These models were used to provide Chambers County with insight into flooding problems within the county and offer localized flooding solutions.

7.2.1.27. Harris County Hydraulic Models

Hydraulic models were acquired from the Harris County Flood Control District (HCFCD) Model and Map Management (M3) System. The M3 website maintains all of the FEMA effective floodplain models for Harris County. All models were downloaded in a HEC-HMS or HEC-RAS version. All models contained their own model version number to maintain stability and unchanging results.

7.2.1.28. Orange County Hurricane Protection System Feasibility Report

In the wake of Hurricane Ike, which caused major surge-related damages to industrial, municipal/governmental, and private facilities (refining, manufacturing, commercial, public infrastructure, homes) in Orange County, a feasibility study was completed in December 2012. This study was funded in part by Disaster Recovery funding and by a grant from the Texas Water Development Board. The entire study was acquired by the GCCPRD study team, and consists of geotechnical, environmental, transportation, hydrologic, hydraulic, and storm surge modeling, preliminary designs and estimates, benefit-cost analysis, and alternatives analysis.

7.2.1.29. Orange County Drainage District

The Orange County Drainage District is responsible for maintenance and operation of the outfall drainage system that serves the entire area of Orange County. With assistance through a planning grant from the Texas Water Development Board, the District is in the process of developing a masterplan for the Cow and Adams Bayou Watersheds. Existing conditions hydrologic and hydraulic models (HEC-HMS and HEC-RAS) were completed in late 2014 and were acquired by the GCCPRD study team.

7.2.1.30. Jefferson County Drainage District No. 7

The Jefferson County Drainage District No. 7 is responsible for maintenance and operation of the outfall drainage system that serves the Jefferson County area south of the City of Beaumont. The district service area includes the cities of Nederland, Port Neches, Groves, and Port Arthur. A levee accreditation study was conducted by the district and submitted to FEMA during 2014. The entire study was acquired by the GCCPRD study team, and consists of an extensive geotechnical investigation, interior drainage study, inventory, and condition assessment of drainage features, gates, closure structures, pump stations, and maintenance and operation procedures.

7.2.1.31. Jefferson County Beach Ridge Restoration

Several studies and a final design have been undertaken since 2001 to approach the problem of beach erosion in Jefferson and Chambers Counties. These studies have culminated in a project (currently in progress) to rebuild the sand ridge in order to protect the exposed marsh area extending from Sea Rim State Park to High Island. The project owner is the Texas General Land Office. All previous study and project design documents have been acquired for utilization by the GCCPRD study team.

7.3. Bathymetry

Preliminary bathymetry was obtained from the NOAA charts and USACE Galveston XYZ survey data available online. These charts provide the approximate depth of the channels in question along the Texas Gulf Coast and the shipping channels. They are important in determining the amount of dredging and filling necessary, and the best placement of flood protection structures. These data will also be critical for potential gate design projects for navigation channels that will have to accommodate the current and future vessel fleet.

7.4. Geospatial Information

7.4.1. Phase 1 - Geospatial

The study team collected over 125 geospatial files that will be utilized in visualizing the study area's existing conditions and in analyzing potential solutions to storm surge inundation. Geospatial files (GIS) are location-based database files used to develop graphic exhibits and support automated analysis.

7.4.2. Geospatial Web Portal – Design and Use

The results of geospatial data collection stored in the data library are organized and displayed on a GCCPRD Geospatial Web Portal that is being used to provide mapping visualization of the study area. The Geospatial Portal is username- and password-protected with access granted only to the study team at this time. A publicly accessible executive level summary of generalized information will be released in Phase 2, which will include non-sensitive, less detailed information. The Geospatial Portal was developed using Esri's ArcGIS Server and SQL Server databases and is deployed and hosted from Dannenbaum's Geospatial hosting facility for the duration of the study.

7.4.3. Geospatial Web Portal – Functionality

- Study area map
- Legend describing map symbols
- Map layers "On" or "Off"
- Bookmarks to automatically zoom to predefined regions
- Identify data information associated with mapping layers
- Find property location by owners' names (within study area only)
- Measure distance between features on the map
- Automated mapping exhibit printing

7.4.4. Geospatial Web Portal – Screenshots

The following figure visually demonstrates the automated map exhibit printing functionality from the Geospatial Portal.

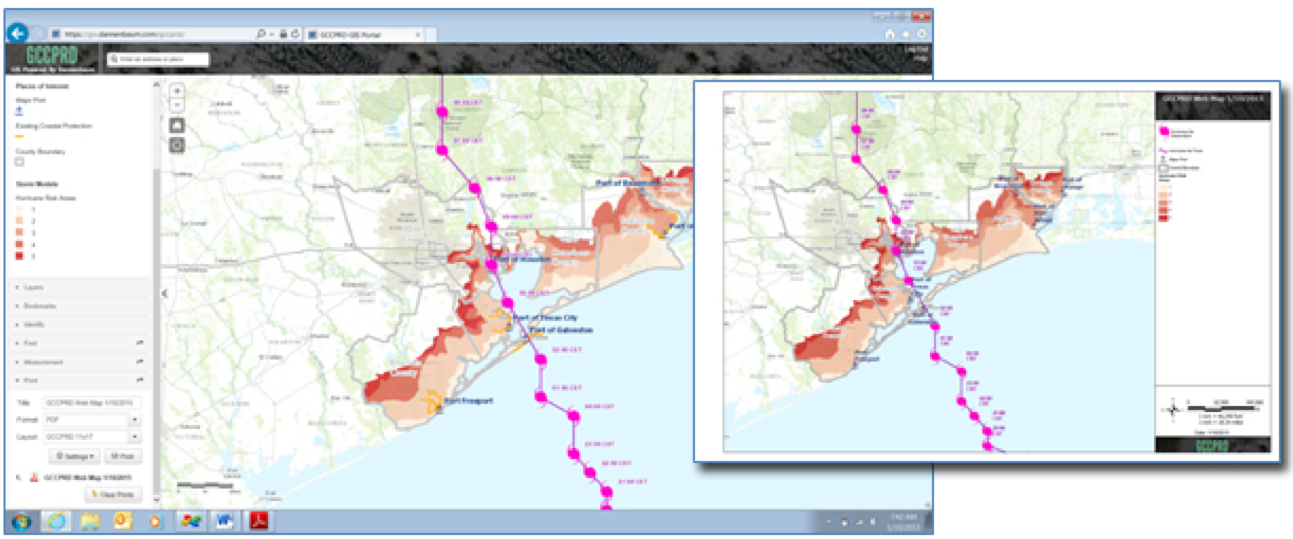


Figure 64 - Geospatial (Web) Portal and PDF Map Exhibit

7.5. Geotechnical

Preliminary geotechnical information was obtained from TxDOT, Galveston County, the Harris County Flood Control District, the Velasco Drainage District, Drainage District No.7, and from the Orange County Flood Protection Planning Study. USACE data will be delivered to the team in February 2015 and added to the data library.

The TXDOT data included soil borings taken from existing bridges built by TxDOT that are near areas that will be investigated. These areas include the Bolivar Peninsula, Galveston Bay, Freeport, Texas City, Seabrook, and the Houston Ship Channel. Additional geotechnical information including soil borings from preliminary bridge design near Clear Lake was obtained from the HCFCD and the Texas City Hurricane-Flood Protection Levee System report obtained from Galveston County. This geotechnical information will be used for foundation design of all structures, including gates, T-walls, and levees.

Additional geotechnical information related to historic boring locations is discussed in the previous sections titled “GWDB Well Locations” and “SDRDB Well Locations”.

8. Additional Data Requirements

8.1. Future Technical Evaluations

The following subsections identify important data collection requirements and corresponding analysis required to optimize alternatives for developing a protection system along the Texas coast.

8.1.1. Bathymetric data collection

Bathymetry information corresponds to the various bottom elevations along Galveston Bay, Sabine Pass, San Luis Pass, the Houston Ship Channel, and other areas along the Texas Gulf Coast. It has already been established that not all gate types are suitable for all types of channel closure depths. Exact depths of sill elevations are needed to identify the applicability of certain flood gates at certain locations. Bathymetry information will be obtained by studying navigation maps provided by NOAA and the U.S. Coast Guard, as well as from the USACE Galveston XYZ survey data available online. These maps show various depths along the channels and coast, and aid in recognizing available drafts for vessel traffic. Such maps need to be studied extensively for the entire study area to gather a better understanding of the channel elevations, leading to a selection of an ideal gate structure for each location. Based on the maps, channel depth profiles need to be constructed. Since flood gates are always accompanied by other auxiliary flood control structures, such a profile of channel depth will be beneficial for preliminary design, as well as quantity and cost analysis along entire alignments of flood protection measures. In the next phase of the study more precise data shall be collected by investigating available bathymetric survey information. Based on these, elevation profiles of channel cross-sections shall be identified. Additionally, any available utility-crossing data shall be utilized. Coupled with the elevation profile created, the utility information shall facilitate in identifying a number of alternative alignments of flood control measures, which will be further investigated for economy, constructability, logistical issues, and operation and maintenance concerns.

8.1.2. Land Survey Data

In addition to bathymetric information, ground elevation information for different potential project areas needs to be acquired, checked, verified, and coordinated for the various datum inconsistencies that will likely be encountered. Part of the storm-proofing measures will include berms, levees, or other concrete structures on land. However, due to the differences in elevations of the various locations, and due to the variation of surge heights along the project boundary, applying the same protective measure design at all locations is not warranted. Also, depending on existing ground elevations, the cost of construction may vary to some large extent. In the next phase, coordination with different disciplines and agencies will be required to finalize those elevations after hydraulic modeling.

8.1.3. Geotechnical Data Collection

Foundations are an essential and crucial part of flood gates and other auxiliary flood control structures. The lateral loads from storm surge and waves are resisted by the flood control structures, which in turn transfers the load to the foundations. The costs of deep foundations, which are considered essential characteristics of the study area due to its soil conditions, are considered as major components of the entire cost of the flood protection system. Foundation types are determined based on the existing soil characteristics of the area. Deep soil investigations such as Cone Penetration Tests (CPT) or soil borings are required to identify the soil profile at different elevations. However, for a preliminary study like this, it is generally cost-restrictive to perform such investigations. In that case, it is more judicious to rely on existing soil boring information that has been carried out either in the study area or in nearby locations. USACE, state, and local government agencies routinely carry out subsurface soil investigations as a part of their projects that involve deep foundations. Such historic soil boring data needs to be identified, collected, and studied to understand the geomorphology of the general project area. Based on this investigation, foundation types and their approximate depths can be identified for the flood gates and their auxiliary structures. If, for a certain sub-region, soil data are not available, an interpolative approach may be taken using data from the surrounding region.

8.1.4. Hydrologic and Hydraulic Study

Restricting a naturally flowing channel always entails different physical, ecological, and logistical challenges. As part of a flood control line of defense, it is expected that certain areas within the channel shall be blocked permanently. This will pose an environmental concern as the natural habitat for aquatic species will be disrupted. At the same time, constricting the width of natural flow causes an increase in flow velocity that causes scouring of the channel bottom. Preliminary H&H modeling of the waterways is needed to identify the effect of blocking the channels using flood gates and other measures. If it is deemed, through the study, that a navigation gate is not adequate to maintain natural flow without scour issues, additional gate openings shall be recommended. Such non-navigable gate openings (i.e., tainter gate, spillway, etc.) will be placed at strategic locations as required.

8.1.5. Selection of Flood Gates

Based on the study of different flood gates, suitable options for different locations along the line of protection shall be selected. Different alignments of a unified flood protection system across the six counties will be considered, and their costs and benefits will be compared. Although a gate across each of the inlets (San Luis Pass, Galveston Bay, Neches River) may seem like the most obvious and straightforward solution, potential physical, environmental, political, and logistical problems also need to be investigated in the next phase of the study before proposing the location and size of any gates.

8.1.6. Cost Data Collection

One of the objectives of the study includes evaluation of the complete construction cost of different flood gate options, including auxiliary flood control structures. Construction costs include the costs associated for real estate acquisition, costs of potential relocations, mitigation of environmental impacts, engineering design, operations and maintenance expenses, and construction management. For preliminary cost analysis, construction cost of previous projects, including the flood gate type selected, shall be investigated. Such data shall be modified to suit the dimensions required for the project area based on interpolation. Wherever it is more suitable to identify the quantity of the different components of the flood protection structures such as concrete, structural steel, piles, etc., the total cost will be derived by adding the total cost of all such items. The unit cost of such items shall be investigated by studying recent bid tabulations of TxDOT and other state and county projects carried out in the vicinity of the study region. Additionally, the operation and maintenance costs of the selected gate structure will need to be investigated. A contingency cost will need to be incorporated due to the uncertainties involved with preliminary design assumptions and the potential lack of site-specific data, such as geotechnical information

8.1.7. Hydrodynamic Modeling

The ADCIRC model was selected for this storm surge analysis, as it is a highly vetted and commonly utilized storm surge analysis model. ADCIRC is the standard coastal storm surge model used by the USACE and was the model applied in a recent coastal Texas FEMA Flood Insurance Study (FIS) (FEMA 2011).

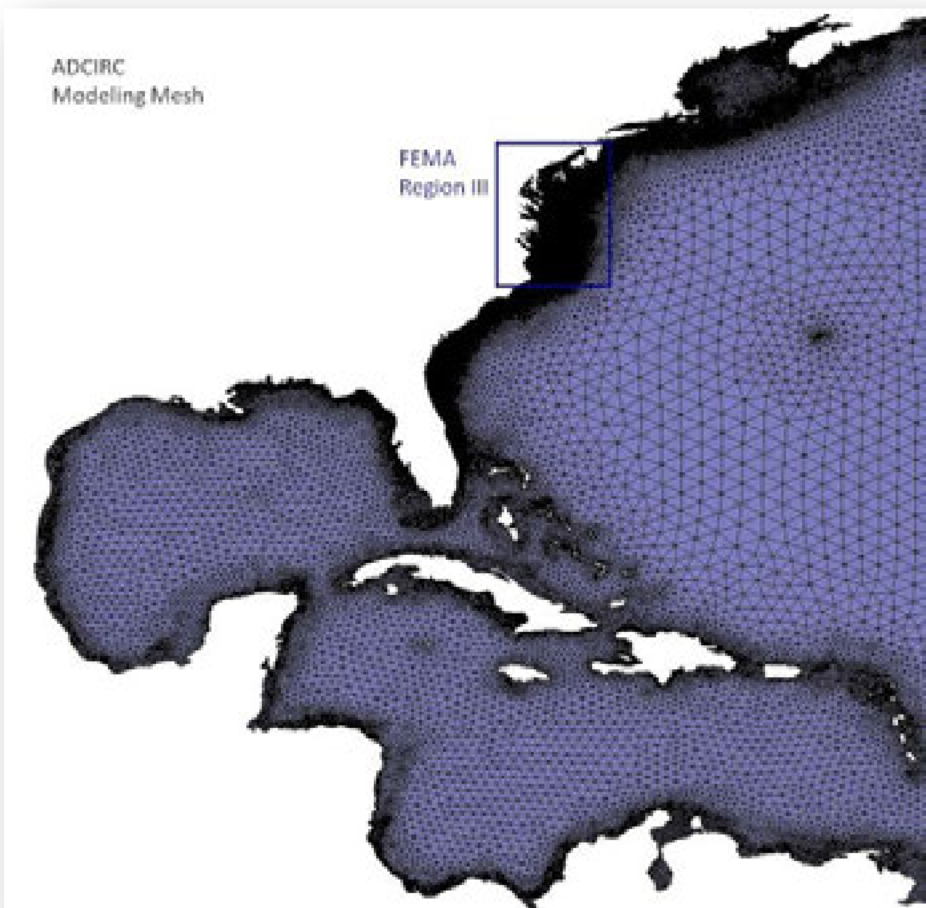


Figure 65 – Example of ADCIRC Modeling Mesh of the Atlantic Ocean and Gulf of Mexico (FEMA, n.d.)

The FIS model mesh, or grid, was constructed utilizing the most recent and accurate elevation data available at the time of the study in Texas and Louisiana to determine flood risk under current conditions. The ADCIRC modeling system was validated during the FEMA FIS using Hurricanes Allen, Bret, Carla, Rita, and Ike.

This study is able to build from the FIS by applying the highly accurate and robust ADCIRC-based system that has been thoroughly validated and reviewed by some of the leading experts in the field of coastal engineering. The study team is able to leverage this model to accurately simulate storm surge and waves, with minor variations to the model setup to improve model runtime efficiency and to incorporate the most recent ADCIRC model version.

The computational mesh developed for the FIS will be the basis for this study as well. The FEMA mesh between approximately Freeport, Texas, and Calcasieu Lake, Louisiana, will be utilized to assess the impacts of projects on risk reduction. Areas south of Freeport are anticipated to be removed from the FEMA coast-wide mesh to improve computational efficiency. However, the mesh will remain largely the same in the study area. Hurricane Ike will be simulated on the original FEMA mesh and the reduced domain mesh to demonstrate the model skill after reducing the domain size.

The primary inputs to the ADCIRC model are wind and pressure fields generated by the Planetary Boundary Layer (PBL) model; each storm is represented by wind and pressure field files read by ADCIRC. A set of 446 storms were developed for the FEMA study by combining the probable combinations of central pressure, radius to maximum winds, forward speed, angle of track relative to coastline, and track (FEMA 2011). The storms are specified by variations of the hurricane parameters along the tracks shown in Figure 66 (FEMA 2011). The estimated range of storm frequencies using the selected parameters was between the 10-year and 500-year events (FEMA 2011).

Near shore wind-wave growth and propagation will be stimulated using STWAVE or SWAN. These models compute random, short crested wind-generated waves in coastal area and inland waters. The study's modeling team consists of collaboration between the Engineer Research Development Center (ERDC), Jackson State University, and the University of Texas.

Two subsets of the 446 storms will be applied for this study to evaluate and compare the flood damage reduction related to selected alternatives. The first subset will be a set of representative storms (e.g., those that create approximately a 100-year flood elevation in a portion of the six-county region). This subset, on the order of five to ten storms, will be used to understand the changes in flooding patterns due to the placement of various design alternatives. Model outputs will be used to select those alternatives that should be moved forward for more detailed assessments.

A second subset of storms will be applied to evaluate selected alternatives in greater detail. A significantly larger storm suite, likely 40 to 70 storms, defining a range of storm frequencies will be simulated. These storms will be incorporated into a statistical analysis based on the Joint Probability Method-Optimal Sampling (JPM-OS) to develop stage frequency relationships for the storm events. JPM-OS outputs will be the basis of the inputs for the HEC-FDA model analysis.

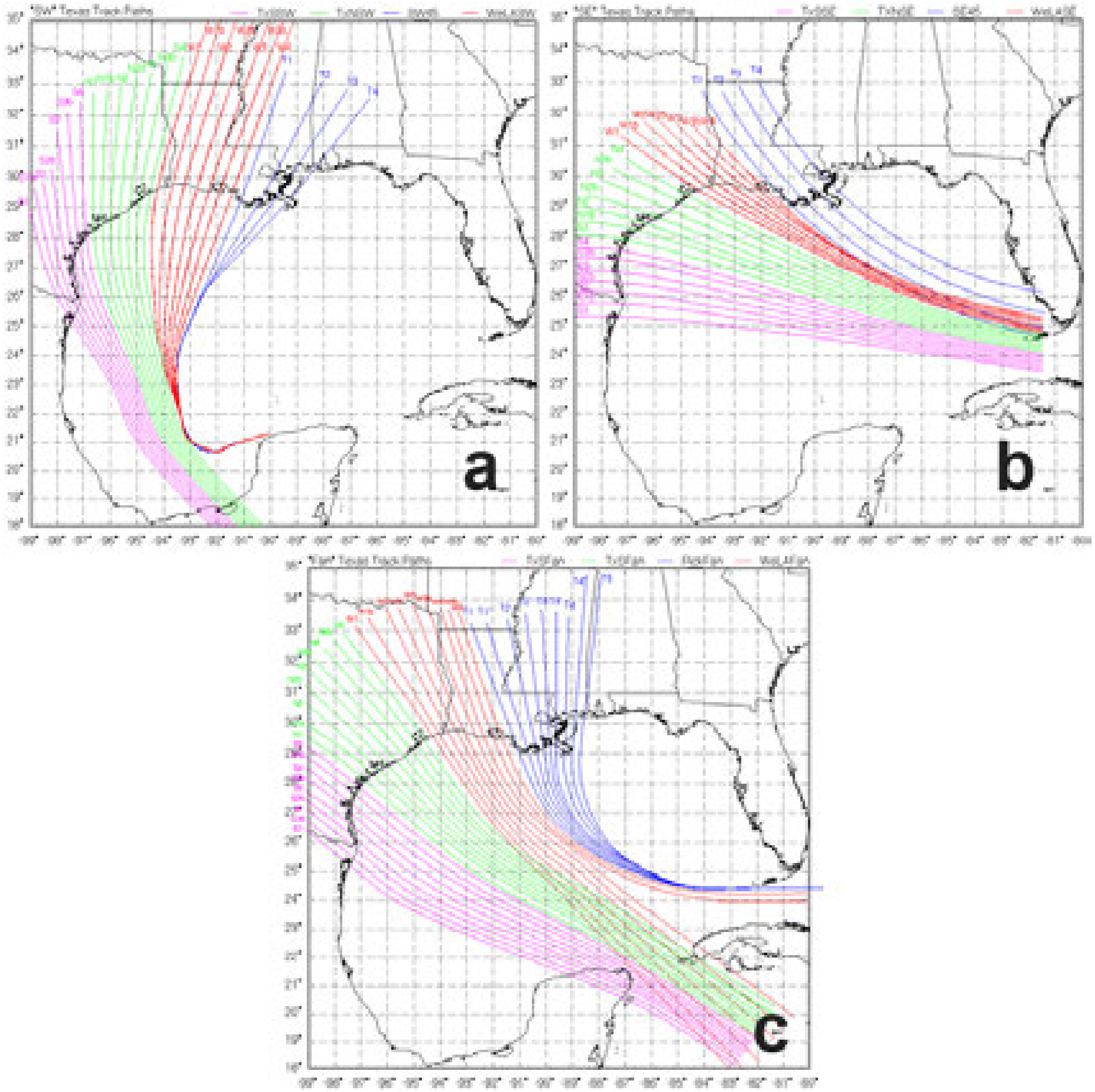


Figure 66 a-c - Tracks used to define the synthetic storms. Hurricane parameters vary along the tracks. Each provides the storm forcing required for simulations (FEMA 2011).

8.2. Economic Data

HEC-FDA is an interdisciplinary program used to formulate and evaluate flood damage reduction plans. Interaction with HEC-FDA is through a graphical user interface (GUI). The program performs economic flood inundation damage analysis and hydrologic engineering performance calculations for plan evaluations. In HEC-FDA terminology a study is a set of files associated with a planning evaluation. The files associated with the study contain information on plans, analysis years (points in time to be evaluated), damage reaches, damage categories, and an inventory of structures. During the course of a study multiple plans can be formulated and evaluated. The first plan is always the without-project condition. Additional plans may include levees, floodwalls, nonstructural measures, and other measures or combinations of measures. The highest level of HEC-FDA economic output is expected and/or equivalent annual damage. Expected annual damage is the probability-weighted expectation of damage in a given analysis year. Equivalent annual damage is the probability-weighted expectation of damage over the entire study period of analysis reflected as a single value by means of conventional present-value techniques.

HEC-FDA quantifies the uncertainty in stage-exceedance probability and stage-damage functions and incorporates these into economic and engineering performance analyses of plans. The process applies Monte Carlo simulation, a numerical-analysis procedure that computes the expected value of damage while explicitly accounting for the uncertainty in the basic parameters used to determine flood inundation damage.

The available county tax assessor and LiDAR data will be analyzed by the study team to ensure there are not any gaps in required information. Additionally, the following economic data will need to be collected to complete the input requirements for the HEC-FDA model: first-floor height above ground for residential and commercial structures, depth-damage relationships for residential and commercial structures for both structure damage and content damage, and site-specific depth-damage relationships for major industrial facilities. First-floor height above ground and residential/commercial depth-damage relationships will be derived from work performed for other studies in the coastal region. Site-specific industrial depth-damage relationships will require industry input that will be solicited by means of survey questionnaires and future stakeholder engagements. The FEMA HAZUS database will be among the data sources used to fill data gaps. In support of the assessment of second- and subsequent-round economic impacts of inundation to petrochemical facilities, regional and national trade flow data will be acquired as input to a multi-regional input-output economic model.

8.3. Survey, Mapping, and GIS Data (Geospatial)

Additional GIS data will be developed to display the results of Phase 2 and 3 studies. Potential infrastructure will be mapped and displayed through the GIS Web Portal and report exhibits. Geospatial information developed through other studies simultaneously underway will also be displayed if made available to the GCCPRD study team.

9. Phase 2: Technical Mitigation- Methodology:

Phase 2 of the study will focus on determining the technical, economic, environmental, and social feasibility of proposed alternatives. These factors will enable the study team to analyze the advantages and disadvantages of each alternative with respect to each criteria outlined above and provide an informed process for the selection of the recommended plan. The process that will be used is as follows:

- **Step 1**: Identify and scope the full range of alternatives
- **Step 2**: Apply screening criteria to alternatives
- **Step 3**: Alternatives analysis
- **Step 4**: Alternatives Selection and Recommendation

9.1. Identify and Scope Alternatives

Based on the analysis of Phase 1 data, public comments, and collaboration with other research teams also studying surge protection in this region, the study team developed a preliminary list of potential alternatives to review for our study. The study area has been thoroughly studied by the USACE and other researchers over the past 50 years, and the majority of the technical alternatives have already been identified through these efforts. **This list is not all-inclusive, and additional alternatives or combinations of alternatives are expected to be developed during Phase 2.**

For simplicity, the study team has divided the study region into three:

- **North Region**: Orange and Jefferson County
- **Central Region**: Galveston, Chambers, and Harris Counties
- **South Region**: Brazoria County and Galveston County (vicinity of San Luis Pass)

9.2. North Region Draft Alternatives

Structural Alternatives

- Build levee system along the Sabine River and Sabine Lake (starting at I-10, running southwest to the Neches River) with a gate structure across the Neches River and tying into the existing levee at Port Arthur
- Levee system along Sabine River and Sabine Lake (Starting at I-10, running southwest to the Neches River) extending along the east bank of the Neches River with a corresponding extension
- Extend the Port Arthur Levee system along the west bank of the Neches River to the Port of Beaumont
- Construct ring levee around the industrial region in Orange County between Adams and Cow Bayous
- Levee system along the Sabine River (Starting at I-10, running southwest around Bridge City) and turning Northwest along the Neches River to I-10 vicinity the Port of Beaumont
- Beach restoration project to protect the exposed marsh area extending from Sea Rim State Park to High Island

Nonstructural Alternatives

- Elevate homes in Bridge City and the City of Orange and surrounding areas
- Selective buy outs of homes within the floodplain in Orange County
- Enhance evacuation plans and related public education

9.3. Central Region Draft Alternatives

Structural Alternatives

- Elevate Highway 87 from Bolivar Landing to High Island
- Construct a dune/levee system along Bolivar Peninsula from the North Jetty to High Island
- Construct a gate structure at Bolivar Roads
- Elevate Highway 3005 from the end of the Galveston Seawall to San Luis Pass
- Construct a dune/levee system along the west end of Galveston Island from the Seawall to San Luis Pass
- Construct a ring levee around the City of Galveston
- Construct a gate across the Houston Ship Channel in the vicinity of SH146
- Extend the Texas City Levee System along SH 146 to FM 528 to LaPorte
- Construct shoreline protection along the western shore of Galveston Bay
- Construct a gate where Highway 146 crosses Clear Creek vicinity of Kemah
- Construct disposal facilities, bird islands, and oyster reefs in Galveston Bay
- Construct a gate across west Galveston Bay
- Construct shoreline protection for Baytown
- Construct shoreline protection for Anahuac
- Close the Houston Lighting and Power canal at Cedar Bayou
- Construct Seabrook/La Porte/Deer Park shoreline protection

Nonstructural Alternatives

- Elevate homes on the west end of Galveston Island and Bolivar Peninsula out of the floodplain
- Flood proof homes along the west end of Galveston Bay and Bolivar Peninsula
- Flood proof homes in Baytown
- Flood proof homes in Anahuac
- Enhance evacuation plans and related public education

9.4. South Region Draft Alternatives

Structural Alternatives

- Build gate structure at the San Luis Pass tied into an elevated Highway 3005
- Modify the existing Freeport Hurricane Protection System to potentially increase elevation and/or extend the line of protection to Clute
- Construct ring levee around the petro-chemical complex on Chocolate Bayou in the vicinity of Highway 2004
- Construct levee system to protect the City of Jones Creek from surge and flooding on the Brazos River

Nonstructural Alternatives

- Elevate or flood proof homes in the vicinity of Jones Creek and Clute
- Enhance evacuation plans and related public education

9.5. Alternatives Screening

The study team has developed the following screening criteria to reduce the number of alternatives to those that are focused on the objective of the study, which is to reduce the vulnerability of the study region to storm surge and flood damages.

9.5.1. Screening Criteria

1. The proposed alternative effectively reduces risk associated with storm surge/coastal flooding, and reduces impacts to:

- People
- Infrastructure
- Environment
- Regional and National economy

This criterion does not eliminate the use of enhanced natural features or nature-based features. The study team will attempt to incorporate as many nature-based features into each remaining alternative.

2. The proposed alternative must be in compliance with local, state, and federal regulations.

9.6. Alternatives Analysis

Once alternatives have been screened, the remaining alternatives will be fully developed using the following evaluation criteria. The evaluation criteria will establish a means to compare alternatives based on qualitative and quantitative means.

9.6.1. Evaluation criteria:

- **Technical Feasibility**: This criterion considers administrative and technical factors related to design, constructability, and operations and maintenance of the proposed alternative.
- **Economic Feasibility**: This criterion consists of a comparison of an alternatives' direct benefits derived from protection to the cost of construction for the alternative. Alternative direct benefits are measured by comparing the storm surge and coastal flooding damages with the alternative in place to existing conditions.
- **Environmental Feasibility:** This criterion considers natural, biological, and cultural resources and hazardous materials impacts and the potential environmental benefits associated with an alternative. The associated environmental impacts and benefits must be in the public's interest.
- **Social Feasibility:** This criterion considers federal, state, and local governments' opinion, environmental justice and community impacts related to the proposed alternative and whether the alternative is in the best public interest.

9.7. Alternative selection and Recommendation

Once the alternatives have been analyzed and compared, the final decision criteria will be applied to determine the selected plan.

9.7.1. Decision criteria

- **Public acceptance:** This criterion evaluates the public's willingness to accept an alternative based on public feedback achieved through outreach efforts.
- **Flexibility, adaptability, and resilience**: This criterion refers to an alternative's capacity to anticipate, prepare for, respond to, and adapt to changing conditions and recover rapidly from disruptions.
- **Extended benefits**: This criterion considers the second and subsequent round of regional economic impacts of an alternative measured as changes in income, employment, and output, in addition to the recreational, aesthetic, and ecosystem restoration benefits.

10. The Way Ahead

Once the GCCPRD Board approves the Phase 1 report, it will be made available to the public through the study website: www.GCCPRD.com. The public will have the ability to comment on the report through the website.

The study team is in the process of planning future engagements with public stakeholders, industry, and environmental representatives located along the Houston Ship Channel, Freeport Channel, and Sabine-Neches Waterway. To date, industry has not taken an active role with respect to various storm surge suppression plans that have been proposed by other researchers. The GCCPRD study team would like to identify the internal measures industry has taken to protect their assets to reduce their risk from storm surge flooding and understand how they gauge their perceived vulnerability. This information will be critical to the overall study and final report.

Phase 2 has started ahead of schedule, and the study team is currently on track to deliver the Phase 2 report in April 2016. The final report will be submitted in June 2016 at the end of Phase 3.

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C. Vipulanandan, *Innovative Shutter Concept for Coastal Protection.* Texas Hurricane Centre for Innovative Technology (THC-IT) University of Houston, Houston

P.T.M. Dircke, T.H.G. Jongeling, P.L.M. Jansen. *An Overview and Comparison of Navigable Surge Barriers.* USSD

Appendix B: Data Library

Appendix B: Data Library

Data Library Index

Name	Type	Notes	Publication Date	Location
2010 Beaumont Evacuation Routes.pdf	Document	2010 Inland Evacuation Map for Beaumont District. Includes Evaculanes, Emergency evacuation routes, and alternative evacuation routes.	1/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Beaumont/2010 Beaumont Evacuation Routes.pdf
2012 LiDaR of the Coast.zip	GIS	ASCII Raster format & LAS point cloud files1 Meter Digital Elevation Model (DEM)	2/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/2012 LiDaR of the Coast.zip
A100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A100-00-00_Hydraulic_Model.zip
A100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A100-00-00_Hydrology_Model.zip
A104-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A104-00-00_Hydraulic_Model.zip
A104-04-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A104-04-00_Hydraulic_Model.zip
A104-07-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A104-07-00_Hydraulic_Model.zip
A104-13-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A104-13-00_Hydraulic_Model.zip
A104-14-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A104-14-00_Hydraulic_Model.zip
A107-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A107-00-00_Hydraulic_Model.zip
A111-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A111-00-00_Hydraulic_Model.zip
A118-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A118-00-00_Hydraulic_Model.zip

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
		Data Library Index		
A119-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A119-00-00_Hydraulic_Model.zip
A119-02-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A119-02-00_Hydraulic_Model.zip
A119-05-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A119-05-00_Hydraulic_Model.zip
A119-07-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A119-07-00_Hydraulic_Model.zip
A120-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Clear Creek Watershed/A120-00-00_Hydraulic_Model.zip
Abstracts.shp.zip	GIS	GIS data for Orange County	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/Abstracts.shp.zip
All Models.zip	Model	HEC-RAS 3.0.1 and HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Sims Bayou Watershed/All Models.zip
All Models.zip	Model	HEC-RAS 3.0.1 and HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Spring Creek Watershed/All Models.zip
All Models.zip	Model	HEC-RAS 3.0.1 and HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Vince Bayou Watershed/All Models.zip
All Models.zip	Model	HEC-RAS 3.0.1 and HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/White Oak Bayou Watershed/All Models.zip
All Models.zip	Model	HEC-RAS 3.0.1 and HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Willow Creek Watershed/All Models.zip
Alligator Bayou Pumping Station & Gravity Drainage Structure Operation and Maintenace Manual.pdf	Document	1978 Operation and Maintenance Manual for Alligator Bayou Pump Station and Gravity Drainage Structure	5/1/1978	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Alligator Bayou/Alligator Bayou Pumping Station & Gravity Drainage Structure Operation and Maintenace Manual.pdf

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	Type	Notes	Publication Date	Location
Anahuac FIS Report 7-6-82.pdf	Document	FIS Reports for Anahuac	7/6/1982	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/DOCUMENT/Anahuac FIS Report 7-6-82.pdf
ARCADIS Orange County Levee Analysis.pdf	Document	Effectiveness of a Proposed Orange County Levee Structure to Suppress Storm Surge and Waves; Model Development, Simulations, and Scenario Analysis	7/31/2012	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/DOCUMENT/ARCADIS Orange County Levee Analysis.pdf
B100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B100-00-00_Hydraulic_Model.zip
B100-00-00_Hydrology_Model.zip	Model	hec-hms 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B100-00-00_Hydrology_Model.zip
B104-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B104-00-00_Hydraulic_Model.zip
B104-04-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B104-04-00_Hydraulic_Model.zip
B104-05-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B104-05-00_Hydraulic_Model.zip
B106-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B106-00-00_Hydraulic_Model.zip
B109-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B109-00-00_Hydraulic_Model.zip
B109-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B109-03-00_Hydraulic_Model.zip
B111-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B111-00-00_Hydraulic_Model.zip
B112-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B112-00-00_Hydraulic_Model.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	Type	Notes	Publication Date	Location
B112-02-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B112-02-00_Hydraulic_Model.zip
B112-04-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B112-04-00_Hydraulic_Model.zip
B113-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B113-00-00_Hydraulic_Model.zip
B114-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B114-00-00_Hydraulic_Model.zip
B114-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B114-01-00_Hydraulic_Model.zip
B114-02-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B114-02-00_Hydraulic_Model.zip
B115-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B115-00-00_Hydraulic_Model.zip
B204-04-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Armand Bayou Watershed/B204-04-00_Hydraulic_Model.zip
Baker & Lawson, Inc Analysis of Velasco Drainage District Levee and Out of Region Documentation of Flood Prevention.zip	Document	Contains detailed information of the Valasco Drainage District. Contains A TON of great Info on other project that could apply to us in the "Publications" Folder. such as "Reliability Analysis Flood Sea Defence Structures and Systems" Might take a while to dig through but there is valuable information in here.	1/1/2000	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/DOCUMENT/Baker & Lawson, Inc Analysis of Velasco Drainage District Levee and Out of Region Documentation of Flood Prevention.zip
BlocksAug14.shp.zip	GIS	GIS data for Oragne County	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/BlocksAug14.shp.zip
BoundaryLines10_03_14.shp (1).zip	GIS	Boundary Line data	10/3/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/BoundaryLines10_03_14.shp (1).zip
Brazoria County LIDAR.gdb.zip	Image	Brazoria County LiDAR used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/GIS/IMAGE/FEMA REPORT/Brazoria County LIDAR.gdb.zip

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
Brazoria County LIDAR.zip	GIS	This is the LIDAR data for Brazoria County	1/1/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/GIS/IMAGE/Brazoria County LIDAR.zip
Brazoria County MDP.pdf	Document	This report represents the culmination of efforts by Brazoria County, the Texas https://www.twdb.state.tx.us/publications/reports/contracted_reports/doc/99483318.pdf Water	8/29/2002	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/DOCUMENT/Brazoria County MDP.pdf
Brazoria County Parcel Data.zip	GIS	Downloaded from: https://www.dropbox.com/sh/9h1r41yi83q3qfm/AACzPrMiYiSlxElfjqDp2hp4a	9/10/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/GIS/DATA/Brazoria County Parcel Data.zip
Brazoria County Parcels.PDF				pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/GIS/DATA/Brazoria County Parcels.PDF
Brazoria FIS reports 9-22-1999.zip	Document	FIS Reports for Brazoria County	9/22/1999	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/DOCUMENT/Brazoria FIS reports 9-22-1999.zip
Calhoun County LIDAR.gdb.zip	Image	Calhoun County LiDAR Data used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/FEMA REPORT LIDAR/Calhoun County LIDAR.gdb.zip
Cameron County LIDAR.gdb.zip	Image	Norther Cameron County LiDAR Data used in FEMA Report	1/1/2005	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/GIS/IMAGE/Cameron County LIDAR.gdb.zip
Chambers county FIS Report 5-18-99.pdf	Document	FIS Reports for Chambers County	5/18/1999	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/DOCUMENT/Chambers county FIS Report 5-18-99.pdf
Chambers County LIDAR.gdb.zip	Image	Chambers County LiDAR used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/GIS/IMAGE/FEMA REPORT/Chambers County LIDAR.gdb.zip
Chambers County LIDAR.zip	GIS	LIDAR data for Chambers County	1/1/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/GIS/IMAGE/Chambers County LIDAR.zip
Chambers County Models.zip	Model	Models for chambers county	5/5/2013	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/MODEL/Chambers County Models.zip
Chambers County Parcel Data.zip	CAD	This is the Parcel data for Chambers county. This was available in CAD format	5/2/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/CAD/Chambers County Parcel Data.zip

Appendix B: Data Library

GCCPRD		Data Library Index		
Name	Type	Notes	Publication Date	Location
Chambers County Parcel Data.zip				pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/GIS/DATA/Chambers County Parcel Data.zip
Chambers County Parcels.PDF				pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/GIS/DATA/Chambers County Parcels.PDF
Chocolate Bayou Watershed Flood Control Study Volume 1 & 2.zip	Document	Flooding is frequent and widespread in the 155 square mile Chocolate Bayou Watershed Located Predominately in Brazoria county. A watershed wide study was undertaken to identify possible flood control projects to significantly lessen flooding.	9/1/2007	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/DOCUMENT/Chocolate Bayou Watershed Flood Control Study Volume 1 & 2.zip
City of Baytown FIS Reports 6-9-2014.zip	Document	FIS Reports for Baytown	6/9/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/DOCUMENT/City of Baytown FIS Reports 6-9-2014.zip
City of Orange - Orange Riverfront Boardwalk & Pavilion.pdf	Document	Plans for Orange Riverfont Boardwalk and Pavillion from 2012	2/3/2012	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/DOCUMENT/City of Orange - Orange Riverfront Boardwalk & Pavilion.pdf
City of Orange Study - 1955.pdf	Document	1957 Study plans for City of Orange	10/1/1957	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/DOCUMENT/City of Orange Study - 1955.pdf
City of Orange study (1994).pdf	Document	City of Orange Study	4/1/1994	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/DOCUMENT/City of Orange study (1994).pdf
CityLimits10_03_14.zip	GIS	City Limit data for Orange County	10/3/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/CityLimits10_03_14.zip
Coastal Barrier Resources System.zip	GIS	The Coastal Barrier Resources Act (CBRA) of 1982 established the John H. Chafee Coastal Barrier Resources System (CBRS), comprised of undeveloped coastal barriers along the Atlantic, Gulf, and Great Lakes coasts.	1/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Coastal Barrier Resources System.zip
coastal_migratory_pelagic_efh_gom.zip	GIS	EFH for coastal migratory pelagic resources consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council from estuarine waters out to depths of 100 fathoms.	1/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/coastal_migratory_pelagic_efh_gom.zip
coastal_Texas_Louisiana_Mississippi_Alabama_four_marsh_type_classification_2010.zip	GIS	coastal Texas, Louisiana, Mississippi, Alabama four-marsh-type classification - 2010 Coastal zone managers and researchers often require detailed information regarding emergent marsh vegetation types for modeling habitat capacities and needs of marsh-reliant wildlife (such as waterfowl and alligator).	1/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/coastal_Texas_Louisiana_Mississippi_Alabama_four_marsh_type_classification_2010.zip
ColoradoMatagordaRAS.zip	Model	HECRAS data Colorado River / Matagorda Bay	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/ColoradoMatagordaRAS.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	**Type**	**Notes**	**Publication Date**	**Location**
County Limits.zip	GIS	A set of county limits for our study area.	1/2/2013	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/County Limits.zip
CountyPrecincts.zip	GIS	County Precincts data for Orange County	10/3/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/CountyPrecincts.zip
Cove City FIS report 2-17-1993.pdf	Document	FIS report for Cove City	2/17/1993	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/DOCUMENT/Cove City FIS report 2-17-1993.pdf
Critical Habitats.zip	GIS	Information regarding Threatened and Endangered Species final Critical Habitat designation across the United States. Not all of the critical habitat data designated by the U.S. Fish & Wildlife Service (USFWS) is available from this shapefile.	8/5/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Critical Habitats.zip
D100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D100-00-00_Hydraulic_Model.zip
D100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D100-00-00_Hydrology_Model.zip
D109-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D109-00-00_Hydraulic_Model.zip
D111-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D111-00-00_Hydraulic_Model.zip
D112-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D112-00-00_Hydraulic_Model.zip
D118-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D118-00-00_Hydraulic_Model.zip
D120-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D120-00-00_Hydraulic_Model.zip
D122-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D122-00-00_Hydraulic_Model.zip
D124-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D124-00-00_Hydraulic_Model.zip

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
Data Library Index				
D126-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D126-00-00_Hydraulic_Model.zip
D129-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D129-00-00_Hydraulic_Model.zip
D132-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D132-00-00_Hydraulic_Model.zip
D133-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D133-00-00_Hydraulic_Model.zip
D139-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D139-00-00_Hydraulic_Model.zip
D140-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D140-00-00_Hydraulic_Model.zip
D142-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D142-00-00_Hydraulic_Model.zip
D144-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Brays Bayou Watershed/D144-00-00_Hydraulic_Model.zip
DD6 - 2006 Drainage Plan.pdf	Document	Jefferson County Drainage District No. 6, Jefferson County, Texas - A Plan Related to Drainage and Flood Damage Reduction	12/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Beaumont/DD6 - 2006 Drainage Plan.pdf
DD6 Design Criteria Manual (11-19-07).pdf	Document	Jefferson County Drainage District No. 6 Drainage Criteria Manual	11/19/2007	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Beaumont/DD6 Design Criteria Manual (11-19-07).pdf
DD7 2012 Hazard Mitigation Plan.pdf	Document	Jefferson County Drainage District No. 7, 2012 Hazard Mitigation Plan Update	7/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/DD7 2012 Hazard Mitigation Plan.pdf
DD7 Reference Map.pdf	Document	Area map of Jefferson County Drainage District No. 7	1/4/2007	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/DD7 Reference Map.pdf

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
DD7 Watersheds.pdf	Document	Jefferson County Drainage DIstrict No. 7 General Watersheds	4/1/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/DD7 Watersheds.pdf
Design Memorandum No 1 Taylors Bayou April 1969.pdf	Document	Drainage And Flood Control Project - Design Memorandum No. 1	4/1/1969	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Taylors Bayou/Design Memorandum No 1 Taylors Bayou April 1969.pdf
Design Memorandum No 3 Taylors Bayou.pdf	Document	Taylors Bayou, Texas, Drainage and Flood Control Project, Design Memorandum No. 3 - Channel Rectification, Taylors Bayou Reach	5/1/1985	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Taylors Bayou/Design Memorandum No 3 Taylors Bayou.pdf
Design Memorandum No 4 Taylors Bayou.pdf	Document	Taylors Bayou, Texas, Drainage And Flood Control Project, Design Memorandum No. 4 - Channel Recitification, Hilldebrandt Bayou, Stas. 4+07.12 to 350+00	3/28/1986	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Taylors Bayou/Design Memorandum No 4 Taylors Bayou.pdf
ELECTED OFFICIALS_GCCPRD Stakeholder Database.xlsx	Document	Final List for Elected Official Mailout	10/24/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/COMMUNICATION/NOTICING/Elected Official Noticing/ELECTED OFFICIALS_GCCPRD Stakeholder Database.xlsx
Engineering and Design - Flood-hydrograph Analyses and Computations.pdf	Document	Engineering and Design, Flood-hydrograph Analyses and Computations provided by USACE	8/31/1959	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Miscellaneous Regional Studies/Engineering and Design - Flood-hydrograph Analyses and Computations.pdf
Esd.shp.zip	GIS	GIS data for Orange County	10/3/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/Esd.shp.zip
esi.zip	GIS	Environmental Sensitivity Index Shoreline of Texas with Environmental Sensitivity Index classification (sensitivity of shoreline habitats to oil contamination and removal). Classification conducted by the University of Texas Bureau of Economic Geology.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/esi.zip
EsmtAug14.shp.zip	GIS	Easement data for Orange County	8/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/EsmtAug14.shp.zip
Evacuation and Population Protection.pdf	Document	Evacuation and population protection annex, State of Texas Emergency Management Plan	5/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Miscellaneous Regional Studies/Evacuation and Population Protection.pdf
F216-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Galeston Watershed/F216-00-00_Hydraulic_Model.zip
F216-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Galeston Watershed/F216-00-00_Hydrology_Model.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	**Type**	**Notes**	**Publication Date**	**Location**
F220-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Galeston Watershed/F220-00-00_Hydraulic_Model.zip
F220-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Galeston Watershed/F220-00-00_Hydrology_Model.zip
FEMA Report.zip	Document	Flood INsurance Study: Coastal Counties, Texas	11/15/2011	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/DOCUMENT/FEMA Report/FEMA Report.zip
Final Report From THC-IT on Hurricane IKE (10-30-14).pdf	Document	Hurricane Prediction Models for Gulf of Mexico States and Damage Estimates Using HAZUS-MH and Hurricane IKE Survey	9/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/UNIVERSITY/University of Houston/Final Report From THC-IT on Hurricane IKE (10-30-14).pdf
FINAL_Elected Official Letter_10-27-2014.docx	Document	Fianl letter to elected officials	10/27/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/COMMUNICATION/NOTICING/Elected Official Noticing/FINAL_Elected Official Letter_10-27-2014.docx
FINAL_PublicNotice_102814.pdf	Document	Submitted with letter to elected officials	10/28/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/COMMUNICATION/NOTICING/Elected Official Noticing/FINAL_PublicNotice_102814.pdf
Flood Protection Planning Study - Beaumont.pdf	Document	Flood protection planning study, City of Beaumont, Jefferson County, TX	3/31/2011	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Beaumont/Flood Protection Planning Study - Beaumont.pdf
FRS Sites.zip	GIS	Geospatial information for all publicly available Facility Registry System (FRS) facilities that have latitude/longitude data. You need to add the desired Layer file first then connect it to the Facility.shp in the geo database	9/30/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FRS Sites.zip
Fugawi_nautical_charts.zip	Image	Maps are RNC Nautical Charts from Fugawi Marine ENC (Ver. 4) Coastline of Texas, from North to South, starting at Lake Sabine (Orange County)	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/Fugawi_nautical_charts.zip
Galveston County LIDAR.gdb.zip	Image	Galveston County LiDAR used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/GIS/IMAGE/FEMA REPORT/Galveston County LIDAR.gdb.zip
Galveston County LIDAR.zip	GIS	Lidar Data for Galveston County LARGE FILE	1/1/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/GIS/IMAGE/Galveston County LIDAR.zip
Galveston Parcels.PDF				pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/GIS/DATA/Galveston Parcels.PDF
galveston parcels.zip	GIS	Parcel info for Galveston County	5/5/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/GIS/DATA/galveston parcels.zip

Appendix B: Data Library

GCCPRD		Data Library Index		
Name	Type	Notes	Publication Date	Location
GCCPRD_TEAM_ASSIGNMENT_MAPBOOK.pdf	Document	GIS Map describing the study area and data collection assignments by firm and agency.	10/2/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ASSIGNMENT/GCCPRD_TEAM_ASSIGNMENT_MAPBOOK.pdf
Guadalupe_RAS_from_USACE.zip	Model	Guadalupe River HecRAS	5/30/2001	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/Guadalupe_RAS_from_USACE.zip
H100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Hunting Bayou Watershed/H100-00-00_Hydraulic_Model.zip
H100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Hunting Bayou Watershed/H100-00-00_Hydrology_Model.zip
H103-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Hunting Bayou Watershed/H103-00-00_Hydraulic_Model.zip
H110-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Hunting Bayou Watershed/H110-00-00_Hydraulic_Model.zip
H112-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Hunting Bayou Watershed/H112-00-00_Hydraulic_Model.zip
H118-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Hunting Bayou Watershed/H118-00-00_Hydraulic_Model.zip
Harris County LIDAR.zip	GIS	LIDAR data for Harris County	1/1/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/GIS/IMAGE/Harris County LIDAR.zip
Harris County Parcels.PDF				pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/GIS/DATA/Harris County Parcels.PDF
Harris County Parcels.zip	GIS	Harris County Parcels with real estate account information	10/28/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/GIS/DATA/Harris County Parcels.zip
HecRasFromLeapEgin.zip	Model	HecRAS Data for Taylor Bayou and Hillebrandt Bayou	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/HecRasFromLeapEgin.zip
HFP Design Memorandum No 1B PtArthur & Vacinitypdf.pdf	Document	Design Memorandum No. 1B, Hydrology (Interior Drainage), for Port Arthur and Vicinity, Texas, Hurricane-Flood Protection	4/26/1965	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/HFP Design Memorandum No 1B PtArthur & Vacinitypdf.pdf

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GCCPRD		Data Library Index		
Name	Type	Notes	Publication Date	Location
HFP Design Memorandum No 1B PtArthur & Vacinitypdf--ABPS.pdf	Document	USACE Interior Drainage Report for the Port Arthur and Vicinity Hurricane Flood Protection Levee	9/26/1965	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/HFP Design Memorandum No 1B PtArthur & Vacinitypdf--ABPS.pdf
HFP Design Memorandum No 2 PtArthur & Vacinity.pdf	Document	USACE Design Memorandum 2 - Volume 1 (General DM) for Port Arthur and Vicinity Hurricane Flood Protection Levee	3/29/1965	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/HFP Design Memorandum No 2 PtArthur & Vacinity.pdf
HFP Design Memorandum No 2 Vol 1 PtArthur & Vacinity.pdf	Document	Port Arthur and Vicinity, Texas, Hurricane Flood Protection , Design Memorandum No. 2 (General design memorandum) Volume 1 - Main Report	3/1/1965	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/HFP Design Memorandum No 2 Vol 1 PtArthur & Vacinity.pdf
HFP Design Memorandum No 2 Vol 2 Pt Arthur & Vacinity.pdf	Document	Port Arthur & Vicinity, Texas, Hurricane Flood Protection, Design Memorandum No. 2 (General design memorandum)	3/1/1965	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/HFP Design Memorandum No 2 Vol 2 Pt Arthur & Vacinity.pdf
HFP Design Memorandum No 5A Pt Arthur Vacinity.pdf	Document	Port Arthur & Vicinity, Texas, Hurricane Flood Protection Supplement No. 2 to Design Memorandum 5A, Alligator Bayou Pumping Plant and Gravity Drainage Structure	11/1/1965	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/HFP Design Memorandum No 5A Pt Arthur Vacinity.pdf
Horsepen_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Horsepen_Hydraulic_Model.zip
Hurricane Ike Impact Report - 2008.pdf	Document	2008 Hurricane Ike Impact Report including research of over 17 federal agencies, offices, and programs	12/8/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Hurricane Ike/Hurricane Ike Impact Report - 2008.pdf
Hurricane Ike Impact Report.zip	Document	Hurricane Ike Impact Report including agricultural impact, executive impact, industrial impact, services impact, jefferson county impact, and orange county impact	1/1/2009	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Hurricane Ike/Hurricane Ike Impact Report.zip
Hurricane Risk Zones.zip	GIS	Displays how far each category hurricane would travel into each county.	5/5/2005	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Hurricane Risk Zones.zip
Hydraulic Design-Tidal Hydraulics.pdf	Document	Hydraulic Design EM110-2-1607	1/1/1953	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Miscellaneous Regional Studies/Hydraulic Design-Tidal Hydraulics.pdf
Inland Evacuation.pdf	Document	2011 Inland Evacuation Map for Beaumont District	4/1/2011	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Miscellaneous Regional Studies/Inland Evacuation.pdf
Integrated Model THC-2014 Mod 1.pdf	Document	Integrated Modeling of Natural (Hurricane) and Man-Made (Oil Spill) Disasters	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/UNIVERSITY/University of Houston/Integrated Model THC-2014 Mod 1.pdf

Appendix B: Data Library

GCCPRD		Data Library Index		
Name	Type	Notes	Publication Date	Location
Interim Report Hurricane Survey Pt Arthur & Vicinity.pdf	Document	Interim Report on Hurricane Survey of Port Arthur and Vicinity, Texas	11/1/1961	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/Interim Report Hurricane Survey Pt Arthur & Vicinity.pdf
Jackson County LIDAR.gdb.zip	Image	Jackson County LiDAR used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/FEMA REPORT LIDAR/Jackson County LIDAR.gdb.zip
Jefferson County Appraisal District GIS Data.zip	GIS	GIS data for Jefferson County	1/1/2013	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/GIS/DATA/Jefferson County Appraisal District GIS Data.zip
Jefferson County DD7 Master Plan.zip	Document	Jefferson County Drainage District 7 Master Plan	5/1/2002	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Port Arthur & Vicinity/Jefferson County DD7 Master Plan.zip
Jefferson County LIDAR.gdb.zip	Image	Jefferson County LiDAR Data used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/GIS/IMAGE/FEMA REPORT/Jefferson County LIDAR.gdb.zip
Jefferson County Parcel Data.zip	GIS	Login Info Host/IP/URL: ftp.JCAD.org Username: jcad_public Password: Pub4Jcad	8/5/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/GIS/DATA/Jefferson County Parcel Data.zip
Jefferson County Parcel.pdf				pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/GIS/DATA/Jefferson County Parcel.pdf
K100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K100-00-00_Hydraulic_Model.zip
K100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K100-00-00_Hydrology_Model.zip
K111-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K111-00-00_Hydraulic_Model.zip
K111-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K111-03-00_Hydraulic_Model.zip
K112-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K112-00-00_Hydraulic_Model.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	Type	Notes	Publication Date	Location
K116-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K116-00-00_Hydraulic_Model.zip
K120-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K120-00-00_Hydraulic_Model.zip
K120-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K120-01-00_Hydraulic_Model.zip
K120-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K120-03-00_Hydraulic_Model.zip
K124-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K124-00-00_Hydraulic_Model.zip
K124-02-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K124-02-00_Hydraulic_Model.zip
K131-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K131-00-00_Hydraulic_Model.zip
K131-02-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K131-02-00_Hydraulic_Model.zip
K131-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K131-03-00_Hydraulic_Model.zip
K131-04-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K131-04-00_Hydraulic_Model.zip
K133-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K133-00-00_Hydraulic_Model.zip
K140-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K140-00-00_Hydraulic_Model.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	**Type**	**Notes**	**Publication Date**	**Location**
K142-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K142-00-00_Hydraulic_Model.zip
K145-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K145-00-00_Hydraulic_Model.zip
K150-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K150-00-00_Hydraulic_Model.zip
K152-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K152-00-00_Hydraulic_Model.zip
K155-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K155-00-00_Hydraulic_Model.zip
K157-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K157-00-00_Hydraulic_Model.zip
K159-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K159-00-00_Hydraulic_Model.zip
K159-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K159-01-00_Hydraulic_Model.zip
K160-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K160-00-00_Hydraulic_Model.zip
K160-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K160-01-00_Hydraulic_Model.zip
K166-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K166-00-00_Hydraulic_Model.zip
K166-02-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K166-02-00_Hydraulic_Model.zip

Appendix B: Data Library

GCCPRD		Data Library Index		
Name	**Type**	**Notes**	**Publication Date**	**Location**
K166-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K166-03-00_Hydraulic_Model.zip
K172-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cypress Creek Watershed/K172-00-00_Hydraulic_Model.zip
K172-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/K172-00-00_Hydraulic_Model.zip
L100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Little Cypress Creek Watershed/L100-00-00_Hydraulic_Model.zip
L100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.4	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Little Cypress Creek Watershed/L100-00-00_Hydrology_Model.zip
L109-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Little Cypress Creek Watershed/L109-00-00_Hydraulic_Model.zip
L112-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Little Cypress Creek Watershed/L112-00-00_Hydraulic_Model.zip
L114-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Little Cypress Creek Watershed/L114-00-00_Hydraulic_Model.zip
L114-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Little Cypress Creek Watershed/L114-01-00_Hydraulic_Model.zip
La Porte City Wide Drainage Study.zip	GIS	A City Wide Drainage Study (CWDS) for the City of La Porte (City) was undertaken to identify, develop and recommend drainage improvements to address drainage problems and lessen flooding and its impacts across the City. Reasons for existing drainage and flooding problems 1) insufficient flow capacity in ditches and channels, 2) ponding of waters in streets and adjacent properties, 3) undersized storm sewers, 4) temporary blockage of storm water inlets by debris, 5) backup of storm waters in	1/1/2009	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/DOCUMENT/La Porte City Wide Drainage Study.zip
Lake Sabine Study Area Map.pdf	Document	Lake Sabine study area map including evacuation routes, county boundaries, and risk areas	6/1/2002	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Miscellaneous Regional Studies/Lake Sabine Study Area Map.pdf

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
Land_Use.zip	GIS	NLCD land cover data	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT LANDUSE/Land_Use.zip
Large ESI Upper Coast.zip	GIS	An Environmental Sensitivity Index (ESI) atlas has been developed for the marine and coastal areas of upper Texas (from Sabine Lake to East Matagorda Bay). The ESI atlas is a compilation of information from three main categories: shoreline habitats, sensitive biological resources, and human-use resources. http://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html#Texas	8/5/2013	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Large ESI Upper Coast.zip
leagueline.zip	GIS	Three Marine League Line boundary between state and federal jurisdiction located three marine leagues (approx. 10 miles) offshore in the Gulf of Mexico.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/leagueline.zip
leasepoly.zip	GIS	Coastal Lease (Polygonal Locations) locations of structures and activities permitted by the GLO within state-owned land and waters. Includes areal features such as dredging areas, parks, mitigation projects, and conservation easements.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/leasepoly.zip
leasept.zip	GIS	Coastal Lease (Point Locations) locations of structures and activities permitted by the GLO within state-owned land and waters. Includes features represented by a single point location, such as piers, docks, breakwaters, and shoreline protection projects.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/leasept.zip
LotsAug14.zip	GIS	Lot data for Orange County	8/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/LotsAug14.zip
Major Ports.zip	GIS	a set of points displaying the major ports in our study area found using google earth.	9/10/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Major Ports.zip
Man Groves.zip	GIS	This dataset consists of the current distribution (2000s) of mangrove forests in the southeastern U.S. This dataset was created from the current best available mangrove data on a state specific basis. Florida mangrove data was extracted from Florida Landuse Land Cover Classification System (FLUCCS). For Louisiana, we used observations of mangrove stands from aerial surveys by Michot et al. (2010). Mangrove presence in Texas came from maps produced by Sherrod & McMillan (1981) and the NOAA Benthi	1/1/2013	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Man Groves.zip
Matagorda County LIDAR.gdb.zip	Image	Matagorda County LiDAR used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/FEMA REPORT LIDAR/Matagorda County LIDAR.gdb.zip
ME.zip	GIS	Pipelines and Miscellaneous Easements located in state-owned submerged lands and other areas along the Texas Gulf Coast.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/ME.zip
Mont Belvieu FIS Report 6-15-82.pdf	Document	FIS Reports for Mont Belvieu	6/15/1982	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/DOCUMENT/Mont Belvieu FIS Report 6-15-82.pdf
N100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Carpenter Bayou Watershed/N100-00-00_Hydraulic_Model.zip

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Name	Type	Notes	Publication Date	Location
N100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Carpenter Bayou Watershed/N100-00-00_Hydrology_Model.zip
N104-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Carpenter Bayou Watershed/N104-00-00_Hydraulic_Model.zip
N117-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Carpenter Bayou Watershed/N117-00-00_Hydraulic_Model.zip
National Wildlife Refuge areas.zip	GIS	Areas that are considered National Wildlife Refuges by US FWS.	9/5/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/National Wildlife Refuge areas.zip
NED_Data_NuecesKlebergKenedyWillacy.zip	GIS	National Elevation Data (NED) for Southern Cameron County, Kenedy County, Kleberg County, and Willacy County used in FEMA Report	1/1/1999	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT NED DATA/NED_Data_NuecesKlebergKenedyWillacy.zip
nlcd_2011_landcover_2011_edition_2014_03_31.zip	GIS	For NLCD 2011, there are 3 primary data products: 1) NLCD 2011 Land Cover map; 2) NLCD 2006/2011 Change Pixels labeled with the 2011 land cover class; and 3) NLCD 2011 Percent Developed Imperviousness. Four additional data products were developed to provide supporting documentation and to provide information for land cover change analysis tasks: 4) NLCD 2001/2006 Percent Developed Imperviousness Change; 5) NLCD 2006/2011 Maximum Potential Change derived from the raw spectral change analysis;	3/31/2011	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/nlcd_2011_landcover_2011_edition_2014_03_31.zip
NLCDS2006 .zip	GIS	For NLCD 2006, there are 3 primary data products: 1) NLCD 2006 Land Cover map; 2) NLCD 2001/2006 Change Pixels labeled with the 2006 land cover class; and 3) NLCD 2006 Percent Developed Imperviousness. Four additional data products were developed to provide supporting documentation and to provide information for land cover change analysis tasks: 4) NLCD 2001/2006 Percent Developed Imperviousness Change; 5) NLCD 2001/2006 Maximum Potential Change derived from the raw spectral change analysis;	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/NLCDS2006 .zip
nmline.zip	GIS	Three Marine League Line between state and federal jurisdiction located three marine leagues (approx. 10 miles) offshore in the Gulf of Mexico.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/nmline.zip
NoaaNos_Gulf_FromHPourtaheri_OriginalFiles.zip	Model	NOS Hydrographic Data Base	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/NoaaNos_Gulf_FromHPourtaheri_OriginalFiles.zip
NoaaNos_HydrographicSurveyData_Bays_originalData.zip	GIS	Survey Data for Aransas, Baffin, Corpis Christi, Matagorda, and San Antonio Bays	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/NoaaNos_HydrographicSurveyData_Bays_originalData.zip

Appendix B: Data Library

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Data Library Index

Name	Type	Notes	Publication Date	Location
O100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Goose Creek Watershed/O100-00-00_Hydraulic_Model.zip
O100-00-00_Hydrology_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Goose Creek Watershed/O100-00-00_Hydrology_Model.zip
O105-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Goose Creek Watershed/O105-00-00_Hydraulic_Model.zip
O200-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Goose Creek Watershed/O200-00-00_Hydraulic_Model.zip
O200-00-00_Hydrology_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Goose Creek Watershed/O200-00-00_Hydrology_Model.zip
O208-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Goose Creek Watershed/O208-00-00_Hydraulic_Model.zip
Oil & Gas Leases.zip	GIS	Oil and Gas Leases managed by the Texas General Land Office.	8/5/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Oil & Gas Leases.zip
Old River FIS Report 2-17-93.pdf	Document	FIS reports for City of Old RIver	2/17/1993	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/DOCUMENT/Old River FIS Report 2-17-93.pdf
Orange County Drainage Hazard Mitigation Plan.pdf	Document	2011 Oragne County Drainage Distyrict Hazard Mitigation Plan	8/1/2011	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/DOCUMENT/Orange County Drainage Hazard Mitigation Plan.pdf
Orange County Emergency Mapbook.pdf	Document	South East Texas Regional Planning Commission - Orange County Emergency Mapbook	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/DOCUMENT/Orange County Emergency Mapbook.pdf
Orange County Feasibility Report - 12-2012.pdf	Document	Study conducted by Orange County and Orange County EDC utilizing a Planning Grant from the Texas Water Development Board	12/26/2012	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/DOCUMENT/Orange County Feasibility Report - 12-2012.pdf
Orange County LIDAR.gdb.zip	Image	Orange County LiDAR Data used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/IMAGE/FEMA REPORT/Orange County LIDAR.gdb.zip
Orange County PARCELS.zip	GIS	Parcel Data from OCAD. Exact date of creation unknown it was created in 2014.	4/4/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/Orange County PARCELS.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	**Type**	**Notes**	**Publication Date**	**Location**
Orange Jefferson LIDAR data.zip	GIS	Combination of LIDAR data for both Orange and Jefferson Counties	1/1/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/Orange Jefferson LIDAR data.zip
otlsglo.zip	GIS	State Submerged Land tracts in offshore waters and coastal bays. These tracts are owned and leased by the GLO.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/otlsglo.zip
Ownership10_03_14.zip	GIS	Ownership shape files	10/3/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/Ownership10_03_14.zip
P100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P100-00-00_Hydraulic_Model.zip
P100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P100-00-00_Hydrology_Model.zip
P109-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P109-00-00_Hydraulic_Model.zip
P110-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P110-00-00_Hydraulic_Model.zip
P114-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P114-00-00_Hydraulic_Model.zip
P118-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P118-00-00_Hydraulic_Model.zip
P118-14-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P118-14-00_Hydraulic_Model.zip
P118-23-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P118-23-00_Hydraulic_Model.zip
P125-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P125-00-00_Hydraulic_Model.zip
P126-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P126-00-00_Hydraulic_Model.zip

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
P130-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P130-00-00_Hydraulic_Model.zip
P130-02-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P130-02-00_Hydraulic_Model.zip
P130-02-02_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P130-02-02_Hydraulic_Model.zip
P130-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P130-03-00_Hydraulic_Model.zip
P130-03-01_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P130-03-01_Hydraulic_Model.zip
P130-05-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P130-05-00_Hydraulic_Model.zip
P133-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P133-00-00_Hydraulic_Model.zip
P138-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P138-00-00_Hydraulic_Model.zip
P140-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P140-00-00_Hydraulic_Model.zip
P145-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P145-00-00_Hydraulic_Model.zip
P145-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P145-03-00_Hydraulic_Model.zip
P146-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P146-00-00_Hydraulic_Model.zip

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
P147-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P147-00-00_Hydraulic_Model.zip
P148-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P148-00-00_Hydraulic_Model.zip
P155-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P155-00-00_Hydraulic_Model.zip
P156-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Greens Bayou Watershed/P156-00-00_Hydraulic_Model.zip
Phase 2 ESMT By Eco Region.zip	GIS	Vegetation Areas for Our Study Area Part of a two part file the other is called Phase 3 ESMT by Eco Region	2/24/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Phase 2 ESMT By Eco Region.zip
Phase 3 ESMT By Eco Region.zip	GIS	Vegetation Areas for Our Study Area part of a two part file the other is called phase 2 ESMT by Eco Region	2/17/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/Phase 3 ESMT By Eco Region.zip
priority.zip	GIS	Priority Protection Habitat Areas to be protected during oil or hazardous material spills on the Texas coast. Areas were identified and prioritized by TPWD and GLO personnel in cooperation with other entities.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/priority.zip
Q100-00-00_Hydrology_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q100-00-00_Hydrology_Model.zip
Q101-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q101-00-00_Hydraulic_Model.zip
Q112-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q112-00-00_Hydraulic_Model.zip
Q114-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q114-00-00_Hydraulic_Model.zip
Q122-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q122-00-00_Hydraulic_Model.zip

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Name	Type	Notes	Publication Date	Location
		Data Library Index		
Q128-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q128-00-00_Hydraulic_Model.zip
Q130-00-00_Hydraulic_Model.zip	Model	HEC-ras 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q130-00-00_Hydraulic_Model.zip
Q200-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Cedar Bayou Watershed/Q200-00-00_Hydraulic_Model.zip
R100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Jackson Bayou Watershed/R100-00-00_Hydraulic_Model.zip
R100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Jackson Bayou Watershed/R100-00-00_Hydrology_Model.zip
R102-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Jackson Bayou Watershed/R102-00-00_Hydraulic_Model.zip
R102-03-00&01_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Jackson Bayou Watershed/R102-03-00&01_Hydraulic_Model.zip
R102-13-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Jackson Bayou Watershed/R102-13-00_Hydraulic_Model.zip
red_drum_efh_gom.zip	GIS	EFH for red drum consists of all Gulf of Mexico estuaries; waters and substrates extending from Vermilion Bay, Louisiana to the eastern edge of Mobile Bay, Alabama out to depths of 25 fathoms; waters and substrates extending from Crystal River, Florida to Naples, Florida between depths of 5 and 10 fathoms; waters and substrates extending from Cape Sable, Florida to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Co	1/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/red_drum_efh_gom.zip
reef_fish_efh_gom.zip	GIS	EFH for coastal migratory pelagic resources consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council from estuarine waters out to depths of 100 fathoms.	1/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/reef_fish_efh_gom.zip
Refugio_Aransas County LIDAR.gdb.zip	Image	Aransas and Refugio County LiDAR Data used for FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/FEMA REPORT LIDAR/Refugio_Aransas County LIDAR.gdb.zip

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
RioGrande_Bathymetry.zip	GIS	Bathymetric Survey of Rio Grande River from the Brownsville El Jardin Weir to the Gulf of Mexico	3/5/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/RioGrande_Bathymetry.zip
rmc.zip	GIS	State Tracts with Resource Management Codes for State-owned tracts in offshore waters and coastal bays, with codes added that reflect restrictions and concerns associated with leasing of these tracts	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/rmc.zip
rookeries.zip	GIS	Colonial Waterbird Rookery Area locations of waterbird rookery sites in the coastal counties of Texas. Information compiled by the Texas Colonial Waterbird Society.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/rookeries.zip
S100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Luce Bayou Watershed/S100-00-00_Hydraulic_Model.zip
S110-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Luce Bayou Watershed/S110-00-00_Hydraulic_Model.zip
S110-00-00_Hydrology_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Luce Bayou Watershed/S110-00-00_Hydrology_Model.zip
S114-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Luce Bayou Watershed/S114-00-00_Hydraulic_Model.zip
S114-00-00_Hydrology_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Luce Bayou Watershed/S114-00-00_Hydrology_Model.zip
Sabine_KeithLake_Bathymetry.zip	GIS	Hydrographic Survey of the Keith Lake-Salt Bayou System	4/1/2007	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/Sabine_KeithLake_Bathymetry.zip
San Jacinto River Watershed all Models.zip	Model	HEC-RAS 3.0.1 and HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/San Jacinto River Watershed/San Jacinto River Watershed all Models.zip
San_Patricio County LIDAR.gdb.zip	Image	San Patricio County LIDAR used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/FEMA REPORT LIDAR/San_Patricio County LIDAR.gdb.zip
SanBernard_Bathymetry.zip	GIS	Hydrographic Survey of Cow Trap Lake, San Bernard River, Cedar Lakes, Intra Coastal Canal and Surrounding Areas Sargent, Texas	6/5/2007	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/SanBernard_Bathymetry.zip
SchoolDistrictsJune14.zip	GIS	School District shape files for Orange County	6/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/SchoolDistrictsJune14.zip

Appendix B: Data Library

GCCPRD		Data Library Index		
Name	**Type**	**Notes**	**Publication Date**	**Location**
Sea Brook FIS Report 6-9-2014.zip	Document	FIS Reports for City of Sea Brook	6/9/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/DOCUMENT/Sea Brook FIS Report 6-9-2014.zip
Section 408 Summary Report - Alligator Bayou Pump Station.zip	Document	Section 408 Summary Report for Alligator Bayou Pump Station	8/1/2012	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Alligator Bayou/Section 408 Summary Report - Alligator Bayou Pump Station.zip
Soil Survey of Jefferson and Orange Counties.pdf	Document	Soil survey data for BOTH Jefferson and Orange County	6/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Miscellaneous Regional Studies/Soil Survey of Jefferson and Orange Counties.pdf
species.zip	GIS	Species/Habitats coastal distribution of animals, plants and habitats potentially at risk from oil spill damage or response activities. Mapped as part of a joint project involving GLO, TPWD and other entities.	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/species.zip
Specs for Alligator Bayou PS&GDS.pdf	Document	Specifications for Alligator Bayou Pumping Station and Gravity Drainage Structure, Port Arthur and Vicinity, Texas	2/1/1974	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Alligator Bayou/Specs for Alligator Bayou PS&GDS.pdf
State wide Floodplain Data.zip	GIS	State wide floodplain data.	9/3/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/State wide Floodplain Data.zip
Statistical Methods in Hydrology.pdf	Document	Statistical Methods in Hydrology, by L. R. Beard	7/1/1952	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/Miscellaneous Regional Studies/Statistical Methods in Hydrology.pdf
StreetCenterlines5_6_13.zip	GIS	Street Centerlines shape files for Orange County	5/6/2013	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/StreetCenterlines5_6_13.zip
Subdivisions10_03_14.zip	GIS	Subdivision shape files for Orange County	10/3/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/Subdivisions10_03_14.zip
Survey_Data_SWG.zip	Model	Deep and Shallow Draft Survey Data	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/Survey_Data_SWG.zip
SwanLakeDataFromHDR_RawProvidedData.zip	GIS	Bathymetry for Swan Lake just south of the Port of Texas City (Swan Lake is an embayment of Galveston Bay)	4/14/2008	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/SwanLakeDataFromHDR_RawProvidedData.zip
T100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/barker Reservoir Watershed/T100-00-00_Hydraulic_Model.zip
T100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/barker Reservoir Watershed/T100-00-00_Hydrology_Model.zip

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Name	Type	Notes	Publication Date	Location
Data Library Index				
T101-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/barker Reservoir Watershed/T101-00-00_Hydraulic_Model.zip
T101-03-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/barker Reservoir Watershed/T101-03-00_Hydraulic_Model.zip
T103-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/barker Reservoir Watershed/T103-00-00_Hydraulic_Model.zip
T103-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/barker Reservoir Watershed/T103-01-00_Hydraulic_Model.zip
TCEQ_PSOC.zip	GIS	TCEQ Potential Sources of Contamination (PSOC) to Public Water Supply (PWS) point locations.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/TCEQ_PSOC.zip
TCEQ_PSOC_gdb.zip	GIS	TCEQ Potential Sources of Contamination (PSOC) to Public Water Supply (PWS) point locations with layer files for symbology.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/TCEQ_PSOC_gdb.zip
TCEQ_PSOC_Legend.pdf	Document	TCEQ Potentail Sources of Contamination (PSOC) map legend document.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/TCEQ_PSOC_Legend.pdf
TCEQ_PST.zip	GIS	TCEQ Petroleum Storage Tanks (PST) point locations.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/TCEQ_PST.zip
TCEQ_PWS_Surface_Water_Intakes.zip	GIS	TCEQ Public Water Supply (PWS) surface water intake point locations.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/TCEQ_PWS_Surface_Water_Intakes.zip
TCEQ_PWS_Wells.zip	GIS	TCEQ Public Water Supply (PWS) well point locations.	1/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/TCEQ_PWS_Wells.zip
Texas City_Hurricane Levee Sys_certification_Updated Report.zip	Document	Texas City Hurricane-Flood Protection Levee System Certification, It contains As Builts, Design Memo, Freeboard Info, Internal Drainage (GIS/MHS Model); O&M Plans	8/10/2013	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/DOCUMENT/Texas City_Hurricane Levee Sys_certification_Updated Report.zip
tf04_AdcircMesh_v1_grd.zip	Model	ADCIRC Mesh Models	1/1/2005	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/tf04_AdcircMesh_v1_grd.zip
THC 2012 and 2013 on ADCIRC use for Shutter Modeling.zip	Document	Coastal Protection Systems and Hurricane IKE Storm Surge Modeling Using ADCIRC and Modeling of Shutter Coastal Protection against Storm Surge for Galveston Bay	1/1/2012	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/UNIVERSITY/University of Houston/THC 2012 and 2013 on ADCIRC use for Shutter Modeling.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	**Type**	**Notes**	**Publication Date**	**Location**
TNRIS - Jefferson County.zip	GIS	TNRIS GIS shapefiles. Boundaries, census, original Texas land survey, Stratmap, transportation,	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/GIS/DATA/TNRIS - Jefferson County.zip
TNRIS - Orange County.zip	Document	TNRIS GIS data for Orange county. Census, FEMA, Original Texas land survey, TxDOT	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/GIS/DATA/TNRIS - Orange County.zip
TrinityRiver_Hec2_ProvidedData.zip	Model	Trinity River HecRAS	3/1/1992	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/TrinityRiver_Hec2_ProvidedData.zip
TsarpStudy_HecRas_CleanedScatterSets.zip	Model	HecRAS model and surveys	1/1/1901	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/DATA/FEMA REPORT BATHYMETRY/TsarpStudy_HecRas_CleanedScatterSets.zip
TxDOT - Hurricane Evacuation Traffic Operations.pdf	Document	Recommended practices for hurricane evacuation traffice operations as written by Andrew J. Ballard, P.E. (Texas #59027)http://tti.tamu.edu/documents/0-4962-P2.pdf	5/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/DOCUMENT/TxDOT/TxDOT - Hurricane Evacuation Traffic Operations.pdf
txdot_urban_brazoria_dwg2003.zip	CAD	An urban Autocad drawing displaying streets, rail roads and bayous . Exact date of creation unknown it was created in 2003.	1/1/2003	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/BRAZORIA/CAD/txdot_urban_brazoria_dwg2003.zip
txdot_urban_chambers_dwg2003.zip	CAD	An urban Autocad drawing displaying streets, rail roads and bayous . Exact date of creation unknown it was created in 2003.	1/1/2003	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/CHAMBERS/CAD/txdot_urban_chambers_dwg2003.zip
txdot_urban_galveston_dwg2003.zip	CAD	An urban Autocad drawing displaying streets, rail roads and bayous . Exact date of creation unknown it was created in 2003.	1/1/2003	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/CAD/txdot_urban_galveston_dwg2003.zip
txdot_urban_harris_dwg2003.zip	CAD	An urban Autocad drawing displaying streets, rail roads and bayous . Exact date of creation unknown it was created in 2003.	1/1/2003	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/CAD/txdot_urban_harris_dwg2003.zip
txdot_urban_jefferson_dwg.zip	CAD	An urban Autocad drawing displaying streets, rail roads and bayous . Exact date of creation unknown it was created in 2003.	1/1/2003	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/JEFFERSON/CAD/txdot_urban_jefferson_dwg.zip
txdot_urban_orange_dwg2003.zip	CAD	An urban Autocad drawing displaying streets, rail roads and bayous . Exact date of creation unknown it was created in 2003.	1/1/2003	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/ORANGE/CAD/txdot_urban_orange_dwg2003.zip
U100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U100-00-00_Hydraulic_Model.zip
U100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U100-00-00_Hydrology_Model.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	**Type**	**Notes**	**Publication Date**	**Location**
U101-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U101-00-00_Hydraulic_Model.zip
U101-07-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U101-07-00_Hydraulic_Model.zip
U102-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U102-00-00_Hydraulic_Model.zip
U102-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U102-01-00_Hydraulic_Model.zip
U106-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U106-00-00_Hydraulic_Model.zip
U120-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/U120-00-00_Hydraulic_Model.zip
UNDER CONSTRUCTION_GCCPRD Stakeholder Database.xlsx	Document	THIS STAKEHOLDER DATABASE IS UNDER CONSTRUCTION AS OF 10/30/2014.	10/30/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/COMMUNICATION/NOTICING/Stakeholder Database/UNDER CONSTRUCTION_GCCPRD Stakeholder Database.xlsx
Victoria County LIDAR.gdb.zip	Image	Vicoria County LiDAR used in FEMA Report	1/1/2006	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/REGION/GIS/IMAGE/FEMA REPORT LIDAR/Victoria County LIDAR.gdb.zip
Vipu THC-2010 INNOVATIVE SHUTTER CONCEPT FOR COASTAL PROTECTION.pdf	Document	Innovative Shutter Concept for Coastal Protection	9/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/UNIVERSITY/University of Houston/Vipu THC-2010 INNOVATIVE SHUTTER CONCEPT FOR COASTAL PROTECTION.pdf
Volm_1_1979 USACE study storm damage reductions galveston.pdf	Document	Texas Coast Hurricane Study_Feasibility Report_Volm1, Galveston County Engineer Mike Fitzerald provided the copy.	1/1/1979	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/DOCUMENT/Volm_1_1979 USACE study storm damage reductions galveston.pdf
Volm_2_1979_USACE study storm damage reduction galveston bay.f.pdf	Document	Texas Coast Hurricane Study_Feasibility Report_Volm 2, Galveston County Engineer Mike Fitzerald provided the copy.	1/1/1979	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/GALVESTON/DOCUMENT/Volm_2_1979_USACE study storm damage reduction galveston bay.f.pdf
W100-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W100-00-00_Hydraulic_Model.zip

Appendix B: Data Library

Name	Type	Notes	Publication Date	Location
W100-00-00_Hydrology_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W100-00-00_Hydrology_Model.zip
W140-00-00_Hydraulic_Model.zip	Model	HEC-HMS 3.3	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W140-00-00_Hydraulic_Model.zip
W140-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W140-01-00_Hydraulic_Model.zip
W141-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W141-00-00_Hydraulic_Model.zip
W142-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W142-00-00_Hydraulic_Model.zip
W156-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W156-00-00_Hydraulic_Model.zip
W157-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W157-00-00_Hydraulic_Model.zip
W167-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W167-00-00_Hydraulic_Model.zip
W167-01-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Addicks Reservior Watershed/W167-01-00_Hydraulic_Model.zip
W170-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W170-00-00_Hydraulic_Model.zip
W190-00-00_Hydraulic_Model.zip	Model	HEC-RAS 3.0.1	10/1/2014	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/HARRIS/MODEL/Buffalo Bayou Watershed/W190-00-00_Hydraulic_Model.zip

Appendix B: Data Library

GCCPRD	Data Library Index			
Name	**Type**	**Notes**	**Publication Date**	**Location**
Water Management in the Netherlands_tcm224-303503.pdf	Document	Water management in the Netherlands is a complicated issue. Also,water distribution throughout the country is far from straightforward. The challenges for water policy makers are significant and the discussions about these challenges frequent. That is precisely why it would be practical if the parties involved could share an unequivocal body of knowledge and a vocabulary that everybody understands.	1/1/2010	pw://us-hou-pw01.dannenbaum.local:Dannenbaum - GCCPRD/Documents/GCCPRD/02-DATA LIBRARY/OUT OF REGION/Water Management in the Netherlands_tcm224-303503.pdf

Appendix C: Public Coordination & Outreach Documentation

*Section 1: Mailed Letters of Notice

Elected Official Notice

Stakeholder Mailing List – Elected Officials

Public Notice (English and Spanish)

Stakeholder Mailing List – Stakeholders

*Section 2: Mass E-mails

E-blast

Stakeholder E-mail List

Section 3: Legal Notices and Publications

Baytown Sun (Published November 6, 2014)

Beaumont Enterprise (Published November 6, 7, and 9, 2014)

Galveston County Daily News (Published November 6, 2014)

Houston Chronicle (Published November 6, 2014)

La Voz (Published November 9, 2014)

Port Arthur News (Published November 6, 2014)

The Facts (Brazoria County) (Published November 6, 2014)

The Orange Leader (Published November 8, 2014)

Section 4: Press Releases

List of Media Outlets

October 9 Public Information Session Press Release (Released October 6, 2014)

October 9 Public Information Session Follow-up Press Release (Released October 10, 2014)

Public Scoping Meetings and Media Briefing Press Release (Released November 17, 2014)

*Section 5: Public Scoping Meeting Attendees

Public Scoping Meeting Attendee List

Scanned Attendee Cards

League City Meeting (December 4, 2014)

Baytown Meeting (December 9, 2014)

Beaumont Meeting (December 11, 2014)

Media Briefing (December 1, 2014)

Section 6: Public Scoping Meeting Organization and Materials

Public Scoping Meeting Layouts

GCCPRD Study Guide (English and Spanish)

"How to Participate" Handout (English and Spanish)

Public Meeting Display Materials

Display Board Layouts (English and Spanish)

Full-page Displays (English and Spanish)

Digital Displays

Section 7: Public Scoping Meeting Photographs

Section 8: Additional Outreach Activities

GCCPRD Study Overview PowerPoint Presentation

*Section 9: Phase 1 Public Comments

Comment Form

Public Comment Database (through February 1, 2015)

Scanned Comment Documents

Public Input Maps

To protect personal identity, Sections 1, 2, 5, and 9 are not available for download.

To protect personal identity, Section 1 is not available for download.

Section 1: Mailed Letters of Notice

Elected Official Notice
Stakeholder Mailing List – Elected Officials
Public Notice (English and Spanish)
Stakeholder Mailing List – Stakeholders

To protect personal identity, Section 2 is not available for download.

Section 2: Mass E-mails

E-blast
Stakeholder E-mail List

Section 3: Legal Notices and Publications

Baytown Sun (Published November 6, 2014)
Beaumont Enterprise (Published November 6, 7, and 9, 2014)
Galveston County Daily News (Published November 6, 2014)
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The Orange Leader (Published November 8, 2014)

Baytown Sun (Published November 6, 2014)

The Baytown Sun
1301 Memorial Drive
Baytown, Texas 77520
281-422-8302

AFFIDAVIT OF PUBLICATION

Crouch Environmental Services
Attn: Connor Stokes
402 Teetshorn St.
Houston, TX 77009

COUNTY OF HARRIS OF TEXAS

Reference: GCCPRD- Public Meeting Notice

Before me, the undersigned authority, on this day personally appeared, Misty Warner who being duly sworn, deposes and says that she is an agent of the Baytown Sun: that said newspaper is regularly published in Harris County and generally circulated in Harris and Chambers Counties, Texas: that the attached notice was published on the following date.

Misty Warner

Misty Warner, Agent

Printed: November 6, 2014

Subscribed and sworn before me this 06 of November 2014 AD

Deborah Florence Robertson

DEBORAH FLORENCE ROBERTSON
Notary Public, State of Texas
My Commission Expires
May 24, 2016

OBITUARIES

For obituary information, call 281-422-8302

Lois Manier

Lois Manier, 72, died peacefully on November 3, 2014 after a remarkable, 24-year battle with breast cancer. Born in Buffalo, New York on October 20, 1942, Lois was the only child of Jack and Dolores Levea. From an early age, she witnessed the generosity and selflessness of her parents, who supported and cared for numerous elderly, sick and disabled relatives and foster children. For all of her adult life, Lois continued this tradition of service to family, neighbors and members of her community. She had a special deference for children, the elderly, the poor, and animals, offering countless hours of service to nursing homes, schools, community organizations and her church. Lois served as an elementary school teacher, PTA President, Girl Scout Leader, Mother's Day Out teacher; youth group director, small business owner and founder of the Alzheimer's Support Group in Baytown. Until her death, Lois was actively involved in the fight against cancer and Alzheimer's, leading teams and fund raising efforts for the Baytown Relay for Life and the Alzheimer's Memory Walk.

Lois received her Bachelor's degree in education from Buffalo State Teachers College in 1964 and her Master's degree in education from Valparaiso University in 1977. She had a gift for fostering self-worth and confidence in her students and was known for her energetic, creative and inspirational teaching style. Many of her former students, from more than 45 years ago, continued to show their appreciation for her influence up until her death.

Lois' children and grandchildren were her greatest source of pride and accomplishment. She spent many years as a full-time mother, actively involved in her daughters' activities and interests. Family and faith were her greatest priorities. Timothy Manier, her childhood sweetheart and husband of 49 years; daughter Jody Kris and husband David Kris of Mercer Island, Washington; daughter Tracy Manier and husband Daniel Floyd of Austin; and grandchildren Hannah and Audrey Kris and Eli and August Floyd survive her. Cousins John Foster and Bonnie Staffeldt also survive her.

Lois was the consummate extrovert who never met a stranger. She placed a high value on friendship and never lost touch with a friend, despite distance in time or geography. Voted "class clown" in high school, Lois' love of good humor, laughter, and fun endeared her to many people, especially those who needed a reason to smile. She is survived by hundreds of friends, from the many stages of her life, who reside all over the United States and abroad. The family expresses their appreciation for the support from her friends, the community of Baytown, the congregations of Redeemer and St. Paul's Lutheran churches, and to the highly capable medical professionals in Baytown, especially Dr. Pamela Medellin and her staff, for providing exceptional health care to Lois for more than 24 years in her fight against cancer.

The family will receive visitors on Friday, November 7, 2014 from 5-7 pm at Navarre Funeral Home. Funeral services will be held at 11 am on Saturday, November 8, 2014 at Redeemer Lutheran Church 1200 E. Lobit St., Baytown Texas 77520.

NAVARRE Funeral Home & Cremation Services

Deborah "Debbie" May Arthur

Deborah "Debbie" May Arthur, 58, of Dayton, passed away on Tuesday, November 4, 2014 at her residence, surrounded by her family. She was born August 13, 1956 to Daniel and Deloris Green.

Debbie was a member of Grace Community Baptist Church and was currently employed with Sterling Funeral Home since 2007. Debbie was a very well loved mother, daughter, sister, grandmother, aunt, and friend. Debbie and her husband moved into her father and mothers home in 2006 to help her father who was terminally ill. After her fathers' death she has lived with and was taken care of her mother. Debbie never hesitated to help anyone in need. She loved spending time with all her family and friends especially her grandchildren. Debbie is very much loved by all who met her.

Her father Daniel F. Green preceded Debbie in death, also grandparents Jeff and Polly Green and Joe and Virginia Polermo.

Debbie is survived by her loving husband of 31 years, William E. (Eddie) Arthur; sons, Charles W Neal and his wife Michelle, Steve Arthur, Scott Arthur and his wife Yuki; daughters, Donna Neal Johnson and her husband Kenneth, and Chrisy Arthur Harriman and her husband Mark; mother, Deloris Green, sisters, Cyndi Green Carroll and her husband Cecil, Carla Green Hunt and her husband Wesley; brother, Glenn Dixon Green and wife Cheryl; sister-in-law, Virginia Arthur Truitt and husband Ronnie; brother-in-laws, Wallace Arthur and wife Martha, grandchildren: Brittany Arthur, Briannah Farmer, Raven Farmer, Mike Arthur, Haley Harriman, Breeze Harriman and numerous nieces, nephews and extended family whom she loved very much.

Visitation with the family will be on Friday, November 7, 2014, from 9:00AM until 11:00AM in the Chapel of Sterling Funeral Home, 602 N. Main St., Dayton, where funeral services will be held at 11:00AM with our dear family friend and Pastor Rev. Wayne Hardin of Grace Community Baptist Church.

Graveside services and interment will be on Friday, at 3:00PM in Palms Memorial Park in Dayton, Texas. Pallbearers will be brother-in-law Ronnie Truitt, great nephews Blake Green, Caeden Hunt, Justin West and very close family friends Kade Bailey, Jerry Yarborough and Les Abner. Condolences can be sent online to www.sterlingfuneralhome.com.

Sterling Funeral Homes
602 N. Main • Dayton • 936-258-2678

Raymond Weldon Watson

Raymond Weldon Watson (Ray) was born July 4, 1940 in Lufkin, Texas to Nathan Ernest Watson and Eva L. Watson. He passed away Saturday, October 18 in Crockett, Texas. Raymond was one to help anyone he could, very active in Shrines' of Baytown, Old River Lodge. He was a retired paint contractor. He was also an active member of Mont Belvieu Church of Christ.

Survivors include daughter Rhonda LeBlanc, son Jonathon Watson, three grand children, sisters Bonnie Oliver of Lufkin, Texas Louise Carmicheal of Kentucky, one brother, Nathan Watson of Broaddus, Texas, several nieces, nephews, and a host of friends, also one very special friend Janet Andrews, her children and grand children of Baytown. He truly loved these folks. Son, Little Raymond, two brothers Olan and Fred Watson, and also one sister Kathryn Hilliard precedes him in death.

We will miss you Ray
Dad Brother, Uncle, and Great Friend.

Anderson takes Harris Co. DA race

BY CHRISTOPHER JAMES
christopher.james@baytownsun.com

Harris County District Attorney Devon Anderson was elected Tuesday night with 53 percent of the vote.

Results showed Anderson winning with 354,098 votes compared with Ogg's 311,094.

"Thank you so much for all of your support and I am proud to continue serving Harris County as your District Attorney," Anderson said. "I look forward to seeing the office restored to its rightful place as the best DA's office in the country."

The DA race was for the unexpired term of Mike Anderson, who died months into his term. His widow, Devon, was appointed to fill the post by Gov. Rick Perry.

Devon is an attorney and former partner of Anderson and Thomas PLLC and is a former judge of the 177th Judicial District Court as well as a past assistant district attorney for Harris County.

She holds a bachelor's degree and law degree from the University of Texas.

She will serve a two-year term until the next general election in 2016.

Anderson campaigned that she has been on three sides of the courtroom, first as a prosecutor for a dozen years, then as a judge for four years and finally as a defense attorney for five years.

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CONTINUED FROM PAGE 1

the morals and values that favor a marriage between man and a woman only, that as Christians we must have a respect for life from conception to the grave."

He also said, "I will also be an advocate for increased public safety, which is good not only for our business environment but also for our families."

In reference to regulation, he said, "Government intrusiveness and regulation will only increase costs for our families. Instead, offering incentives for industry operators gives them a reason to be good stewards in our community."

Pena has not served in elected office before. He ran unsuccessfully for mayor in Pasadena in 2013.

The Hispanic Republicans of Texas noted that Pena's election, along with Rick Galindo of San Antonio, added two GOP Hispanics to the Texas House.

ELECTION NEWS

Faircloth wins by 3,000 votes

Republican Wayne Faircloth beat Democrat Susan Criss to became the first Republican to represent House District 23., which includes Galveston and Chambers counties.

Unofficially, Faircloth edged Criss by 3,000 votes with 17,557 compared to 14,553 votes for Criss.

In Galveston County, Faircloth got 10,699 votes to 13,117 for Criss. In Chambers County, Faircloth received 6,888 to 1,436 for Criss.

Faircloth, 61, is an insurance agent and Criss, 53, a former district judge.

There was no incumbent in the race when longtime Democratic Rep. Craig Eiland chose not to seek re-election.

Faircloth will serve a two-year term.

Dayton ISD voters OK $87.8 mil bond

Dayton ISD voters narrowly approved a $87.8 million bond issue Tuesday.

Unofficially, the bond passed by 96 votes, 2,188 to 2,092.

The bond will finance the construction of two new kindergarten through fifth grade campuses, provide upgrades to Woodrow Wilson Junior High, repurposing existing campuses and district wide safety and security improvements.

Group seeks halt to fracking ban

DENTON, Texas (AP) — A North Texas city that sits atop a natural gas reserve is preparing for an extended court battle after voters made it the first in the state to ban further hydraulic fracturing — a fight that cities nationwide considering similar laws will likely be watching closely.

An energy industry group responded quickly to the measure Denton approved Tuesday, filing a petition Wednesday in district court seeking an injunction to stop it from being enforced.

The ban could have a domino effect in Texas, threatening an "energy renaissance" in shale gas from hydraulic fracturing or fracking, said David Porter, a commissioner on the Texas Railroad Commission, the state's oil and gas regulator.

Scores of cities in other states have considered similar bans over health and environmental concerns. But the proposal in Denton was a litmus test on whether any community in Texas — the nation's biggest oil and gas producer — could rebuff the industry and still thrive.

The Market in Review

Combined Stock Exchange Highlights

NYSE	NASDAQ	S&P 500
10,824.07 +65.99	4,620.72 -2.91	2,023.57 +11.47

Gainers ($2 or more)

Name	Last	Chg	%Chg
Elecsys	17.29	+7.72	+80.7
EKodk wtA	7.68	+2.42	+46.0
Asteaintl h	2.16	+.54	+33.3
Coupons n	16.57	+4.13	+33.2
WrldEnSol	5.46	+1.31	+31.6
YouOnDm	3.12	+.67	+27.3
SinoCoking	3.31	+.66	+24.9
Criteo SA	35.99	+6.44	+21.8
PaycomS n	21.15	+3.42	+19.3
AdeptTech	8.27	+1.27	+18.1

Losers ($2 or more)

Name	Last	Chg	%Chg
ChuysHldg	20.68	-9.49	-31.5
AlbnyMlc	16.59	-6.08	-26.8
Zagg	5.07	-1.72	-25.3
Enphase	12.05	-3.55	-22.8
Zulily n	28.16	-7.80	-21.7
CelldexTh	13.10	-3.48	-21.0
DirGMnBul	3.10	-.80	-20.5
NY&Co	2.61	-.55	-17.4
EmpirRsts	6.87	-1.35	-16.4
LibTripA n	25.21	-4.68	-15.7

Most Active ($1 or more)

Name	Vol(00)	Last	Chg
S&P500ETF	825119	202.34	+1.27
MktVGold	795354	16.59	-.62
BkofAm	570084	17.34	+.13
Alibaba n	457961	108.67	+2.60
iShEMkts	447900	41.47	-.37
Sprint	417702	4.92	-.26
SiriusXM	396924	3.49	+.01
Facebook	348211	74.83	-.93
Apple Inc s	341254	108.86	+.26
Intel	313816	33.76	-.55

Stocks of Local Interest

Name	Div	Yld	PE	Last	Chg	YTD %Chg
AK Steel	...	...	...	6.23	-.11	-24.0
AT&T Inc	1.84	5.3	11	34.92	+.13	-.7
ActivsBliz	.20	1.0	24	20.83	+.88	+16.8
AlcatelLuc	.18	...	...	3.20	+.03	-27.3
Alibaba n	...	...	...	108.67	+2.60	+15.7
Allstate	1.12	1.7	11	65.74	+.85	+20.5
Ambev n	.33	5.0	...	6.55	...	-10.9
AEP	2.00	3.3	16	59.74	+1.61	+27.8
ARltCapPr	1.00	11.5	...	8.71	+.64	-32.2
Apple Inc s	1.88	1.7	17	108.86	+.26	+35.8
Ashland	1.36	1.3	15	106.62	+.93	+9.9
Atmel	...	...	67	7.34	+.02	-6.3
BP PLC	2.40	5.7	6	41.77	+.72	-14.1
BkofAm	.20	1.2	16	17.34	+.13	+11.4
B iPVix rs	...	...	...	30.24	-.38	-28.9
BarrickG	.20	1.8	27	10.97	-.49	-37.8
Boeing	2.92	2.4	18	124.22	-.89	-9.0
CampSp	1.25	2.8	17	44.87	+.41	+3.7
CenterPnt	.95	3.8	19	25.13	+.49	+8.4
Chevron	4.28	3.7	11	117.05	+1.68	-6.3
Cisco	.76	3.0	17	25.15	+.27	+13.0
Citigroup	.04	.1	13	54.02	+.83	+3.7
CocaCola	1.22	2.9	23	42.31	+.49	+2.4
ConAgra	1.00	2.9	44	34.37	+.02	+2.0
ConocoPhil	2.92	4.2	12	69.88	+1.11	-1.1
ConEd	2.52	3.9	15	64.64	+1.26	+16.9
CSVixSht	...	...	...	2.79	-.06	-62.8
CrownHold	...	...	14	48.28	+.87	+8.3
DxGldBull	...	...	...	9.80	-1.24	-64.2
DrxSCBear	...	...	...	13.74	-.06	-19.0
DirGMnBull	...	...	...	3.10	-.80	-80.1
Disney	.86	.9	22	91.00	+.65	+19.1
DowChm	1.48	3.0	16	49.16	+1.58	+10.7
DryShips	.76	52.1	...	1.46	+.08	-68.9
DuPont	1.88	2.7	21	69.81	+1.30	+7.4
DukeEngy	3.18	3.8	27	83.50	+1.27	+21.0
EMC Cp	.46	1.6	24	29.04	+.13	+15.5
EnPro	...	...	56	64.38	+.66	+11.7
EntPrdPt s	1.46	4.0	24	36.71	+.27	+10.7
ExxonMbl	2.76	2.9	12	95.07	+.55	-6.1
Facebook	...	...	71	74.83	-.93	+36.9
FordM	.50	3.6	9	13.94	-.01	-9.7
GenElec	.88	3.4	18	25.82	+.12	-7.9
Groupon	...	...	...	7.62	-.23	-35.3
Hallibrtn	.72	1.4	14	52.37	+1.19	+3.2
HewlettP	.64	1.8	14	36.18	+.28	+29.3
Hilton n	...	...	46	25.04	+.44	+12.5
HomeDp	1.88	2.0	23	95.78	-.18	+16.3
HonwllIntl	2.07	2.1	18	96.71	+1.42	+5.8
iShBrazil	1.55	3.7	...	42.03	-.38	-5.9
iShJapan	.17	1.4	...	11.76	-.06	-3.1
iShEMkts	.71	1.7	...	41.47	-.37	-.8
iShR2K	1.50	1.3	...	116.03	+.21	+.6
Intel	.90	2.7	16	33.76	-.55	+30.1
IBM	4.40	2.7	13	161.82	-.83	-13.7
JohnJn	2.80	2.6	18	108.82	+.20	+18.8
Kinross g	...	...	...	2.00	-.07	-54.3
Kroger	.74	1.3	19	57.51	+.43	+45.5
Level3	...	...	72	46.84	-.41	+41.2
MVJrGold	...	...	...	22.71	-1.80	-26.9
MktVGold	.19	1.1	...	16.59	-.62	-21.5
McDnlds	3.40	3.6	19	94.64	+.17	-2.5
Merck	1.76	3.0	33	59.57	+.20	+19.0
MicronT	...	...	13	33.71	+.34	+55.0
Microsoft	1.24	2.6	19	47.86	+.29	+27.9
MorgStan	.40	1.1	15	34.90	+.24	+11.3
NRG Egy	.56	1.7	...	32.27	+2.33	+12.4
OcciPet	2.88	3.3	12	86.47	+1.15	-9.1
OfficeDpt	...	...	...	6.48	+.15	+22.5
Oracle	.48	1.2	16	39.29	+.16	+2.7
Penney	...	...	...	7.23	-.09	-21.0
PepsiCo	2.62	2.7	22	96.89	+.16	+16.8
Petrobras	.46	4.1	...	11.16	-.16	-19.0
Pfizer	1.04	3.5	15	30.04	+.02	-1.9
PlugPowr h	...	...	...	4.96	-.39	+220.0
PwShs QQQ	1.34	.9	...	101.37	+.01	+15.2
ProctGam	2.57	2.9	24	89.00	+.36	+9.3
Qualcom	1.68	2.2	18	77.20	+.09	+4.0
RegionsFn	.20	2.0	12	10.11	+.10	+2.2
RoyDShllA	3.76	5.4	13	69.23	+.44	-2.9
SpdrDJIA	3.58	2.1	...	174.55	+1.09	+5.5
S&P500ETF	3.68	1.8	...	202.34	+1.27	+9.6
Sapient	...	...	37	24.61	-.05	+41.8
Schlmbrg	1.60	1.7	19	96.64	+2.48	+7.2
SearsHldgs	...	...	...	33.26	-2.57	-16.3
SiriusXM	...	...	50	3.49	+.01	0.0
SouthnCo	2.10	4.4	18	47.96	+1.02	+16.7
SwstAirl	.24	.7	22	36.75	+.32	+95.1
Sprint	...	...	...	4.92	-.26	-54.2
SP Engy	1.77	2.1	...	85.75	+1.48	-3.1
SPDR Fncl	.37	1.5	...	24.10	+.16	+10.2
SP Util	1.48	3.2	...	46.56	+1.03	+22.6
Tenneco	...	...	12	52.69	+1.06	-6.9
3M Co	3.42	2.2	21	155.69	+.64	+11.0
TimeWarn	1.27	1.6	17	77.99	+3.02	+16.6
21stCFoxA	.25	.7	21	34.84	+1.51	-.9
Twitter n	...	...	...	40.37	-.53	-36.6
UnilevNV	1.50	3.9	...	38.51	+.33	-4.3
UPS B	2.68	2.5	23	107.54	+.46	+2.3
USSteel	.20	.6	...	36.36	-.21	+23.3
Vale SA	.84	8.8	...	9.56	+.02	-37.3
VerizonCm	2.20	4.4	11	50.34	+.01	+2.4
WalMart	1.92	2.5	16	77.70	+.44	-1.3
Walgrn	1.35	2.1	33	65.66	+.42	+14.3
WellsFargo	1.40	2.6	13	53.53	+.61	+17.9
Yahoo	...	...	6	47.46	+.38	+17.4
Yamana g	.06	1.7	...	3.47	-.30	-59.7

Beaumont Enterprise
(Published November 6, 7, and 9, 2014)

Affidavit of Publication

Crouch Environmental Services, Inc.
Attn: Connor Stokes
402 Teetshorn St.
Houston, TX 77009

COUNTY OF JEFFERSON TEXAS

Reference: GCCPRD- Public Meeting Notice
Before me, the undersigned authority, on this day personally appeared, Robert Hollier [NAME] who being duly sworn, deposes and says that He [HE/SHE] is an agent of Beaumont Enterprise: that said newspaper is regularly published in Jefferson County and generally circulated in Jefferson County, Texas: that the attached notice was published on the following date.

R. Holl

[BEAUMONT ENTERPRISE REPRESENTATIVE]

Printed: November 6, 7, and 9, 2014

Subscribed and sworn before me this 22nd [DAY] of January [MONTH] 2015 AD

[NOTARY SIGNATURE]

11-15-2017 [NOTARY STAMP]

APRIL L. MCKINNON
Notary Public, State of Texas
My Commission Expires
November 15, 2017

6 injured in Kirbyville school bus crash

18-wheeler hit vehicle carrying 53, but injuries were not life-threatening.

KIRBYVILLE

By Manuella Libardi

Six Kirbyville ISD students were hurt on Wednesday morning when their school bus was struck from behind by an 18-wheeler traveling in the southbound lane of U.S. 96, according to information from the Texas Department of Public Safety.

Trooper Stephanie Davis said 53 children were passengers on the bus, which had stopped at a home about four miles north of Kirbyville to allow a student to board.

Preliminary reports show that the school bus was displaying all of its emergency lights that indicate the bus was stopped, Davis said. The driver of a 2007 Freightliner semi was traveling southbound on US 96 and struck the back left quarter panel of the stopped bus, she said.

The driver of the tractor-trailer tried to veer to the left seconds before the collision, Davis said.

"This is an active crash investigation and DPS troopers are trying to determine all the factors that contributed to this crash," Davis said in a prepared statement. "After a complete investigation, troopers will determine what traffic laws were violated and take appropriate actions."

Five of the injured students were taken to Jasper Memorial Hospital. The other was taken to Christus St. Elizabeth Hospital in Beaumont, according to Davis.

None of the injuries are life-threatening, she said.

The 52-year-old driver of the school bus was shaken up by the crash but was uninjured, Davis said.

The driver of the Freightliner, Robert Watson, 72, of Monroe, Louisiana, was also visibly upset about the crash and was unhurt, Davis said.

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Photo provided by Darry Cillow/KBMT 12 News

Six students where taken to the hospital Wednesday after a school bus and a tractor trailer collided south of Jasper. None of the injuries appear to be life threatening.

Invision

A night in the country

Brad Paisley, left, Steven Tyler, center, and Carrie Underwood perform onstage on Wednesday at the 48th annual CMA Awards at the Bridgestone Arena in Nashville, Tenn.

GCCPRD
The Gulf Coast Community Protection and Recovery District

PUBLIC MEETING NOTICE

The Gulf Coast Community Protection and Recovery District (GCCPRD) will host a series of public scoping meetings in December 2014 to encourage public participation and feedback in the Storm Surge Suppression Study. The GCCPRD is a local government corporation created by Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties, and is leading a technical, scientific-based effort to investigate opportunities to alleviate the vulnerability of the upper Texas coast to storm surge and flooding. This effort is an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a plan that meets the needs of the region and the nation.

Public feedback and participation will be encouraged throughout the duration of the study. Public scoping meetings will be held on the following dates at these locations:

Thursday, December 4, 2014 *6 p.m. to 8 p.m.* *League City Civic Center* *400 West Walker St.* *League City, Texas 77573*	*Tuesday, December 9, 2014* *6 p.m. to 8 p.m.* *Harris County Precinct 2* *J.D. Walker Community Center* *7613 Wade Rd.* *Baytown, Texas 77521*	*Thursday, December 11, 2014* *6 p.m. to 8 p.m.* *Jefferson County Courthouse* *Jury Impaneling Room* *1001 Pearl St.* *Beaumont, Texas 77701*

Materials, presentation, and format will be the same at all three meetings. The open houses will last from 6 p.m. to 8 p.m. Informational displays will be available for public viewing, and GCCPRD representatives will provide information and answer questions. No formal presentation will be made. Informational materials will be available in English and Spanish.

If hearing impaired or language translation services are needed, please contact the GCCPRD consulting team at 713-868-1043 or ***info@gccprd.com*** by November 26, 2014. GCCPRD representatives will make every reasonable effort to accommodate these needs.

Comments will be accepted at the public scoping meetings and throughout the duration of the study. Written comments may be mailed to the ***Gulf Coast Community Protection and Recovery District in care of Col. Christopher Sallese at 3100 West Alabama St., Houston, Texas 77098,*** or emailed to ***info@gccprd.com***.

For more information about GCCPRD and this study, visit ***www.gccprd.com***.

10 BISD students taken to hospital after bus crash

BEAUMONT

By Brooke Crum

Photos by Kim Brent/@kimbpix

A Beaumont ISD school bus rests in a ditch at the intersection of Prince Street and Grand Avenue in Beaumont on Thursday. The accident resulted in minor injuries.

Ten Beaumont ISD students were taken to the hospital following a bus crash in the 3200 block of Grand Avenue, according to a district spokesman.

None of the students suffered major injuries, and two were released, said Ron Reynolds, the spokesman.

A bus carrying 12 students from the Pathways Learning Center ran off the road when the driver made a turn onto Grand Avenue from Prince Street.

The driver became distracted by another vehicle traveling at a fast rate and tried to stop the bus but instead hit the accelerator pedal, Reynolds said.

The driver was cited for failure to control speed, he said.

An ambulance transported four students to the hospital, and a separate bus took the six other students. The bus was taking the students home.

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RECOUNT: 'I'm no sour grapes kind of guy. If I lose the election, I lose the election.'

Continued from page 1A

registration cards but had signed affidavits stating they would provide the proper information.

Sigee had lost the election for tax assessor-collector by 16 votes. A ballot board appointed by the county judge accepted 61 of the provisional ballots and those votes resulted in a net of seven more votes for Sigee, which was still insufficient to change the results of that election, which was won by J. Shane Howard.

Howard later resigned and took a private sector job in West Texas. Sigee ran again this year and lost by 5 percentage points to Allison Nathan Getz, who will serve out the rest of Howard's term.

When Sigee asked for a recount, he had to deposit $11,000 with the county treasurer to cover the cost. He later withdrew the request, but the recount could have cost more if he had proceeded with it.

A recount could involve the electronic touch-screen ballots, paper mail-in ballots, paper ballots cast at a polling place or the provisional ballots, as well as mail-in ballots from overseas.

Wiggins said he thinks the voters who backed him also should have unshakeable evidence that the vote count is correct.

"It's close, but it's not like Shane Howard's 16 votes," Wiggins said.

Williams faces the same dilemma, even though the spread in his race for 172nd District Court is wider.

"There is a lot to consider," Williams said. "We're stepping back to look at the options."

Williams at first thought he had defeated incumbent Democrat Donald Floyd for the state district court bench.

"Between 11:30 p.m. and midnight, an extra 6- or 8,000 votes came in from somewhere," Williams said. "We were told at 10 p.m. that the only boxes still out were Hamshire, Fannett and Sabine Pass. So, we'd won the election."

County Clerk Carolyn Guidry said the electronic touch screen ballots were still being delivered to the Mid-County counting station by 10 p.m. Tuesday.

Problems with the paper ballot reader halted that count of 3,848 votes earlier in the day because the equipment broke down, said Bruce Drury, the counting station manager. A technician from Tyler, more than three hours away by car, had to drive to Beaumont to fix it, he said.

The mail-in ballot count didn't finish until past 11:30 p.m., Drury said.

Then a discrepancy in numbers of electronic ballots caused the entire vote to be recounted. That process wasn't complete until about 4:30 a.m. Wednesday, Drury said.

Williams was attending the Republican vote-watching party at Madison's restaurant on Dowlen Road and did not witness the problems at the counting station.

"You win or you lose. It typically doesn't happen in the same night," he said. "I'm no sour grapes kind of guy. If I lose the election, I lose the election."

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CATTLE BARONS' BALL: ON THE DANCE FLOOR AT FORD PARK

Kim Brent/@kimbpix

Cameron Fontenot and Stephanie Bertrand take a spin on the dance floor at the Cattle Barons' Ball: Cowboys and Angels, an American Cancer Society benefit honoring the Douget Family. The event was held at the Ford Park Stockyard Barn Saturday and featured dinner, dancing, entertainment and a performance by country singer John Anderson. **View a photo gallery at Beaumont Enterprise.com/photos.**

TEXAS GOP: Abbott and Patrick seem closer on policy

Continued from page 1A

an incoming class of tea party Republicans in the Senate band together with Patrick and try to force an ultra-conservative agenda on the decidedly more moderate Straus in the House. Abbott, who falls somewhat more closely to Patrick on matters of ideology, could be cast in the role of peacemaker, should this worst-case scenario come to pass.

"There's a lot of unpredictability here, but it's in no one's interest for it to be a disaster," said GOP strategist Matt Mackowiak. Abbott won't want his first legislative session to be combative, and Patrick will want to quiet critics "who think he's not going to be effective."

Abbott and Patrick were elected Tuesday as part of the statewide GOP sweep, and Straus was easily re-elected.

Abbott and Straus have similar personalities and management styles that appear outwardly calm and measured, political insiders said, while Patrick has proven himself more prone to emotion and occasional political grandstanding, when he wants to make a point.

'Serve as a bridge'

On policy, however, Patrick and Abbott may be closer to alike.

"That could mean that Greg Abbott will serve as a bridge between Patrick and Straus on issues they don't agree on, which has been his style," said Mark Jones, a Rice University political scientist who has been watching Texas' top leaders for years. "But you shouldn't discount that Patrick and Straus will be able to work on common issues together."

In some general respects, several lawmakers and lobbyists said, Texas' new leadership team could take on the dynamics that existed when principled consensus-builder George W. Bush was governor, strong-willed Bob Bullock was lieutenant governor and pragmatic veteran insider Pete Laney was House speaker during the 1990s. Bush was a Republican and Bullock and Laney were Democrats. All three considered themselves conservative.

Taxes to handguns

Political affiliations aside, Abbott and Patrick will be wanting to deliver on their campaign promises, "and that could complicate the scenario," Mackowiak said.

Look for tightening the state budget and cutting taxes to be the top issues, most lawmakers and political observers said, and for the Senate to lead the charge for tighter fiscal policies — Patrick's campaign mantra and a goal of tea party conservatives who were among his biggest supporters.

Count on border security to be ramped up, they said, but perhaps not a push by the top leaders to toughen immigration enforcement and abortion laws, though there will probably be controversial bills filed by some Republicans to do just that.

Add to that mix legislation that would allow handguns to be carried openly, would permit concealed weapons on college and university campuses, and would prohibit so-called "sanctuary cities" that don't enforce immigration laws, among others.

"It will be expected that Sen. Patrick will bring a lot of visceral legislation and wedge issues to the forefront," said San Antonio state Rep. Trey Martinez Fischer, a top House Democrat and chairman of the Mexican-American Legislative Caucus. "We have a budget and some very serious agencies under regulatory review. It doesn't make good sense when you start mixing in toxic and divisive legislation while trying to conduct that business. If (the Republicans) want to have a wedge war, we can have that war, but we're going to do it after we get the people's work done."

Democratic chairs?

In the Senate, where conservative Republicans hold their largest majority ever, state Sen. Eddie Lucio, a Brownsville Democrat, said he is looking for Patrick to be inclusive in assembling his leadership team.

Translate that as having some Democrats as committee chairs, perhaps including himself, since he voted with Republicans on a controversial bill in 2013 that restricted abortions.

If Patrick chooses Democrats as committee chairs, as he has hinted he might do, after backing away from comments during the GOP primary that he might name only Republicans, most senators expect the candidate list to include Lucio, state Sen. Juan Hinojosa, a McAllen Democrat who already chairs the Senate Intergovernmental Relations Committee, and Sen. John Whitmire, a Houston Democrat who is the chamber's longest-serving member and who helped Patrick establish the state's first seminary in a state prison.

"He has an opportunity to be revered for the long term and possibly be elected governor some day," Lucio said of Patrick.

That said, Lucio noted he's "hoping we can have that kind of leadership that allows us to do our best work for people of the state. But that can't happen if you go in there with a machete or a hacksaw," a reference to consolidating committees or removing Democratic chairs.

No hope seen

Jeff Crosby, a Democratic consultant, is among those who expect trouble.

"There's going to be a wave of all the worst Republican ideas in legislation, all the most extreme and radical stuff they're going to throw out there," he said. "Any whacked out thing they felt they couldn't get done last session they'll try again and get farther this time.

"There's no hope in my mind for them fixing anything," he said. "My hope is they kick the can down the road a little bit."

As Abbott, Patrick and Straus in recent days have pledged to work together on passing legislation that will move Texas forward, so have conservative and tea party groups pledged to remain actively involved to make sure the people they helped elect do what they want them to do.

"We're going to be watching very closely and will have a very, very active lobbying effort that will be real and substantial," said George Rodriguez of San Antonio, the South Texas coordinator for the Tea Party Patriots. "We hope to set the agenda, because we know how people forget what they promised once they get into office."

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Tea party sees GOP rise as a new threat

By New York Times News Service

As most Republicans were taking a victory lap the morning after the elections, a group of conservatives huddled anxiously in a conference room not far from Capitol Hill and agreed that now is the time for confrontation, not compromise and conciliation.

Despite Republicans' ascension to control of the U.S. Senate and an expanded House majority, many conservatives from the party's activist wing fear that congressional leaders are already being too timid with President Barack Obama.

They do not want to hear that government shutdowns are off the table or that repealing the Affordable Care Act is impossible — two things Republican leaders have said in recent days.

"If the new Republican leadership in the Senate is only talking about what they can't do, that's going to be very demoralizing," said Thomas J. Fitton, president of Judicial Watch, a conservative advocacy group that convenes a regular gathering called Groundswell.

Any sense of triumph at its meeting last week was fleeting.

"I think the members of the leadership need to decide what they're willing to shut down the government over," Fitton said.

Establishment Republicans, who had vowed to thwart the tea party, succeeded in electing new lawmakers who are, for the most part, less rebellious. And when the new Congress convenes in January, the Republican leaders who will take the reins will be mainly in the mold of conservatives who have tried to keep the tea party in check. But they have not crushed the movement's spirit.

As Republicans on Capitol Hill transition from being the opposition party to being one that has to show it can govern, a powerful tension is emerging: how to move forward with an agenda that challenges the president without self-destructing.

Some conservatives believe that the threat of another shutdown is their strongest leverage to demand concessions on the health care law and to stop the president from carrying out immigration reform through executive order. Yet their leadership has dismissed the idea as a suicide mission that could squander the recent gains.

One thing that will prove popular among the base is Sen. Mitch McConnell's commitment to bring up a bill that would ban abortions after 20 weeks of pregnancy, which he is expected to do next year.

Whether the party can reconcile more demands of its base with the will of its leadership could determine how enduring the Republican Senate majority will be. The crop of senators up for re-election in 2016 includes those elected in the first tea party wave of 2010. And in a sign of what is at stake, even some of them are sounding notes of compromise and caution that would have been unthinkable at the height of the right's resurgence.

"I understand the frustrations of the conservative base; I am one of them," said Sen. Ron Johnson, R-Wis., one of the original class of tea party-inspired senators. "I also recognize reality.

"We're not going to pass the entire conservative agenda tomorrow. We can certainly lay it out," Johnson added. "Let's start with the things we can pass. Doesn't that make more sense?"

But in a stark reminder of the difficulties Republican leaders will face from within their own ranks, other lawmakers popular with the tea party base are saying the fight is on.

Galveston County Daily News
(Published November 6, 2014)

A F F I D A V I T

Attachment

County of Galveston §
§
State of Texas §

Before me, the undersigned authority, on this day personally came and appeared **Kristi Quigley**, to me well known(or proved to me on the basis of satisfactory evidence), and who after being duly sworn (affirmed) did depose and say that she/he is an **AGENT** for **THE GALVESTON COUNTY DAILY NEWS**, a newspaper of general circulation, which has been continuously and regularly published for a period of not less than one year, in the County of Galveston, and that the **NOTICE**, a copy of which is hereto attached was published in said newspaper on the following day to wit:

January 20, 2015

Kristi Quigley
Agent Signature

Sworn and subscribed before me

On this the 20th day of January, 2015.

Melanie P

Notary for the State of Texas

LOCAL

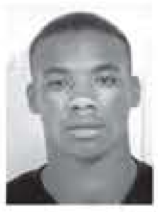
20-year-old Hitchcock man found dead in Galveston

By ERIN HEFFERNAN
The Daily News

» GALVESTON
Police found a body Wednesday under the Charles B. Smith viaduct at 51st and Postoffice streets.

The body has been identified as that of Hitchcock resident, Brandon Stelly, 20, police said. Stelly had been reported missing Monday.

Members of Stelly's family called police about 9:30 a.m. Wednesday to report they had found Stelly's Texas driver's license beneath the viaduct. Officers found the body that morning in a small pool of water just north of the roadway, police said.


Brandon Stelly, 20, of Hitchcock

Major crimes detectives and Galveston crime scene investigators began processing the scene immediately and interviewed Stelly's friends and relatives.

Investigators learned officers had gone to Stelly's residence Saturday morning in response to claims from his mother that Stelly was intoxicated on the drug PCP and causing a disturbance in the home, police reported.

Investigators also spoke with a woman they identified as Stelly's girlfriend, who told police she was with Stelly in a vehicle Saturday night. She said he was still high on PCP and the two got in an argument that escalated into physical violence, police said.

Police said they believed that at some point Stelly got out of the vehicle on Postoffice Street. Witnesses reported seeing the vehicle moving down Postoffice Street with Stelly clinging to the hood, according to police officials.

Stelly's girlfriend told police that Stelly got off the hood and began walking off the roadway toward the bridge, and Stelly's girlfriend sustained minor injuries during the altercation, police said.

No charges had been filed Wednesday, but police said the investigation is ongoing. The cause of death was still unknown Wednesday, and investigators were awaiting the results of an autopsy to determine the direction of the investigation.

Contact reporter Erin Heffernan at 409-683-5237 or erin.heffernan@galvnews.com.

Driver under influence hit two Galveston police cars

By ERIN HEFFERNAN
The Daily News

A driver smashed into two Galveston police cars Tuesday night causing major damage, police reported

The officers were parked at 51st Street and Broadway about 7:35 p.m. Tuesday responding to a major traffic accident and were using the two police vehicles to block both the left and middle lanes, police said.


Raymond Oakley, 66, of Dickinson

As the officers investigated the incident, however, another driver added to the wreckage significantly.

Police reported that a red 1992 BMW came whipping down the street traveling east on Broadway. It almost hit an officer directing traffic before it swerved, heading directly for the accident — and the two cop cars, police said.

Police say the BMW struck one police car, which was propelled down the street and crashed into the second police vehicle.

No one was injured, but both police cars sustained significant damage, police said.

Raymond Oakley, 66, of Dickinson was detained by police after emergency medical workers determined he had not been injured in the crash, police said.

Police officers reported finding several prescription narcotics not belonging to Oakley while searching his vehicle.

Oakley was charged with driving under the influence, two counts of possession of a dangerous drug and driving with an invalid license, police said.

He was being held on $25,000 in bonds, according to the law enforcement sources.

Contact reporter Erin Heffernan at 409-683-5237 or erin.heffernan@galvnews.com.

Wounded service members to arrive in Kemah, League City today

Ride kicks off annual Salute to Military Service weekend

By T.J. AULDS
The Daily News

» KEMAH
The American Legion riders from Post 554 braved the rain Wednesday as they traveled from League City to Brooke Army Medical Center in San Antonio.

Coming Friday
Read more about the Salute to Military Service weekend and see photos from the escort ride in Friday's edition of The Daily News.

The 30-plus motorcycle riders will return today with a special package following. The Legion riders will escort 30 wounded soldiers and their families to Galveston County for a weekend of fun, relaxation and music.

The soldiers and their families are the guests of the fifth Salute to Military Service weekend. They will be treated to a meal at the American Legion Hall on state Highway 3 tonight and a weekend of activities at the Kemah Boardwalk and the Pleasure Pier in Galveston.

Martinas Smith, the public information officer for the Legion riders, said her group should arrive back in the county at about 2:30 p.m. today.

Riders will come by Interstate 45 to NASA Parkway to state Highway 146 and then parade through Kemah before taking a tour through League City along state Highway 3.

Those wanting to salute the wounded soldiers and their families are asked to line up along the route between 2:30 and 3 p.m. with American flags and signs of encouragement, Smith said.

Each year thousands of people line the roads for the ride escort.

Contact Mainland Editor T.J. Aulds at 409-683-5334 or tj@galvnews.com.

LIBRARY EVENTS

» **TEXAS CITY**
Moore Memorial Public Library will offer **free computer classes** at 10 a.m. in the meeting room of the library, 1701 Ninth Ave. N.

All potential students must come to the library between 9 a.m. and 9:30 a.m. on the day of the class for pre-class screening. First-come, first-served.

The following classes will be offered:
- Social Networking — today;
- Intermediate Excel — Friday;
- Under-the-Radar Resources — Nov. 13;
- Intermediate Email — Nov. 14;
- Online Search Strategies — Nov. 20; and
- Security and Privacy — Nov. 21.

Call 409-643-5977.

» **SANTA FE**
The Junkfood and Journaling Club for ages 9 and older at the **Mae S. Bruce Library** will meet from 6 p.m. to 7:30 p.m. today at 13302 Sixth St.

Participants will learn writing and journaling techniques.

Visit www.maebrucelibrary.org or call 409-925-5540.

» **LA MARQUE**
The **La Marque Public Library** will have **story time for children** from 10 a.m. to 11 a.m. Friday and Nov. 21 at 1011 Bayou Road.

Attendees can RSVP by emailing Margaret Little, m.little@ci.la-marque.tx.us.

Call 409-938-9270.

» **TEXAS CITY**
Moore Memorial Public Library's Teen Advisory Board will meet at 4 p.m. Friday at 1701 Ninth Ave. N.

Teens can earn leadership hours while giving ideas for making the library a better place, doing fun projects, meeting new people, and having snacks.

The program is for ages 12-18.

Call 409-949-3308.

» **LA MARQUE**
The **La Marque Public Library** is offering patrons to learn **All About eBooks**

See library | A6

GCCPRD The Gulf Coast Community Protection and Recovery District

PUBLIC MEETING NOTICE

The Gulf Coast Community Protection and Recovery District (GCCPRD) will host a series of public scoping meetings in December 2014 to encourage public participation and feedback in the Storm Surge Suppression Study. The GCCPRD is a local government corporation created by Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties, and is leading a technical, scientific-based effort to investigate opportunities to alleviate the vulnerability of the upper Texas coast to storm surge and flooding. This effort is an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a plan that meets the needs of the region and the nation.

Public feedback and participation will be encouraged throughout the duration of the study. Public scoping meetings will be held on the following dates at these locations:

Thursday, December 4, 2014 *6 p.m. to 8 p.m.* *League City Civic Center* *400 West Walker St.* *League City, Texas 77573*	*Tuesday, December 9, 2014* *6 p.m. to 8 p.m.* *Harris County Precinct 2* *J.D. Walker Community Center* *7613 Wade Rd.* *Baytown, Texas 77521*	*Thursday, December 11, 2014* *6 p.m. to 8 p.m.* *Jefferson County Courthouse* *Jury Impaneling Room* *1001 Pearl St.* *Beaumont, Texas 77701*

Materials, presentation, and format will be the same at all three meetings. The open houses will last from 6 p.m. to 8 p.m. Informational displays will be available for public viewing, and GCCPRD representatives will provide information and answer questions. No formal presentation will be made. Informational materials will be available in English and Spanish.

If hearing impaired or language translation services are needed, please contact the GCCPRD consulting team at 713-868-1043 or ***info@gccprd.com*** by November 26, 2014. GCCPRD representatives will make every reasonable effort to accommodate these needs.

Comments will be accepted at the public scoping meetings and throughout the duration of the study. Written comments may be mailed to the ***Gulf Coast Community Protection and Recovery District in care of Col. Christopher Sallese at 3100 West Alabama St., Houston, Texas 77098***, or emailed to ***info@gccprd.com***.

For more information about GCCPRD and this study, visit ***www.gccprd.com***.

Houston Chronicle (Published November 6, 2014)

AFFIDAVIT OF PUBLICATION

STATE OF TEXAS:

COUNTY OF HARRIS:

Before me, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared, the Newspaper Representative at the HOUSTON CHRONICLE, a daily newspaper published in Harris County, Texas, and generally circulated in the Counties of: HARRIS, TRINITY, WALKER, GRIMES, POLK, SAN JACINTO, WASHINGTON, MONTGOMERY, LIBERTY, AUSTIN, WALLER, CHAMBERS, COLORADO, BRAZORIA, FORT BEND, GALVESTON, WHARTON, JACKSON, and MATAGORDA and that the publication, of which the annexed herein, or attached to, is a true and correct copy, was published to-wit:

CROUCH ENVIRONMENTAL SERVICE 26156725 10446225
RAN A LEGAL NOTICE
SIZE BEING: 1 X 114 L

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NEWSPAPER REPRESENTATIVE

Sworn and subscribed to before me, this the 6th Day of November A.D. 2014

VERONICA M TYRONE
NOTARY PUBLIC
STATE OF TEXAS
EXPIRES
FEB. 10, 2016

Notary Public in and for the State of Texas

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1001 Pearl St.
Beaumont, Texas 77701

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For more information about GCCPRD and this study, visit **www.gccprd.com**

Legal Notices

To place legal notices
email legals@chron.com or call 713.224.6868.

LEGAL NOTICES

USE NUMBER:
4-21574
THE 80TH JUDICIAL
TRICT COURT OF
RRIS COUNTY, TEXAS
intiff: HSBC CREDIT
NTER INC.

fendant: JOSE M. TIJE-
IA; ROSA G. TIJERINA;
ROLYN G. TIJERINA;
E EMANUEL TIJERINA
A JOSE EMANUEL TIJE-
A JR); THE UNKNOWN
IRS-AT-LAW OF JOSE M.
ERINA and THE UN-
OWN DEVISEES UNDER
WILL OF JOSE M. TIJE-
IA
ATION BY
BLICATION
E STATE OF TEXAS
unty of Harris
OTICE TO DEFENDANT:
You have been sued. You may employ an attorney. If you or your attorney do not file a written answer with the clerk who issued this citation by 10:00 a.m. on the Monday next following the expiration of forty-two days after the date of issuance of this citation and petition, a default judgment may be taken against you."
To: THE UNKNOWN HEIRS-AT-LAW OF JOSE M. TIJERINA; THE UNKNOWN DEVISEES UNDER A WILL OF JOSE M. TIJERINA (DECEASED)
YOU ARE HEREBY COMMANDED to be and appear before the 80TH Judicial District court of Harris county, Texas in the Courthouse in the city of Houston, Texas at or before 10:00 o'clock A.M. Monday the 1st day of DECEMBER, 2014, being the Monday next after the expiration date of forty-two days after this citation is issued, and you are hereby commanded and required then and there to appear and file written answer to the PLAINTIFF'S FIRST AMENDED ORIGINAL PETITION filed in said Court on the 15th day of SEPTEMBER, 2014 in a suit numbered 2014-21574 on the docket of said court, wherein HSBC CREDIT CENTER, INC., Plaintiff and JOSE M. TIJERINA; ROSA G. TIJERINA; CAROLYN G. TIJERINA; JOSE EMANUEL TIJERINA (AKA JOSE EMANUEL TIJERINA JR); THE UNKNOWN HEIRS-AT-LAW OF JOSE M. TIJERINA and THE UNKNOWN DEVISEES UNDER A WILL OF JOSE M. TIJERINA, , Defendant(s), the nature of plaintiff's demand being and the said petition alleging:
Foreclosure of Deed of Trust Lien on the following described real property of which Defendants, Rosa G. Tijerina, Carolyn G. Tijerina, Jose Emanuel Tijerina, aka Jose Emanuel Tijerina, Jr., The Unknown Heirs-at-Law of Jose M. Tijerina and the Unknown Devisees under a will of Jose M. Tijerina, Deceased, are the owners:
LOT NINE (9) AND TEN (10), IN BLOCK SEVENTY-TWO (72) OF MANCHESTER ADDITION, AN ADDITION IN HARRIS COUNTY, TEXAS, ACCORDING TO THE MAP OR PLAT THEREOF RECORDED IN VOLUME 6, PAGE 26 OF THE MAP RECORDS OF HARRIS COUNTY, TEXAS which has the address of 9227 E. Avenue O, Houston, TX 77012.
Notice hereof shall be given by publishing this Citation once a week for four consecutive weeks previous to the 25th day of NOVEMBER, 2014 in some newspaper published in the County of HARRIS, if there be a newspaper published therein, but if not then the nearest county where a newspaper is published, and this Citation shall be returned on the 25th day of NOVEMBER, 2014, which is forty-two days after the date it is issued, and the first publication shall be at least twenty-eight days before said return day.
HEREIN FAIL NOT, but have before said court on said return day this Writ with your return thereon, showing how you have executed same.
WITNESS: CHRIS DANIEL, District Clerk, Harris County, Texas.
GIVEN UNDER MY HAND AND SEAL OF SAID COURT at Houston, texas this 14th day of October, 2014.
(SEAL)
CHRIS DANIEL
District Clerk
Harris County, Texas
201 CAROLINE
Houston, Texas 77002
P.O. box 4651
Houston, Texas 77210
By: /s/ Adiliani Solis
Deputy District Clerk
Newspaper:
HOUSTON CHRONICLE
Issued at the request of:
JEFFREY B. HARDAWAY
Address: 650 N. SAM HOUSTON PKWY EAST #450
HOUSTON, TEXAS 77060
Bar Number: 24038254

IF YOU ARE OR WERE A PATIENT OF DR. NICHOLAS J. STEPHANOU:
We would like to inform you that DR. NICHOLAS J. STEPHANOU will merge his practice with Legacy Community Health Services on Monday, November 17, 2014. If you would like to pick up copies of your medical records, please contact Legacy Community Health Services at 832-548-5400 by Friday, January 16, 2015 to make arrangements to do so. The records will be avail¬able free of charge. After Friday, January 16, 2015, the records will be securely stored to protect your confidential information.
If you have questions, please contact Legacy Community Health Services Medical Records at 832-548-5400.

LEGAL NOTICES

CAUSE NUMBER:
2014-53421
IN THE 157TH JUDICIAL
DISTRICT COURT OF
HARRIS COUNTY, TEXAS
Plaintiff: BLACK FOREST
HOLDINGS, INC.
vs.
Defendant: ALBERT
JOHNSON YOUNG AND
EDITH DORA YOUNG
CITATION BY
PUBLICATION
THE STATE OF TEXAS
County of Harris
NOTICE TO DEFENDAN
"You have been sued. Yo may employ an attorne If you or your attorney d not file a written answ with the clerk who issue this citation by 10:00 a.m on the Monday next fo lowing the expiration forty-two days after th date of issuance of th citation and petition, default judgment may b taken against you."
To: ALBERT JOHNSO YOUNG AND EDITH DOR YOUNG; Whose addre and whereabouts are u known
YOU ARE HEREBY CO MANDED to be and a pear before the 157TH J dicial District court Harris county, Texas the Courthouse in the ci of Houston, Texas at before 10:00 o'clock A. Monday the 8th day of D CEMBER, 2014, being th Monday next after the e piration date of forty-tw days after this citation issued, and you a hereby commanded a required then and the to appear and file writt answer to the PLAI TIFF'S ORIGINAL PETITIO FOR DECLARATORY R LIEF patition, filed in sa Court on the 18th day SEPTEMBER, 2014 in a su numbered 2014-53421 the docket of said cou wherein BLACK FORES HOLDINGS, INC. Plai tiff(s) and ALBE JOHNSON YOUNG A EDITH NDORA YOUNG, D fendant(s), the nature plaintiff's demand bei and the said petition legings
this is an action to dete mine title to real proper described as Lot 754 Co tage Grove, Houston, Ha ris County, Texas. Plaint received a deed to th property in 2003, but di covered that there is gap in the chain of tit because there was deed of record from predecessor in reco title.
Notice hereof shall given by publishing th Citation once a week f four consecutive wee previous to the 1st day DECEMBER, 2014, in som newspaper published the County of HARRIS, there be a newspap published therein, but not then the neare county where a newsp per is published, and th Citation shall be return on the 1st day of DECE BER, 2014, which is fort two days after the date is issued, and the fir publication shall be least twenty-eight da before said return day.
HEREIN FAIL NOT, b have before said court said return day this W with your return there showing how you ha executed same.
WITNESS: CHRIS DANI , District Clerk, Har County, Texas.
GIVEN UNDER MY HAND AND SEAL OF SAID COURT at Houston, texas this 20th day of October, 2014.
(SEAL)
CHRIS DANIEL
District Clerk
Harris County, Texas
201 CAROLINE
Houston, Texas 77002
P.O. box 4651
Houston, Texas 77210
By: /s/ M. Cox
Deputy District Clerk
Newspaper:
HOUSTON CHRONICLE
Issued at the request of:
JERRY L. SCHUTZA
Address: 11 GREENWAY PLAZA, SUITE 2820
HOUSTON, TX 77046
Bar Number: 17853800

NOTICE OF ADOPTION OF ORDER ESTABLISHING POLICY AND RATES FOR WATER AND SEWER SERVICE AND IMPOSITION OF PENALTIES

TO THE RESIDENTS AND TAXPAYERS OF HARRIS COUNTY MUNICIPAL UTILITY DISTRICT NO. 157 AND TO ALL OTHER INTERESTED PERSONS:

NOTICE IS HEREBY GIVEN that the Board of Directors of Harris County Municipal Utility District No. 157 (hereinafter called "District"), at a meeting held on October 28, 2014, adopted an order establishing policy and rates for water and sewer service and establishing penalties for violation of the policy and rules.

The District's order was adopted for the purpose of establishing rules and regulations for connection to the District's system and to establish policy and rates for water and sewer service.

Pursuant to the authority granted by § 49.004 and § 54.205, Texas Water Code, as amended, the District has levied reasonable penalties for the breach of any requirement or rule, which penalties shall not exceed the jurisdiction of a justice court as provided in § 27.031, Texas Gov't Code, currently, up to $10,000.00. Such penalties shall be in addition to any other penalties provided by the laws of the State of Texas. Further, in any suit to enforce its rules, the District shall seek to recover reasonable fees for attorneys, expert witnesses and other costs incurred by the District before the court.

A full copy of the order is on file at 2727 Allen Parkway, Suite 1100, Houston, Texas 77019.

The order and rules will be in full force and effect from and after five (5) days after the date of publication of this notice.

TIMOTHY H. BAYLES
President

ATTEST:

FONDA L. HOLDEN
Secretary

LEGAL NOTICES

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For more information about GCCPRD and this study, visit **www.gccprd.com**

Notice of availability of annual return pursuant to section 4947(a)(1) of the Internal Revenue Code . Notice is hereby given that the annual return for the year ending December 31, 2013 of the Clifton F. Mountain Foundation, a private foundation, is available at the principal office of the foundation at 2028 Albans Road, Houston TX 77005 for inspection during regular business hours by any citizen who requests inspection within 180 days after the publication of this notice. Telephone number for the office is 713-529-2009. The principal manager of the foundation is Kay E. Hermes.

All Zones Auto Storage
8310 E. Hardy Rd.
Houston, TX 77093
713-429-5159
VSF 0606524vsf
2012 GMC VIN #1GDT72B A8C1902566. Towed from 5700 Harvy Wilson
1997 TOYOTA TACOMA VIN #4TAN642NXVZ24 89-01. Towed from 5720 Harvy Wilson
2011 GMC VIN #1GDY72BA XB1903460. Towed from 5700 Harvy Wilson
will be sold if not claimed

BUSINESS

NRG forecasts sunny skies for its home solar business

By Robert Grattan

A mild summer cooled third-quarter profit for power generator NRG Energy, which nonetheless is counting on the sun to heat up its developing solar business.

NRG, with headquarters in Houston and near Princeton, N.J., said its net income rose to $168 million in the third quarter from $119 million in the same period of 2013. The company said its retail electric businesses drove the increase but that summer demand wasn't high enough to boost prices for the power it generates.

Potential benefits seen

Perhaps the most encouraging prospect, executives said during a conference call with analysts, is NRG's push into the home solar market.

The sector so far has been a money-loser: NRG projects its home solar business will lower 2014's earnings by $50 million and 2015's by $100 million.

But NRG officials said that kind of shortfall is normal at this stage in the development of a new business and asked investors to look past the negative cash flow. Instead, they stressed the potential benefits of bolting mini-power generators on customers' roofs.

"Our home solar business is going to be about so much more than just solar panels on the roof," CEO David Crane said during the conference call, "and we consider that one of our greatest advantages."

NRG said it will provide more detail about the business at a meeting with analysts in January, but executives suggested that home solar would be a core interest in the future.

"We are dual focused both on winning the short- to medium-term future of our business based on the current 20th century conventional grid-based paradigm, while also preparing to win the medium- to long-term future of our industry as its 21st century paradigm takes shape," Crane said.

10,000 installations

The company expects by year-end to have more than 10,000 solar installations in place representing 70 megawatts of capacity. By the end of 2015, it hopes to quadruple that with as many as 40,000 installations.

Those growth figures are reasonable, said Toby Shea, an analyst and vice president with Moody's Investors Service. Shea estimated that NRG's home solar business could register positive earnings in fewer than five years.

The summer of 2014 set the company's wholesale business back enough that it revised its projected full-year earnings downward by $200 million, to a range of $3.1 billion-$3.2 billion.

"Under these weather circumstances, I think, our financial results were as good as could be expected," Crane said.

Crane noted that despite the lower 2014 earnings forecast, the company will set its 2015 projections at $3.2 billion to $3.4 billion, based on what he described as encouraging prospects for growth.

Galveston County plant

NRG accompanied its earnings report with an announcement that it has begun building a $150 million natural gas-fired generation plant in Galveston County. The plant will have the capacity to power 72,000 homes at peak demand.

Shares of NRG Energy rose $2.33 to $32.27 in trading Wednesday on the New York Mercantile Exchange.

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Stocks gain as price of crude rebounds

By Steve Rothwell
ASSOCIATED PRESS

Matt Rourke / Associated Press file

Automotive service students work on a car at a college in Philadelphia. The U.S. added 230,000 jobs in October, payroll processor ADP reports.

NEW YORK — Stocks returned to record levels on Wednesday as a rebound in oil prices boosted energy stocks. The stock market also gained after the completion of midterm elections that saw Republicans take control of the Senate.

The direction of the stock market has been dictated by swings in the price of oil this week. Energy stocks plunged on Monday and Tuesday amid reports that Saudi Arabia was cutting prices for U.S.-bound crude. On Wednesday, oil rebounded after a smaller-than-expected increase in overall U.S. supplies.

The stock market has returned to record levels after a sharp slump last month.

The S&P 500 rose 11.47 points to 2,023.57. That surpassed the previous record of 2,018.05 set on Friday. The Dow Jones industrial average gained 100.69 points to 17,484.53. The index is also at an all-time high. The Nasdaq composite fell 2 points to 4,620.72.

Investors also assessed the impact of the elections. America awoke Wednesday to sharper dividing lines in an already divided government. Republicans gained control of the Senate and strengthened their hold on the House.

Many analysts pointed out though that a divided government isn't necessarily negative for the stock market.

Evaluating data going back to 1946, analysts at S&P Capital IQ found that the stock market had its best returns when a Democratic president was opposed by a unified Republican Congress. In the eight years when that combination was in place, the S&P 500 index gained an average of 15.1 percent.

Investors also received some encouraging news Wednesday on hiring. U.S. companies added 230,000 jobs in October, payroll processer ADP said.

IN BRIEF

RUSSIA

Record low value for ruble

Andrey Rudakov / Bloomberg

A customer counts out rubles for payment at a McDonald's in Moscow. The currency is losing value.

MOSCOW — Russia's ruble hit an all-time low on Wednesday after the country's central bank said it would dial back its support for the currency in international markets.

The announcement is a step toward freely floating the currency, which the central bank tries to support in foreign exchange markets.

As confidence in the Russian economy wanes, supporting the ruble is increasingly difficult — and expensive. The ruble has lost more than 25 percent this year amid concern over economic sanctions from the U.S. and the European Union as well as a fall in the price of oil and natural gas exports.

The ruble fell 3 percent to 44.9 to the dollar on Wednesday in Moscow.

SPACE TOURISM

Company says test flights could restart next year

ALBUQUERQUE, N.M. — The head of the space tourism company that suffered a tragic setback when its experimental rocket ship broke apart over the California desert says test flights could resume as early as next summer.

Virgin Galactic CEO George Whitesides said Wednesday that work is underway to finish a second spacecraft.

It will replace the first SpaceShipTwo, which was destroyed last week when it disintegrated during a test flight, killing one pilot and seriously injuring another.

SAMSUNG

Heir apparent's leadership skills still a mystery

SEOUL, South Korea — As Samsung's smartphone business suffers a decline, another issue is vexing investors.

Command of one of the world's most valuable consumer brands will eventually pass to the son of its ailing patriarch whose business abilities remain a mystery despite being elevated two years ago to a top role.

The chairman of the flagship company, Samsung Electronics Co., suffered a heart attack in May. Lee Kun-hee, 72, remains hospitalized and has never publicly named his only son, Lee Jae-yong, 46, as heir apparent. But in South Korea, where Samsung's annual sales equal a quarter of the economy, there is little doubt he'll be the third generation of the Lee family to head the business. Samsung's smartphone business began declining this year, undermined by lukewarm sales of the Galaxy S5 smartphone and cheaper Chinese brands.

Lee Jae-yong

ELECTRIC CARS

Tesla's deliveries increase, though its losses grow

Electric car maker Tesla Motors set a record for deliveries of its Model S sedan in the third quarter, delighting investors even as its losses doubled from a year ago.

Tesla said it delivered 7,785 cars during the July-September period. But its net loss grew to $74.7 million for the quarter.

JAPAN

Decline in yen helps bump up Toyota's profit

TOKYO — Toyota reported a surge in its quarterly profit Wednesday and issued a more optimistic outlook for the year.

Toyota had a net profit in the three months through September of $4.2 billion, a 23 percent gain. It has been among the biggest beneficiaries of a sharp decline in the value of Japan's yen.

AUTOMAKERS

Chrysler posts 32 percent rise in earnings

DETROIT — Chrysler reported a 32 percent increase in net income to $611 million in its third quarter, as the U.S. arm of Fiat Chrysler benefited from surging sales of its SUVs and pickups.

From wire reports

La Voz (Published November 9, 2014)

AFFIDAVIT OF PUBLICATION

STATE OF TEXAS:

COUNTY OF HARRIS:

Before me, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared, the Newspaper Representative at the HOUSTON CHRONICLE, a daily newspaper published in Harris County, Texas, and generally circulated in the Counties of: HARRIS, TRINITY, WALKER, GRIMES, POLK, SAN JACINTO, WASHINGTON, MONTGOMERY, LIBERTY, AUSTIN, WALLER, CHAMBERS, COLORADO, BRAZORIA, FORT BEND, GALVESTON, WHARTON, JACKSON, and MATAGORDA and that the publication, of which the annexed herein, or attached to, is a true and correct copy, was published to-wit:

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Edward Silva

NEWSPAPER REPRESENTATIVE

Sworn and subscribed to before me, this the 9th Day of November A.D. 2014

LESLIE GONZALES NOTARY PUBLIC STATE OF TEXAS EXPIRES APRIL 3, 2016

Leslie Gonzales

Notary Public in and for the State of Texas

AVISO PUBLICO

Por favor, únase a nosotros para una reunión pública de exploración y/o detección de necesidades.

The Gulf Coast Community Protection and Recovery District (El Distrito de Protección y Recuperación de la Comunidad de la Costa del Golfo GCCPRD-) será el anfitrión de una serie de reuniones públicas de exploración en el mes de diciembre de 2014, para fomentar la participación y la retroalimentación pública en el Estudio de Protección contra Marejadas provocadas por Tormentas.

Después de tres huracanes de gran intensidad, el último de los cuales (el huracán Ike) fue el más costoso en la historia de Texas, el Gobernador Perry emitió un Decreto Ejecutivo para crear la Governor's Commission for Disaster Recovery and Renewal (Comisión del Gobernador para la Recuperación y Renovación de Desastres). Una de las recomendaciones de la Comisión fue la de realizar un estudio para determinar cómo pueden reducir las comunidades costeras el impacto de los daños de futuras tormentas. Junto con esa recomendación, los condados de Brazoria, Chambers, Galveston, Harris, Jefferson y Orange formaron el GCCPRD como una corporación del gobierno local. El GCCPRD está dirigiendo el Storm Surge Suppression Study (Estudio de Supresión de Marejadas provocadas por las Tormentas), un esfuerzo técnico, con base científica, para investigar las oportunidades para mitigar la vulnerabilidad de la costa superior de Texas a las marejadas y a las inundaciones provocadas por tormentas.

El estudio es financiado por la Texas General Land Office (Oficina General de Tierras de Texas) a través de una Subvención Federal del Housing and Urban Development, Community Development Block (Bloque de Desarrollo de la Comunidad, del Desarrollo de Vivienda y Urbano), de $3.9 millones, que fue otorgado en el mes de septiembre de 2013. Desde entonces, el GCCPRD ha estado acumulando y analizando los datos existentes, y colaborando con otras organizaciones y universidades que realizan un trabajo similar. El Estudio de Supresión de Marejadas provocadas por las Tormentas producirá un sistema de alternativas que pueden consistir en una variedad de métodos naturales, estructurales y no estructurales. Usando estos hallazgos, el GCCPRD recomendará un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada para ayudar a proteger la región de los seis condados. Este esfuerzo es una oportunidad para que el GCCPRD asuma un papel de liderazgo y trabaje en colaboración con las autoridades federales, estatales, locales y las instituciones públicas y privadas, para desarrollar un plan que satisfaga las necesidades de la instituciones públicas y privadas, para desarrollar un plan que satisfaga las necesidades de la región y de la nación.

La retroalimentación y la participación del público se alentarán a lo largo de la duración del estudio. Las reuniones públicas de exploración se celebrarán en las siguientes fechas y sitios:

Jueves, 4 de diciembre de 2014
de las 6 p.m. a las 8 p.m.
League City Civic Center
400 W. Walker St.
League City, Texas, 77573

Martes, 9 de diciembre de 2014
de las 6 p.m. a las 8 p.m.
Harris County Precinct 2
J.D. Walker Community Center
7613 Wade Rd.
Baytown, Texas 77521

Jueves, 11 de diciembre de 2014
de las 6 p.m. a las 8 p.m.
Jury Impaneling Room, Jefferson County Courthouse
1001 Pearl St.
Beaumont, Texas 77701

Los materiales, la presentación y el formato serán iguales en las tres reuniones. Las jornadas de puertas abiertas tendrán una duración de las 6:00 p.m., a las 8:00 p.m. Estarán disponibles para el público presentaciones informativas, y representantes del GCCPRD proporcionarán información y responderán preguntas. No se hará alguna presentación formal. Los materiales estarán disponibles en inglés y en español.

Si se necesitan servicios para personas con deficiencias auditivas o servicios de traducción, por favor póngase en contacto con el equipo de consultoría del GCCPRD al 713-868-1043 ó a info@gccprd.com, antes del 26 de noviembre de 2014. Los representantes de GCCPRD harán todo esfuerzo razonable para satisfacer estas necesidades.

Se aceptarán comentarios en las reuniones de evaluación pública y a lo largo de la duración del estudio. Los comentarios escritos pueden ser enviados por correo a Gulf Coast Community Protection and Recovery District, con atención al Col. Christopher Sallese en 3100 West Alabama St., Houston, Texas 77098 ó por correo electrónico a info@gccprd.com.

Para obtener más información acerca de GCCPRD y este estudio, visite www.gccprd.com.

Empleos

TRANSPORTACIÓN / LOGÍSTICA

1245 ANUNCIOS LEGALES

Comision De Calidad Ambiental Del Estado De Texas
COMBINADO
AVISO DE SOLICITUD E INTENTO DE OBTENER UN PERMISO DE LA CALIDAD DE AGUA (NORI)
Y
AVISO DE SOLICITUD Y DECISION PRELIMINAR (NAPD) PARA IMPORTANTE ENMIENDA DEL PERMISO DE CALIDAD DE AGUA TPDES DEL SISTEMA DE ELIMINACION DE DESCARGAS DE CONTAMINANTES DE TEXAS (TPDES) PARA AGUAS RESIDUALES INDUSTRIALES
PERMISO TPDES No. WQ000354000

SOLICITUD Y DECISION PRELIMINAR. U.S. Steel Tubular Products, Inc. (Solicitante), 9393 Sheldon Road, Houston, Texas 77049, quien opera U.S. Steel Tubular Products, Inc. - Tubular Processing Houston Operations, una facilidad que produce productos modificados de tubo y productos de tubos de materiales comprados ha solicitado a la Comision de Calidad Ambiental del Estado de Texas (TCEQ) una modificacion importante con la renovacion del Permiso TPDES No. WQ000354000 para autorizar cambiar la frecuencia de realizacion de las inspecciones de aguas pluviales de mensual a trimestral y la eliminacion de lo siguiente del permiso: 1) la autorizacion para la descarga de aguas de prueba hidrostatica y efluentes monitoreados previamente (tratado de aguas residuales domesticas con un flujo promedio diario que no exceda los 18,000 galones por dia (gpd) a traves del desaguadero interno 201), a traves del desaguadero 002, 2) desaguadero interno 201 (incluyendo la autorizacion de descarga de aguas residuales domesticas tratadas y las limitaciones y los requisitos de control), 3) la autorizacion para la descarga de aguas de prueba hidrostatica a traves de los desaguaderos 003, 004, 005, y 006, 4) los requisitos de monitoreo para aluminio total en el desaguadero 001, 5) los requisitos de monitoreo para aluminio y zinc total y los limites de efluentes basados en la calidad del agua para cobre y cianuro total en el desaguadero 003, 6) los requisitos de monitoreo para aluminio total y los limites de efluentes basados en la calidad del agua para cobre total en el desaguadero 004, 7) los requisitos de monitoreo para aluminio total y plata total y los limites de efluentes basados en la calidad del agua para cobre total en el desaguadero 005; y 8) las limitaciones del promedio diario de efluentes de cobre y cianuro total en el desaguadero 001. El permiso actual autoriza la descarga de: aguas residuales de la torre de enfriamiento, aguas de prueba hidrostatica, agua de lavado de vehiculos, y aguas pluviales a un flujo intermitente y variable por medio del desaguadero 001; aguas de prueba hidrostatica, aguas pluviales y efluentes previamente monitoreados (tratado de aguas residuales domesticas con un flujo promedio diario que no exceda los 18,000 galones por dia (gpd) a traves del desaguadero interno 201) sobre una base intermitente y de flujo variable a traves del desaguadero 002; aguas de prueba hidrostatica y aguas pluviales sobre una base intermitente y de flujo variable a traves de los desaguaderos 003, 004, 005, y 006. El permiso preliminar autoriza la descarga de: aguas residuales de la torre de enfriamiento, aguas de prueba hidrostatica, agua de lavado de vehiculos, y aguas pluviales a un flujo intermitente y variable por medio del desaguadero 001 y aguas pluviales a un flujo intermitente y variable por medio de los desaguaderos 003, 004, 005 y 006. La TCEQ recibio esta solicitud el 3 de Enero del 2013.

El solicitante esta publicando este anuncio combinado porque el NORI original, publicado el 4 de Abril del 2014, declaro que la solicitud era solo para una modificacion importante. La solicitud presentada por el solicitante el 3 de Enero del 2013, era para una modificacion importante con renovacion. Ademas, el 4 de Septiembre del 2014, el solicitante modifico su solicitud para solicitar la eliminacion de las limitaciones del promedio del efluente diario de cobre y cianuro total en el desaguadero 001.

La planta esta ubicada en el 9393 Sheldon Road, en la interseccion de Sheldon Road y U.S. Highway 90, aproximadamente cuatro millas al norte de la ciudad de Channelview, Condado de Harris, Texas 77049. El efluente tratado se descarga a traves de los desaguaderos 001, 004, 005, y 006 a la zania G103-07-04 del Distrito de Control de Inundaciones del Condado de Harris (HCFCD); a traves de los desaguaderos 002 y 003 a zanjas sin nombre. De ahi todos los desaguaderos a la zania G103-07-00 de HCFCD; De ahi al lago Muleshoe; De ahi a la marea del rio San Jacinto, en el Segmento No. 1001 de la cuenca del rio San Jacinto. Las aguas receptoras no clasificadas no tienen uso de vida acuatica significativa para las zanjas sin nombre, zania G103-07-04 de HCFCD, y zania G103-07-00 de HCFCD (por encima del ferrocarril Union Pacific); y alto uso de vida acuatica de la zania G103-7-00 de HCFCD (por debajo del ferrocarril Union Pacific) y el Lago Muleshoe. Los usos designados para el segmento no. 1001 son de alto uso de vida acuatica y recreacion de contacto primario.

De acuerdo con la 30 TAC §307.5 y los procedimientos de implementacion de la TCEQ (Enero 2003) para las Normas de Calidad de Aguas Superficiales en Texas, fue realizada una revision de la antidegradacion de las aguas recibidas. Una revision de antidegradacion del Nivel 1 ha determinado preliminarmente que los usos de la calidad del agua existente no seran perjudicados por la accion de este permiso. Se mantendra un criterio narrativo y numerico para proteger los usos existentes. Una revision de Nivel 2 ha determinado preliminarmente que no se espera ninguna degradacion significativa en la calidad del agua de la zania G103-07-00 de HCFCD (debajo del ferrocarril Union Pacific) y el lago Muleshoe, el cual ha sido identificado de tener alto uso de vida acuatica. Los usos existentes seran mantenidos y protegidos. La determinacion preliminar puede ser reexaminada y puede ser modificada, si se recibe alguna informacion nueva.

El Director Ejecutivo de la TCEQ ha completado la revision tecnica de la solicitud y ha preparado un borrador del permiso. El borrador del permiso, si es aprobado, estableceria las condiciones bajo las cuales la instalacion debe operar. El Director Ejecutivo ha tomado una decision preliminar que si este permiso es emitido, cumple con todos los requisitos normativos y legales. La solicitud del permiso, la decision preliminar del Director Ejecutivo y el borrador del permiso estan disponibles para leer y copiar en la biblioteca publica del condado de Harris - North Channel Branch, 15741 Wallisville Road, Houston, Harris County, Texas. Este enlace a un mapa electronico de la ubicacion general del sitio o de la instalacion es proporcionado como una cortesia y no es parte de la solicitud o del aviso. Para la ubicacion exacta, consulte la solicitud. http://www.tceq.texas.gov/assets/public/hb610/index.html?lat=29.78&lng=-95.1244&zoom=13&type=r

COMENTARIO PUBLICO/REUNION PUBLICA. Usted puede presentar comentarios publicos o pedir una reunion publica sobre esta solicitud. El proposito de una reunion publica es dar la oportunidad de presentar comentarios o hacer preguntas acerca de la solicitud. La TCEQ realiza una reunion publica si el Director Ejecutivo determina que hay un grado de interes publico suficiente en la solicitud o si un legislador local lo pide. Una reunion publica no es una audiencia administrativa de lo contencioso.

OPORTUNIDAD DE UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO. Despues del plazo para presentar comentarios publicos, el Director Ejecutivo considerara todos los comentarios apropiados y preparara una respuesta a todo los comentarios publicos esenciales, pertinentes, o significativos. **A menos que la solicitud haya sido referida directamente a una audiencia administrativa de lo contencioso, la respuesta a los comentarios y la decision del Director Ejecutivo sobre la solicitud seran enviados por correo a todos los que presentaron un comentario publico y a las personas que estan en la lista para recibir avisos sobre esta solicitud. Si se reciben comentarios, el aviso tambien proveera instrucciones para pedir una audiencia administrativa de lo contencioso o reconsideracion de la decision del Director Ejecutivo.** Una audiencia administrativa de lo contencioso es un procedimiento legal similar a un procedimiento legal civil en un tribunal de distrito del estado.

PARA PEDIR UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO, USTED DEBE INCLUIR LOS SIGUIENTES DATOS EN SU PETICION: su nombre; direccion; telefono; nombre del solicitante y numero del permiso; la ubicacion y la distancia de su propiedad/actividad con respecto a la instalacion; una descripcion especifica de la forma como usted seria afectado adversamente por el sitio de una manera no comun al publico en general; y la declaracion "[Yo/nosotros] solicito/solicitamos una audiencia administrativa de lo contencioso". Si la peticion para una audiencia administrativa de lo contencioso se presenta por parte de un grupo o asociacion, el grupo o asociacion debe designar al representante del grupo que recibira correspondencia en el futuro; identificar un miembro del grupo que seria afectado adversamente por la planta o la actividad propuesta; proveer la informacion ya indicada anteriormente con respecto a la ubicacion del miembro afectado y su distancia de la planta o la actividad propuesta; explicar como y porque el miembro seria afectado y como los intereses que el grupo desea proteger son pertinentes al proposito del grupo.

Despues del cierre de los periodos para las peticiones y comentarios, el Director Ejecutivo enviara la solicitud y las peticiones para reconsideracion o para una audiencia administrativa de lo contencioso a los Comisionados de la TCEQ para su consideracion en una reunion programada de la Comision.

La Comision solamente otorgara una audiencia administrativa de lo contencioso sobre los hechos reales disputados del caso que son pertinentes y esenciales para la decision de la Comision sobre la solicitud. Ademas, la Comision solo otorgara una audiencia administrativa de lo contencioso sobre los asuntos que fueron presentados antes del plazo de vencimiento y que no fueron retirados posteriormente.

ACCION DEL DIRECTOR EJECUTIVO. El Director Ejecutivo puede emitir una aprobacion final de la solicitud a menos que exista una peticion antes del plazo de vencimiento de una audiencia administrativa de lo contencioso o se ha presentado una peticion de reconsideracion. Si se recibe una peticion de audiencia o de reconsideracion antes del plazo de vencimiento, el Director Ejecutivo no emitira una aprobacion final del permiso y enviara la solicitud y la peticion a los Comisionados de la TCEQ para consideracion en una reunion programada de la Comision.

LISTA DE CORREO. Si somete comentarios publicos, una peticion para una audiencia administrativa de lo contencioso o una reconsideracion de la decision del Director Ejecutivo, la Oficina del Secretario Principal enviara por correo los avisos publicos en relacion con la solicitud. Ademas, puede pedir que la TCEQ ponga su nombre en una o mas de las listas correos siguientes (1) la lista de correo permanente para recibir los avisos de el solicitante indicado por nombre y numero del permiso especifico y/o (2) la lista de correo de todas las solicitudes en un condado especifico. Si desea que se agrega su nombre en una de las listas designe cual lista(s) y envia por correo su pedido a la Oficina del Secretario Principal de la TCEQ a la direccion mencionada en el siguiente parrafo.

Todos los comentarios por escrito del publico y peticiones para una audiencia publica deben ser presentados durante los 30 dias despues de la publicacion del aviso en el periodico a la Oficina del Secretario Principal, MC 105, TCEQ, P.O. Box 13087, Austin, TX 78711-3087 o por el internet a www.tceq.texas.gov/about/comments.html

CONTACTOS E INFORMACION DE LA AGENCIA. Si necesita mas informacion sobre esta solicitud de permiso o el proceso del permiso, por favor llame al Programa de Educacion Publica de la TCEQ, sin cobro, al 1-800-687-4040. Informacion general sobre la TCEQ puede ser encontrada en nuestro sitio de la red: www.tceq.texas.gov.

Tambien se puede obtener mas informacion por parte de U.S. Steel Tubular Products, Inc. a la direccion indicada arriba o llamando al Sr. Dwight Slayback al (903) 656-6561.

Fecha de emision: 9 de Octubre del 2014

1245 ANUNCIOS LEGALES

AVISO DE RECIBO DE SOLICITUD E INTENCION DE OBTENER UNA RENOVACIÓN/ENMIENDA IMPORTANTE DE PERMISO RESIDUOS PELIGROSOS
PERMISO NÚM 50387

SOLICITUD. Sasol Chemicals (USA) LLC (Anteriormente Merisol USA LLC), 1914 Haden Road, Houston, Condado de Harris, Texas 77015-6498, una instalación de almacenamiento y tratamiento de residuos peligrosos, ha solicitado a la Comisión de Calidad Ambiental de Texas (TCEQ) para renovación de permiso y enmienda importante para autorizar las operaciones continuas de la instalación. La enmienda importante solicita la adición de un Plan de Cumplimiento cambio de propiedad y el nombre de Merisol USA LLC a Sasol Químicos (USA) LLC, actualizar la aseguramiento de financiera, coordinadores y contactos de emergencia; los terratenientes adyacentes, y la informe de ingeniería y certificación de ingeniero. La instalación está ubicada a la dirección indicada arriba. La TCEQ recibió esta solicitud el 1 de julio de 2014. La solicitud del está disponible para leer y copiar en la Biblioteca Pública de Condado de Harris, Sucursal North Channel, 15741 Wallisville Road, Houston, Condado de Harris, Texas 77049. Este enlace a un mapa electrónico de la ubicación general del sitio o de la instalación es proporcionado como una cortesía y no es parte de la solicitud o del aviso. Para http://www.tceq.texas.gov/assets/public/hb610/index.html?lat=29.780298&lng=-95.176658&zoom=12&type=r la ubicación exacta, consulte la solicitud.

El Director Ejecutivo de la TCEQ ha revisado esta medida para ver si esta de acuerdo con los objetivos y las regulaciones del Programa de Administración Costero de Texas (CMP) de acuerdo con las regulaciones del Consejo Coordinador de la Costa (CCC) y ha determinado que la acción es conforme con las metas y regulaciones pertinentes de el CMP.

AVISO ADICIONAL. El Director Ejecutivo de la TCEQ ha determinado que la solicitud es administrativamente completa y conducirá una revisión técnica de la solicitud. Después de completar la revisión técnica, el Director Ejecutivo puede preparar un borrador del permiso y emitirá una Decisión Preliminar sobre la solicitud. **El Aviso de la Solicitud y la Decisión Preliminar será publicado y enviado a los que están en la lista de correo de las personas a lo largo del condado que desean recibir los avisos y los que están en la lista de correo que desean recibir avisos de esta solicitud. El aviso dará la fecha límite para someter comentarios públicos.**

COMENTARIO PÚBLICO / REUNIÓN PÚBLICA. **Usted puede presentar comentarios públicos o pedir una reunión pública sobre esta solicitud.** El propósito de una reunión pública es dar la oportunidad de presentar comentarios o hacer preguntas acerca de la solicitud. TCEQ realizará una reunión pública si el Director Ejecutivo determina que existe un interés público suficiente en la solicitud, o si es pedida por un legislador local. Una reunión pública no es una audiencia administrativa de lo contencioso.

OPORTUNIDAD DE UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO. Después del plazo para presentar comentarios públicos, el Director Ejecutivo considerará todos los comentarios apropiados y preparará una respuesta a todo los comentarios públicos esenciales, pertinentes, o significativos. **A menos que la solicitud haya sido referida directamente a una audiencia administrativa de lo contencioso, la respuesta a los comentarios y la decisión del Director Ejecutivo sobre la solicitud serán enviados por correo a todos los que presentaron un comentario público y a las personas que están en la lista para recibir avisos sobre esta solicitud. Si se reciben comentarios, el aviso también proveerá instrucciones para pedir una reconsideración de la decisión del Director Ejecutivo y para pedir una audiencia administrativa de lo contencioso.** Una audiencia administrativa de lo contencioso es un procedimiento legal similar a un procedimiento legal civil en un tribunal de distrito del estado.

PARA PEDIR UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO, USTED DEBE INCLUIR EN SU PEDIDO LOS SIGUIENTES DATOS: su nombre; dirección; teléfono; nombre del solicitante y número del permiso; la ubicación y la distancia de su propiedad/actividad con respecto a la instalación; una descripción específica de la forma cómo usted sería afectado adversamente por el sitio de una manera no común al público en general; y la declaración "[Yo/nosotros] solicito/solicitamos un/a audiencia administrativa de lo contencioso". Si presenta por parte de un grupo o asociación al pedido para una audiencia administrativa de lo contencioso, debe identificar el nombre y la dirección de una persona que representa al grupo para recibir correspondencia en el futuro; debe identificar un miembro del grupo que sería afectado adversamente por la planta o la actividad propuesta; debe proveer la información ya indicada anteriormente con respecto a la ubicación del miembro afectado y la distancia de la planta o actividad propuesta; debe explicar como y porqué el miembro sería afectado y como los intereses que el grupo desea proteger son pertinentes al propósito del grupo.

Después del cierre de los periodos para los pedidos y comentarios, el Director Ejecutivo enviará la solicitud y los pedidos para reconsideración o por una audiencia administrativa de lo contencioso a los Comisionados de la TCEQ para su consideración en una reunión programada de la Comisión.

La Comisión otorgará solamente un audiencia administrativa de lo contencioso sobre los hechos reales disputados del caso que son pertinentes y esenciales para la decisión de la Comisión sobre la solicitud. Además, la Comisión sólo otorgará una audiencia administrativa de lo contencioso sobre los asuntos que fueron presentados antes del plazo de vencimiento y que no fueron retirados posteriormente.

LISTA DE CORREO. Si somete comentarios públicos, un pedido para una audiencia administrativa de lo contencioso o una reconsideración de la decisión del Director Ejecutivo, la Oficina del Secretario Principal enviará por correo los avisos públicos en relación con la solicitud. Además, puede pedir que la TCEQ ponga su nombre en una o mas de las listas correos siguientes (1) la lista de correo permanente para recibir los avisos de el solicitante indicado por nombre y número del permiso específico y/o (2) la lista de correo de todas las solicitudes en un condado específico. Si desea que se agrega su nombre en una de las listas designe cual lista(s) y envía por correo su pedido a la Oficina de la Secretario Principal de la TCEQ. **CONTACTOS Y INFORMACION DE TCEQ. Todos los comentarios escritos del público y los pedidos deben ser presentados a La Oficina de la Secretario Principal, MC 105, TCEQ, P.O. Box 13087, Austin, TX 78711-3087 o por el internet al** www.tceq.texas.gov/about/comments.html. Si desea comunicarse con la TCEQ por vía electrónica, su dirección de correo electrónico, como su dirección postal física, pasará a formar parte del registro público de la agencia. Si necesita más información en Español sobre esta solicitud para un permiso o el proceso del permiso, por favor llame al Programa de Educación Pública de la TCEQ, sin cobro, al 1-800-687-4040.

También se puede obtener información adicional del Sasol Chemicals (USA) LLC a la dirección indicada arriba o llamando a Sr. Randy Shilling, Gerente del Programa de SHESQ al (713) 428-5428.

Fecha de emisión: el 17 de octubre de 2014

Reunión Pública para el Estudio de Administración de Acceso SH 249

Asista a la reunión comunitaria y comparta sus ideas para mejorar la carretera SH 249 con cruceros de calles, senderos de bicicletas/peatones, y de transporte público:

Jueves, 13 de noviembre 2014
Hill Intermediate School
2625 West Mount Houston Road
Houston, TX 77038
6:00-6:30 p.m. Registro / Reunión Abierta
6:30-7:00 p.m. Presentación
7:00-7:30 p.m. Reunión Abierta

El Concilio del Área de Houston-Galveston (H - GAC) está trabajando con el Departamento de Transporte de Texas (TxDOT) y otros grupos en la zona para identificar obras de transporte que mejoren el flujo de tráfico, la seguridad y la calidad de vida. Para más información visite: www.h-gac.com/go/sh249.

La instalación es accesible a personas con discapacidades. H-GAC proveerá facilidades razonables para las personas que asistan a los eventos de H-GAC. Las solicitudes de las personas que necesiten condiciones especiales deberán ser recibidas por H-GAC 24 horas antes del evento. La reunión pública se llevará a cabo en inglés y las solicitudes de intérpretes u otras necesidades especiales de comunicación deberán hacerse por lo menos dos días hábiles antes del evento. Favor de llamar al 713-993-2471 para obtener ayuda.

1245 ANUNCIOS LEGALES

LA COMISION DE CALIDAD AMBIENTAL DEL ESTADO DE TEXAS
AVISO DE RECIBO DE SOLICITUD E INTENTO DE OBTENER UNA RENOVACION AL PERMISO DE CALIDAD DE AGUA
PERMISO NUM. WQ0012898001

SOLICITUD. Aqua Texas, Inc., 1106 Clayton Lane, Suite 400W, Austin, Texas 78723, ha solicitado a la Comision de Calidad Ambiental de Texas (TCEQ, por sus siglas en ingles) para la renovacion del Permiso Num. WQ0012898001 (Num. de I.D. EPA TX0095125) para un Sistema de Eliminacion de Descargas Contaminantes del Estado de Texas (TPDES, por sus siglas en ingles), el cual autoriza la descarga de aguas residuales tratadas a un volumen que no exceda un promedio de flujo diario equivalente a 75,000 galones al dia. La instalacion de tratamiento de aguas residuales domesticas esta ubicada en el 23919 Brushy Woods Street, Hockley, en el Condado de Montgomery, Texas 77447. La ruta de descarga se origina del sitio de la planta hacia un afluente sin nombre; de ahi a Spring Creek. La TCEQ ha recibido la solicitud el 5 de septiembre, 2014. La solicitud del permiso esta disponible para revisarse y copiarse en la Biblioteca del Condado de Montgomery, 104 Interstate 45 North, Conroe, Texas. Este enlace a un mapa electronico del sitio o la ubicacion general de la instalacion es proporcionado como una cortesia al publico y no forma parte de la solicitud o el aviso. Para la ubicacion exacta de la instalacion, deals public/hb610/index.html?lat=30.098888&lng=-95.798&zoom=13&type=r

AVISO ADICIONAL. El Director Ejecutivo de la TCEQ ha determinado que la solicitud esta administrativamente completa y llevara a cabo una revision tecnica de la solicitud. Despues de que dicha revision tecnica sea completada, el Director Ejecutivo puede preparar un borrador del permiso y emitira una decision preliminar en la solicitud. **El aviso de la Solicitud y la Decision Preliminar se publicara y sera enviada por correo a aquellas personas quienes se encuentran en la lista de correo de todo el condado y aquellas que se encuentran en la lista de correo para esta solicitud. Dicho aviso contendra la fecha limite para presentar comentarios publicos.**

COMENTARIO PUBLICO/NOTIFICACION PUBLICA. Usted puede presentar comentarios publicos o solicitar una reunion publica sobre esta solicitud. El proposito de la reunion publica es proveer la oportunidad de hacer comentarios o hacer preguntas sobre la solicitud. La TCEQ llevara a cabo una reunion publica si el Director Ejecutivo determina que existe un nivel significativo de interes publico sobre la solicitud o si es exigida por un legislador local. Una reunion publica no es una audiencia de caso impugnado.

OPORTUNIDAD PARA AUDIENCIA DE CASO IMPUGNADO. Despues de la fecha limite para presentar comentarios publicos, el Director Ejecutivo considerara todos los comentarios presentados puntualmente y preparara una respuesta a todos los comentarios publicos relevantes y materiales, o significativos. **A menos que la solicitud se refiera explicitamente a una audiencia de caso impugnado, la respuesta a los comentarios, y la decision del Director Ejecutivo sobre la solicitud, seran enviados por correo a todos aquellos que presentaron comentarios publicos y a aquellas personas quienes estan en la lista de correo para esta solicitud. Si los comentarios se reciben, el material enviado por correo suministrara instrucciones para solicitar la reconsideracion de la decision del Director Ejecutivo y solicitar una audiencia de caso impugnado.** Una audiencia para caso impugnado es un proceso legal similar a un juicio en una corte de distrito estatal.

PARA SOLICITAR UNA AUDIENCIA DE CASO IMPUGNADO, DEBE INCLUIR LO SIGUIENTE EN SU SOLICITUD: su nombre, direccion, numero telefonico; el nombre del solicitante y el numero de permiso propuesto; la ubicacion y la distancia de su propiedad/area de actividades en relacion con la instalacion propuesta; una descripcion detallada de como usted seria adversamente afectado/a por la instalacion de una manera poco comun al publico en general; y, la declaracion "[I/we] request a contested case hearing." Si la solicitud para una audiencia de caso impugnado es archivada de parte de un grupo o asociacion, la solicitud debe designar a un representante del grupo para recibir correspondencia futura; identificar a un miembro individual del grupo quien seria adversamente afectado por la instalacion propuesta o actividad; proveer la informacion del miembro afectado mencionado anteriormente en relacion a la ubicacion y distancia de la instalacion o actividad en cuestion; explicar como y por que el miembro seria afectado; y explicar como los intereses que el grupo se propone proteger son relevantes al proposito del grupo en conjunto.

Prosiguiendo al cierre de todos los periodos pertinentes para comentarios y solicitud, el Director Ejecutivo remitira la solicitud y cualquiera de las peticiones para reconsideracion o para una audiencia de caso impugnado a los Comisarios de la TCEQ para su consideracion en una junta programada de la Comision.

La Comision solamente otorgara una audiencia de caso impugnado sobre cuestiones discutidas de hechos relevantes y materiales a la decision de la Comision sobre la solicitud. Ademas, la Comision solamente otorgara una audiencia sobre cuestiones planteadas y archivadas de manera puntual que no fueron retraidas posteriormente. **Si ciertos criterios se cumplen, la TCEQ puede tomar accion sobre una solicitud de renovar un permiso para la descarga de aguas residuales sin proveer una oportunidad de una audiencia de caso impugnado.**

LISTA DE CORREO. Si presenta comentarios publicos, una peticion para una audiencia de caso impugnado o una reconsideracion de la decision del Director Ejecutivo, se le ingresara en la lista de correo para esta solicitud especifica y recibira avisos publicos futuros por la Oficina del Funcionario Jefe. Ademas, puede solicitar ser incluido en: (1) la lista de correo permanente de un solicitante por nombre en especifico, y/o (2) la lista de correo de un condado en especifico. Si desea que se le incluya en la lista de correo permanente y/o la lista de correo del condado, especifique claramente la lista(s) y envie su peticion a la Oficina del Funcionario Jefe de la TCEQ en la direccion a continuacion.

CONTACTOS DE AGENTE E INFORMACION. Todos los comentarios publicos por escrito y las peticiones deben ser entregados a la Oficina del Funcionario Jefe, MC 105, TCEQ, P.O. Box 13087, Austin, TX 78711-3087 o electronicamente al www.tceq.state.tx.us/about/comments.html. Si necesita mas informacion sobre la solicitud del permiso o el proceso de obtencion de permisos, por favor llame al Programa de Educacion Publica de la TCEQ, sin cobro, al 1-800-687-4040. Si desea informacion en Espanol, puede llamar al 1-800-687-4040. Informacion general conceniente a la TCEQ puede encontrarse via internet en www.tceq.texas.gov.

Informacion adicional tambien puede ser obtenida de Aqua Texas, Inc., en la direccion mencionada arriba o llamando al Sr. Abel Bautista, al 281-651-0174.

Fecha de Expedicion: 15 de octubre, 2014

1245 ANUNCIOS

AVISO PÚBLICO

Por favor, únase a nosotros para una reunión pública de exploración y/o detección de necesidades.

The Gulf Coast Community Protection and Recovery District (El Distrito de Protección y Recuperación de la Comunidad de la Costa del Golfo GCCPRD-) será el anfitrión de una serie de reuniones públicas de exploración en el mes de diciembre de 2014, para fomentar la participación y la ... marejadas provocadas por tormentas.

Después de tres huracanes de gran intensidad, el último de los cuales (el huracán Ike) fue el más costoso en la historia de Texas, el Gobernador Perry emitió un Decreto Ejecutivo para crear la Governor's Commission for Disaster Recovery and Renewal (Comisión del Gobernador para la Recuperación y Renovación de Desastres). Una de las recomendaciones de la Comisión fue la de realizar un estudio para determinar cómo pueden reducir las comunidades costeras el impacto de los daños de futuras tormentas. Junto con esa recomendación, los condados de Brazoria, Chambers, Galveston, Harris, Jefferson y Orange formaron el GCCPRD como una corporación del gobierno local. El GCCPRD está dirigiendo el Storm Surge Suppression Study (Estudio de Supresión de Marejadas provocadas por las Tormentas), un esfuerzo técnico, con base científica, para investigar las oportunidades para mitigar la vulnerabilidad de la costa superior de Texas a las marejadas y a las inundaciones provocadas por tormentas.

El estudio es financiado por la Texas General Land Office (Oficina General de Tierras de Texas) a través de una Subvención Federal del Housing and Urban Development, Community Development Block (Bloque de Desarrollo de la Comunidad, del Desarrollo de Vivienda y Urbano), de $3.9 millones, que fue otorgado en el mes de septiembre de 2013. Desde entonces, el GCCPRD ha estado acumulando y analizando los datos existentes, y colaborando con otras organizaciones y universidades que realizan un trabajo similar. El Estudio de Supresión de Marejadas provocadas por las Tormentas producirá un sistema de alternativas que pueden consistir en una variedad de métodos naturales, estructurales y no estructurales. Usando estos hallazgos, el GCCPRD recomendará un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada para ayudar a proteger la región de los seis condados. Este esfuerzo es una oportunidad para que el GCCPRD asuma un papel de liderazgo y trabaje en colaboración con las autoridades federales, estatales, locales y las instituciones públicas y privadas, para desarrollar un plan que satisfaga las necesidades de la región y de la nación.

La retroalimentación y la participación del público se alentarán a lo largo de la duración del estudio. Las reuniones públicas de exploración se celebrarán en las siguientes fechas y sitios:

Jueves, 4 de diciembre de 2014
de las 6 p.m. a las 8 p.m.
League City Civic Center
400 W. Walker St.
League City, Texas, 77573

Martes, 9 de diciembre de 2014
de las 6 p.m. a las 8 p.m.
Harris County Precinct 2
J.D. Walker Community Center
7613 Wade Rd.
Baytown, Texas 77521

Jueves, 11 de diciembre de 2014
de las 6 p.m. a las 8 p.m.
Jury Impaneling Room, Jefferson County Courthouse
1001 Pearl St.
Beaumont, Texas 77701

Los materiales, la presentación y el formato serán iguales en las tres reuniones. Las jornadas de puertas abiertas tendrán una duración de las 6:00 p.m., a las 8:00 p.m. Estarán disponibles para el público presentaciones informativas, y representantes del GCCPRD proporcionarán información y responderán preguntas. No se hará alguna presentación formal. Los materiales estarán disponibles en inglés y en español.

Si se necesitan servicios para personas con deficiencias auditivas o servicios de traducción, por favor póngase en contacto con el equipo de consultoría del GCCPRD al 713-868-1043 ó a info@gccprd.com, antes del 26 de noviembre de 2014. Los representantes de GCCPRD harán todo esfuerzo razonable para satisfacer estas necesidades.

Se aceptarán comentarios en las reuniones de evaluación pública y a lo largo de la duración del estudio. Los comentarios escritos pueden ser enviados por correo a Gulf Coast Community Protection and Recovery District, con atención al Col. Christopher Sallese en 3100 West Alabama St., Houston, Texas 77098 ó por correo electrónico a info@gccprd.com.

Para obtener más información acerca de GCCPRD y este estudio, visite www.gccprd.com.

Port Arthur News (Published November 6, 2014)

Affidavit of Publication

Crouch Environmental Services, Inc.
Attn: Connor Stokes
402 Teetshorn St.
Houston, TX 77009

COUNTY OF JEFFERSON TEXAS

Reference: GCCPRD- Public Meeting Notice
Before me, the undersigned authority, on this day personally appeared, Andrea Nussle [NAME] who being duly sworn, deposes and says that she [HE/SHE] is an agent of the Port Arthur News: that said newspaper is regularly published in Jefferson County and generally circulated in Jefferson County, Texas: that the attached notice was published on the following date.

Andrea Nussle
[PORT ARTHUR NEWS REPRESENTATIVE]

Printed: November 6, 2014

Subscribed and sworn before me this 28 [DAY] of January [MONTH] 2015 AD

Connie D. Ytuarte [NOTARY SIGNATURE]

CONNIE D. YTUARTE
Notary Public
STATE OF TEXAS
My Comm. Exp. 09/09/2018
[NOTARY STAMP]

Obama defiant, vows immigration action this year

WASHINGTON (AP) — President Barack Obama's determination to act alone to change the immigration system promptly drove a wedge Wednesday into the post-election commitment from the president and Republican leaders to find common ground under the new political alignment.

Obama defiantly stood by his pledge to act on his own to reduce deportations, grant work permits and improve border security by the end of the year despite resounding election victories by Republicans strongly opposed to his plans. The Senate's likely majority leader next year, Mitch McConnell, R-Ky., declared that such a move would amount to "waving a red flag in front of a bull."

On a day when both sides tried to herald a new era of potential compromise, immigration stood out not only as a single obstacle to bipartisanship but as a sign that the hard-fought election and the heavy Democratic losses had not pushed partisan sparring aside.

"I have no doubt that there will be some Republicans who are angered or frustrated by any executive action that I may take," Obama said in a post-election news conference. "Those are folks, I just have to say, who are also deeply opposed

Some on the right said executive action on immigration could even be grounds for impeachment. Several House Republicans said Obama would make it very difficult to cooperate on other issues if he acts on immigration.

"Him moving ahead like that, I think he's completely tone deaf to what happened last night," said Rep. Phil Roe, R-Tenn.

And a half-dozen GOP senators, including Ted Cruz of Texas, wrote to Senate Majority Leader Harry Reid, D-Nev., on Wednesday urging him to quickly pass legislation to block Obama from taking executive action. Otherwise, the senators warned, they'll use "all procedural means necessary" to resolve what they called a constitutional crisis of Obama's making.

But Obama appeared in no mood for waiting. He had already angered Latinos and immigration advocacy groups this fall when he delayed executive action until after the election.

"What I'm not going to do is just wait," he said. "I think it's fair to say I've shown a lot of patience."

Immigration advocates made clear that their patience, too, was at an end.

Search

Continued from A1

Waste Funds profitable were among the questions along with a request for the candidate to characterize their approach to the Council-Manager form of government.

Finally, the applicants were asked why they wanted to be Port Arthur's City Manager.

Each candidate was scored by the citizens group. Those scores, and the citizens group's recommendation, will be given to City Council Thursday during a closed session meeting scheduled to begin at 8 a.m.

Council will then continue the process with individual interviews scheduled to last 45 minutes each.

At 3:30, Council will meet in executive session again to discuss the seven candidates in further detail.

By Thursday, City Council could be ready to

Luke Mauldin/The News

Frank Johnson of Marshall speaks with two quest at a meet-and-greet with 7 semi-finalist for Port Arthur City Manager at the Hampton Inn in Port Arthur on Wednesday.

Alexander, Roosevelt Petry, Warren Field, Dee Dee Pillitere, and Harold Doucet.

The semi-finalists include, Natasha L. Henderson, Frank Johnson, Brian McDougal, Willie Norfleet Jr., James Palenick, Jane Shang, and William Whitson.

Henderson is currently city manager of Muskegon Heights, Mich., a city with

Socorro is a border city in El Paso County. He has also worked as city manager of other cities including Compton, Calif.

Palenick is currently interim town manager of Dallas, N.C., a surburb of both Charlotte and Gastonia, with a population of 4,488.

Palenick has also been city manager for the cities of Gastonia, N.C., Rio

Akins

Continued from A1

"I always wanted to go back to school and just haven't felt the timing until now," Akins said. "My son (Jude) is turning six Thursday. My husband (Derek) works in a refinery, and he's at a really great place.

"My husband and I bought a house in Nederland two years ago, and my son just started kindergarten at Helena Park Elementary School. I'm part of the Homeroom moms, and I'll still be very active in the school system and the community.

"I did marry an Indian, though, but he's OK with my Nederland (pride). Our son's starting to wonder why dad's and Indian and mom's a Bulldog. He keeps asking, 'So am I a Bulldog or an Indian?' and I'm like, 'You're a Bulldog. Once you join our team, you're in.' It's a good rivalry though — and those roots run deep."

Akins said through her presidency, she's teamed up with the City of Nederland to start the Fourth of July Fireworks Extravaganza and grown the Chamber's visibility through the Boston Avenue Merchants and Christmas on the Avenue.

"It's been an absolute honor to serve as Chamber president for three and a half years," Akins said. "I absolutely love it — every single Chamber business and member I've met and getting to watch our businesses grow. It's been an absolutely wonderful experience.

"This place was such a huge part of me. I've given it my all and just poured myself into it. The Board knows they can call me anytime — I'll always be here for them — but I know they're going to find someone who loves this town that'll just take this opportunity and run with it. That's what this Chamber is all about."

Akins said she'll leave the Chamber's next move up to the new president — still to be determined by the Executive Board of Directors — but she'll always share her love for Nederland with anyone who strolls into town.

"Even though I'll miss my Chamber family and our businesses, I'll always have this love in my heart for our great town," Akins said. "When you love a town so much and are able to share it with people who come in and visit — it's something to be proud of. This community is incredible."

Email: chenderson@panews.com

Twitter: @erhenderson90

Birthday celebration, Thanksgiving coming up

GROVES — Autumn is a season of liberty. Instead of green, leaves can choose between yellow, red, brown and orange by Maria.

The Groves Seniors would like to thank Amber with Altus for calling bingo on Tuesday, Nov. 4.

On Tuesday, Nov. 11, Kim Hernandez with Professional Health Care will call bingo. On Thursday, Nov. 13, we will celebrate the November Birthdays with cake and ice cream. Cypress Glen will provide our ice cream, call bingo and do blood pressure checks. The Meal of the Month is our Thanksgiving Meal. It will be on Nov. 25. Please call by Nov. 17 to make a reservation for the Thanksgiving Meal.

The Groves Center is located at 5649 West Washington. We are open Monday through Friday from 9 a.m. to 1 p.m.

Tuesday and Thursdays we play bingo at 9:30 a.m. Wednesday we have Chair Exercises at 9:30 a.m. Friday is Computer Class at 12:30 p.m. Daily we play dominoes , play games and work on a puzzle. Seniors don't stay home alone we have a place just for you.Come join the fun, food and fellowship. Hope to see you soon.

Tx universities seeking money for construction

AUSTIN (AP) — Several Texas universities are seeking money from the Legislature to build and update facilities on their campuses.

Among the colleges hoping to receive funding for bonds from state lawmakers are Texas State University, the University of Texas and Texas A&M University. The Austin American-Statesman reports those three schools are collectively seeking hundreds of millions of dollars for their construction projects.

But it's unclear whether state legislators will be in the mood to distribute funds when the legislative session starts next year. During last year's session, a package of about $2.7 billion in bonds failed because lawmakers couldn't agree on how much should be allocated to various universities.

Texas Gov. Rick Perry also declined adding such bonds to the legislative agenda in the next three special sessions.

Votes

Continued from A1

only count the ballots as the ballot boxes come in. We have 40 polling locations spread all the way from Sabine Pass to Devil Oaks, so some of the boxes took longer to reach the station than others.

"We're happy that's over. But it's not really over until every vote is counted. Then we can finalize the 2014 election — and sleep — and get back to work."

Email: chenderson@panews.com

Twitter: @erhenderson90

DEATH NOTICES

Barbara N. David, 68, of Port Arthur died Wednesday, November 5, 2014. Clayton Thompson Funeral Home, Port Arthur.

Larry Dean Graves, 55, of Beaumont died Tuesday, November 4, 2014. Broussard's-N. Major Dr., Beaumont.

Eula Mae "Granny Peanut" Leleux, 91, of Port Neches died Tuesday, November 4, 2014. Levingston Funeral Home, Groves.

Yen T. Luu, 96, of Port Arthur died Wednesday, November 5, 2014. Hannah Funeral Home, Port Arthur.

SERVICES TODAY

Charles Ballew, Melancon's Funeral Home, Nederland. 3 p.m.

Rodney J. Benoit, Clayton Thompson Funeral Home, Port Arthur. 10 a.m.

Bobbie "Pie" DeRouen, Clayton Thompson Funeral Home, Port Arthur. 2 p.m.

Leroy Lancon, Melancon's Funeral Home, Nederland. 10 a.m.

Mary Jo Meadows Nix, Calder Baptist Church, Beaumont. 11 a.m.

Thomas "Tom" J. O'Grady, St. Jude Taddeus Catholic Church, Beaumont. 3 p.m.

James D. "Jimmy" Stark, Jr., St. Charles Borromeo Catholic Church, Nederland. 10 a.m.

The Facts (Brazoria County) (Published November 6, 2014)

Affidavit of Publication

Crouch Environmental Services, Inc.
Attn: Connor Stokes
402 Teetshorn St.
Houston, TX 77009

COUNTY OF BRAZORIA TEXAS

Reference: GCCPRD- Public Meeting Notice
Before me, the undersigned authority, on this day personally appeared, Cindy Cornette [NAME] who being duly sworn, deposes and says that She [HE/SHE] is an agent of The Facts: that said newspaper is regularly published in Brazoria County and generally circulated in Brazoria County, Texas: that the attached notice was published on the following date.

x Cindy Cornette
[THE FACTS REPRESENTATIVE]

Printed: November 6, 2014

Subscribed and sworn before me this [DAY] of [MONTH] 2015 AD

[NOTARY SIGNATURE]

[NOTARY STAMP]

ALEXI MEREDITH SELF
NOTARY PUBLIC
STATE OF TEXAS
EXPIRES
08-24-2015

Better to eat a turkey at Thanksgiving than be one

E.M. "BOSIE" **BOSWELL**
BIRDING

Lagarto, Texas, is not much of a town. Its features include an abandoned schoolhouse and a honky-tonk. But the birding on Lagarto Creek can be productive, if you don't get eaten by an alligator.

But it was not reptiles or songbirds that Jackie and I saw on a fall day many years ago. They were lined up in a single row as they marched across a field, and we counted 75 gobblers. That adds up to 150 drumsticks.

Like most birds that are good to eat, the wild turkey had all but disappeared before a program was started in 1940 to re-establish them in the wild. Much like passenger pigeons, grouse, prairie chickens and ring-necked pheasants, they had been shot by the thousands and gobbled down by overweight Americans.

The turkey, at the time of the Pilgrims, was one of only two native North American birds. The other was the muscovy duck. When Columbus saw the birds, he thought they were a type of peacock and called them "tukas," which peacocks are called in India.

Our native Americans had already discovered that the birds were tasty and they called them "frikees," which could be where the name turkey originated, but most think it came from the sound they make when frightened, which is a "turk,turk, turk."

You might recall that, in World War I, Sergeant York used the sound of a turkey to lure German soldiers out into the open.

In the choice between the bald eagle and the wild turkey to be named our national bird, Benjamin Franklin championed the wild turkey, but some assume he had been drinking at the time.

I am glad they chose the bald eagle, for the idea of an eagle on the Thanksgiving table with its rear end crammed full of bread dressing seems un-American. Besides, eagles taste a lot like spotted owls.

A lot of people think a turkey can't fly, but they do get airborne for short distances and can reach speeds up to 55 mph.

Today, most of us go to the grocery store and buy a Butterball that cannot fly, especially in the condition they are in when they reach the store. According to the U. S. Department of Agriculture, Americans will eat more than 45 million turkeys this year. I have a grandson who works for the Department of Agriculture and will have him verify that.

And so, I look forward to the season of Thanksgiving, with the anticipation that my son-in-law, Jim McConnell, will provide one of his fantastic creations again this year. (Actually, I found out he was having someone else cook the bird.) In addition to the bird, there will be cranberry sauce, yams with marsh mellows on top, gravy and potatoes, and with any luck at all, one of Jackie's chocolate pies.

Our family dinners are well-attended by my eight grandchildren, 13 great-grandchildren and all various other, non-essential relatives.

Which probably means I will once again get the neck to chew on.

E.M. "Bosie" Boswell is a member of the American Birding Association and the Audubon Society. Contact him at 6413 Stonewall, Greenville, TX 75402, or email bosieb@geusnet.com.

COMMUNITY CALENDAR

Organizations wishing to include an event can send information by fax to 979-265-9052; by email to community@thefacts.com; by mail to P.O. Box 549, Clute, TX 77531; or drop it off at our office, 720 S. Main St., Clute. To ensure publication, information should be submitted at least three business days before the event.

Today

Clute Library Association quarterly meeting: 6:30 p.m. at Clute Library, 215 N. Shanks St. For anyone with an interest in library services. Election of officers and approval of by-laws. Call Barbara Adkins at 979-417-3412.

Dia de los Muertos exhibit: 10 a.m. to 5 p.m. daily through Saturday at Freeport Museum, 311 E. Park St. Community altar offers public chance to contribute letters, keepsakes and photos to remember loved ones. Call 979-233-0066.

Memory screening: 1 to 4 p.m. at Carriage Inn, 130 Lake Road, Lake Jackson. Screenings by BASF volunteers; snacks and Elvis impersonator. Call 979-864-1925.

Junior Achievement Bowl-a-thon: 2:30 to 5 p.m. daily through Tuesday at Spare Time, 1040 S. Velasco, Angleton. Fundraiser for Junior Achievement. For sponsorship and team details, call 979-549-0800.

Young-Onset Alzheimer's Support Group: 6 to 7:30 p.m. at First Christian Church, 503 Oyster Creek Drive, Lake Jackson. For caregivers whose loved one was diagnosed with dementia prior to age 65. Call 979-236-5393.

Barbecue for Books: During regular business hours through Nov. 22 at any Brazoria County Library branch. Silent auction for 10-person bulk order gift certificate to Kenjo's Barbecue. Starting bid $100. Call Breanna Barrera at 979-798-2372.

Brazoria County Cattlemen's Association Fall Dinner and Raffle: 7 p.m. at Brazoria County Fairgrounds, 901 S. Downing Road, Angleton. Steak dinner and raffle benefits Brazoria County Fair. Tickets available at door, six for $50, three for $25 or $10 each. Call Buddy Gonzales at 979-299-9972.

Dia de los Muertos: 10 a.m. to 1 p.m. today and Friday at Lake Jackson Historical Museum, 249 Circle Way. Final day. Contributed photos may be shared on a community altar along with note to pay tribute to lost close family or friends. Call 979-297-1570.

Friday

Gift of Art: 7 to 9 p.m. at Center for Arts and Science, 400 College Drive, Clute. Presented by Brazosport Art League. Silent auction and reception. Brazosport Wood Worker Guild and Brazoria County Wood Carving Club. Call Majorie Suggs at 979-299-6891.

Heinavanker in concert: 7:30 p.m. at The Clarion at Brazosport College, 500 College Drive, Lake Jackson. Performance by Estonian vocal ensemble. Public invited, free admission. Call 979-230-3156.

Beautiful Baby and Miss Sunburst Texas Pageant: 6:30 p.m. at Brazos Mall, 100 Highway 332, Lake Jackson. For boys and girls infant to 3 years, and girls 4 to 27. Entry form at www.sunburstbeauty.com or pick up at mall. Call 570-654-3785.

Memory screening: Noon to 3 p.m. at Northside Plaza Apartments, 1753 W. Henderson Road, Angleton. Screenings by Woodlake Nursing Home. High-stakes bingo, lunch. Call 979-864-1925.

"Almost, Maine": 8 p.m. Friday, Saturday and Nov. 14-15, 2 p.m. Sunday and Nov. 16, at the Center for Arts and Science, 400 College Blvd., Clute. Collection of stories about relationships presented by Center Stages. Adults $13, children 12 and younger $10, though recommended for adults. Box office open 2 to 5 p.m. weekdays, or buy tickets at brazosportcenterstages.org or 979-264-7731.

Fall Fashion Show: 11:15 a.m. at Bethel Presbyterian Church in East Columbia, 119 CR 300G. Brazoria County Retired Teachers Association program, presenting offerings from Madeline's of West Columbia. RSVP with Becky Gaconnet at 979-345-5060.

Saturday

Fall craft fair: 9 a.m to 4 p.m. at First Baptist Church Angleton, 237 E. Locust St. Hosted by J.O.Y. Ladies Ministry. Call Marilyn Wilson at 979-849-4311.

Austin Town: 10 a.m to 5 p.m. at Austin Town Park, intersection of Highway 288 and Highway 288-B, just north of Angleton, at 22851 FM 521. Sample traditional food served in a Mexican jacale, blacksmiths shaping metal and smell the powder as the militia drills with cannons. Adults $5, ages 12 and younger and 65 and older $3. Contact Brazoria County Historical Museum at 979-864-1208 or www.bchm.org.

Fall Family Festival: 9 a.m. at First Christian Church of Alvin, 1212 S. Durant St. Craft and food vendors, classic car show, games, moonwalk, clowns, silent auction, APD "jail," music and free family movie. Call 281-331-5825 or 281-585-3406.

Paint-n-Dine watercolor painting party: 11 a.m. to 2 p.m. at Brazos Pointe Fellowship, 679 Highway 332 W., Lake Jackson. $50 includes painting, lunch and door prizes. Seating limited. Contact Nanette at 979-299-9144 or Nanette@riverofhopetx.org.

16th annual Walk for Habitat: 8 a.m. at MacLean Park, Lake Jackson. Registration and pep rally. Walk begins at 9 a.m. Refreshments, Texans cheerleaders, drill teams and every child gets a T-shirt. Kids free, adults by donation. Call 979-285-2800.

Marine Corps 239th Birthday Ball: 6 to 10 p.m. at American Legion Hall of Angleton, 1021 S. Highway 288. Special invitation to all Marines. Evening attire, dinner, dance, $15 for singles, $25 for couples. RSVP deadline was Wednesday; call 979-849-0655 or 979-848-1858.

Fall Feast: 11 a.m. to 2 p.m. at First Presbyterian Church, 130 S. Arcola, Angleton. $12 barbecue plates, take out or dine in. Purchase tickets at door or call 979-849-5722.

Chapelwood Mission Fair: 9 a.m. to 2 p.m. at Chapelwood United Methodist Church, 300 Willow Drive, Lake Jackson. Shop till you drop with hand-made items, bake sale, tamale sale and knife sale. Donated items: bag of rice, health kits, hand-made Christmas cards. Call Sherri Archer at 979-297-9984 or 979-236-1747.

Brazosport Symphony concert: 7:30 p.m. at The Clarion, 400 College Blvd., Clute. Performing Mock Morris by Percy Grainger, Ney Rosauro percussion concerto, movement III with soloist Charles Fricker, tuba concerto with soloist Philip Walker, and symphony in D minor by Cesar Frank. Adults $22; seniors, children and students with ID $15. Tickets online at clarion.brazosport.edu or at the door. Call 979-265-7661.

Grandparents Day: 11 a.m. at Alvin Library, 105 S. Gordon St. Bring grandchildren for crafts, stories, games and treats. All aunts and uncles invited. Call the branch at 281-388-4300.

Free Clothes, Really Free: 8 a.m. to noon at New Bethel Baptist Church, 304 W. Live Oak St., Angleton. Clothing exchange for church and class of 2015 members. Call 979-864-9096.

Miracle Market and Bistro: 9 a.m. to 4 p.m. at Columbia United Methodist Church, 315 S. 16th St., West Columbia. Knotty Girls Group brings homemade and hand crafted items. Crocheted and knitted items, baked goods, local author book-signing and more. Breakfast and lunch sold at Bistro. Call 979-345-4642.

CORRECTIONS

The Facts makes every effort to ensure the accuracy of its information, and it is our policy to correct errors promptly. Errors may be reported by telephone at 979-237-0148, fax at 979-265-9052 or email at news@

PUBLIC MEETING NOTICE

GCCPRD
The Gulf Coast Community Protection and Recovery District

The Gulf Coast Community Protection and Recovery District (GCCPRD) will host a series of public scoping meetings in December 2014 to encourage public participation and feedback in the Storm Surge Suppression Study. The GCCPRD is a local government corporation created by Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties, and is leading a technical, scientific-based effort to investigate opportunities to alleviate the vulnerability of the upper Texas coast to storm surge and flooding. This effort is an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a plan that meets the needs of the region and the nation.

Public feedback and participation will be encouraged throughout the duration of the study. Public scoping meetings will be held on the following dates at these locations:

Thursday, December 4, 2014 • 6 p.m. to 8 p.m.
League City Civic Center
400 West Walker St. • League City, Texas 77573

Tuesday, December 9, 2014 • 6 p.m. to 8 p.m.
Harris County Precinct 2
J.D. Walker Community Center
7613 Wade Rd. • Baytown, Texas 77521

Thursday, December 11, 2014 • 6 p.m. to 8 p.m.
Jefferson County Courthouse
Jury Impaneling Room
1001 Pearl St. • Beaumont, Texas 77701

Materials, presentation, and format will be the same at all three meetings. The open houses will last from 6 p.m. to 8 p.m. Informational displays will be available for public viewing, and GCCPRD representatives will provide information and answer questions. No formal presentation will be made. Informational materials will be available in English and Spanish.

If hearing impaired or language translation services are needed, please contact the GCCPRD consulting team at 713-868-1043 or ***info@gccprd.com*** by November 26, 2014. GCCPRD representatives will make every reasonable effort to accommodate these needs.

Comments will be accepted at the public scoping meetings and throughout the duration of the study. Written comments may be mailed to the ***Gulf Coast Community Protection and Recovery District in care of Col. Christopher Sallese at 3100 West Alabama St., Houston, Texas 77098***, or emailed to ***info@gccprd.com***.

For more information about GCCPRD and this study, visit ***www.gccprd.com***.

The Orange Leader (Published November 8, 2014)

Affidavit of Publication

Crouch Environmental Services, Inc.
Attn: Connor Stokes
402 Teetshorn St.
Houston, TX 77009

COUNTY OF JEFFERSON TEXAS

Reference: GCCPRD- Public Meeting Notice
Before me, the undersigned authority, on this day personally appeared, Andrea Nussle [NAME] who being duly sworn, deposes and says that She [HE/SHE] is an agent of The Orange Leader: that said newspaper is regularly published in Jefferson County and generally circulated in Jefferson County, Texas: that the attached notice was published on the following date.

Andrea Nussle
[THE ORANGE LEADER REPRESENTATIVE]

Printed: November 8, 2014

Subscribed and sworn before me this 28 [DAY] of January [MONTH] 2015 AD

Connie D. Ytuarte [NOTARY SIGNATURE]

CONNIE D. YTUARTE
Notary Public
STATE OF TEXAS
My Comm. Exp. 02/22/2016
[NOTARY STAMP]

LSC-PA serves up Nov. 8 Beatles Tribute

Courtesy photo

The "Abbey Road" Beatles band consists of, from left, Laura Pineda, Antonio Briones, Carl Richardson and Josh Birdsong. It is one of several bands from Lamar State College-Port Arthur's Commercial Music Department that will be performing at 3:30 p.m. Saturday, Nov. 8, during a Beatles Tribute concert at the Parker Center in Port Arthur.

PORT ARTHUR — Back when Britney Spears and *NSYNC ruled the airwaves and Y2K was fast approaching, somewhere in Arkansas, an impressionable 7-year-old was about to have his mind blown.

"It turned out my best friends growing up were huge Beatles fans," Josh Birdsong recalled. "So I started checking out the Beatles. Then I started buying Beatles albums. Then I bought more and more. Eventually, I got their box sets.

"The Beatles were the pioneers of the music we know today. And the great thing is, that from Liverpool in 1962 to the Concert on the Roof in 1969, they never stopped changing."

Lamar State College-Port Arthur celebrates the Beatles and a couple of landmark Beatles anniversaries at 3:30 p.m. Saturday, November 8, with a free Beatles Tribute concert in the Parker Center parking lot. The event follows the end of the school's first home basketball game of the season, which begins at 2 p.m. against Houston Community College.

There will be free food and door prize drawings at the concert, and free basketball admission for anyone dressing in 60's retro clothing.

Musicians from the LSC-PA Commercial Music Department will dress the parts of John, Paul, George and Ringo and perform many of the best known Beatles' songs. Birdsong will perform as John Lennon in the homage to the English band that first visited the United States 50 years ago, in 1964, and played its final public performance 45 years ago, the rooftop concert at Abbey Road Studios.

Saturday's concert will also include tributes to other performers with local ties, like Janis Joplin, ZZ Top and Johnny Preston. Jivin' Gene Bourgeois will make a special appearance and reprise his 1959 chart hit "Breaking Up Is Hard To Do."

"This is an opportunity for the students and faculty to share their love of music with the rest of the campus and the greater Golden Triangle community," said John Freyermuth, Chair of the Commercial Music Department. "It allows the department to illustrate our deep appreciation for the extremely talented local artists that call, or called, Southeast Texas home.

"Also, the concert provides us with the opportunity to demonstrate to the community the unique educational experience that our program provides students as they prepare for further study or to enter the workforce."

Birdsong, 22 and a resident of Port Neches, is a member of Section 51, also known as the Commercial Music Department's Touring Band. The department's other group, The House Band, is also taking part in Saturday's show, along with the department's student lighting and sound engineers.

The LSC-PA Theater Department has chipped in with costume and choreography. The Student Activities Department is setting the mood with decorations and even came up with Beatles-themed foods like Sgt. Pepperoni Pizza and Yellow Submarines, which are actually dressed-up Twinkies.

"The students are really excited to be part of a larger campus event and cannot wait to show what they are capable of," Freyermuth said. "Both students and faculty are looking forward to working on future events that involve interdepartmental collaborations and take their performances to new venues on the campus and in the greater Golden Triangle area."

Birdsong said he came to LSC-PA's Commercial Music Department for help in realizing a career as a songwriter and performer. He expects it to be an enjoyable career.

"What I like most about the Beatles is they were the most famous band, and they literally were just four boys having fun," Birdsong said. "That reminds me to have fun on stage, not to take myself too seriously.

"For me, this has been a blast, and everybody's getting in on it."

GCCPRD PUBLIC MEETING NOTICE

The Gulf Coast Community Protection and Recovery District

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Public feedback and participation will be encouraged throughout the duration of the study. Public scoping meetings will be held on the following dates at these locations:

Thursday, December 4, 2014	*Tuesday, December 9, 2014*	*Thursday, December 11, 2014*
6 p.m. to 8 p.m.	*6 p.m. to 8 p.m.*	*6 p.m. to 8 p.m.*
League City Civic Center	*Harris County Precinct 2 J.D. Walker Community Center*	*Jefferson County Courthouse Jury Impaneling Room*
400 West Walker St.	*7613 Wade Rd.*	*1001 Pearl St.*
League City, Texas 77573	*Baytown, Texas 77521*	*Beaumont, Texas 77701*

Materials, presentation, and format will be the same at all three meetings. The open houses will last from 6 p.m. to 8 p.m. Informational displays will be available for public viewing, and GCCPRD representatives will provide information and answer questions. No formal presentation will be made. Informational materials will be available in English and Spanish.

If hearing impaired or language translation services are needed, please contact the GCCPRD consulting team at 713-868-1043 or ***info@gccprd.com*** by November 26, 2014. GCCPRD representatives will make every reasonable effort to accommodate these needs.

Comments will be accepted at the public scoping meetings and throughout the duration of the study. Written comments may be mailed to the ***Gulf Coast Community Protection and Recovery District in care of Col. Christopher Sallese at 3100 West Alabama St., Houston, Texas 77098***, or emailed to ***info@gccprd.com***.

For more information about GCCPRD and this study, visit ***www.gccprd.com.***

Section 4: Press Releases

List of Media Outlets

October 9 Public Information Session Press Release
(Released October 6, 2014)

October 9 Public Information Session Follow-up Press Release
(Released October 10, 2014)

Public Scoping Meetings and Media Briefing Press Release
(Released November 17, 2014)

List of Media Outlets

Media Outlets

- abc 13
- Atascocita Observer
- Bay Area Citizen
- Beaumont Enterprise
- Brazoria – The Facts
- Channel 39 (CW39)
- Cleveland Advocate
- Dayton Advocate
- Deer Park Broadcaster
- East Montgomery County Observer
- Eastex News
- Examiner
- Fox 26 News
- Friendswood Journal
- Galveston Daily News
- Guidry News Service
- Houston Community Newspapers
- Humble Observer
- KHOU Channel 11
- Kingwood Observer
- KPFT 90.1 Houston Public Community News
- KPRC Channel 2
- KUHT Houston
- KVLU 91.3 Lamar University Public Radio
- Lake Houston Observer
- Memorial Examiner
- Pasadena Citizen
- Pearland Journal
- Port Arthur News
- Spring Observer
- The Baytown Sun
- The Houston Chronicle
- The Orange Leader
- The Rancher
- The Sugar Land Sun
- Woodlands Villager

October 9 Public Information Session Press Release (Released October 6, 2014)

FOR IMMEDIATE RELEASE

CONTACT:
Robert Eckels
President, Gulf Coast Community Protection and Recovery District, Inc.
Email: Info@gccprd.com

Re: Gulf Coast Community Protection and Recovery District Public Information Session; October 9, 2014 at 2:00 p.m., Harris County Commissioners Court

HOUSTON (October 6, 2014) – Gulf Coast Community Protection and Recovery District, Inc. (the "GCCPRD") will host a public information session on Thursday, October 9, 2014 at 2:00 p.m., hosted by Harris County Judge Ed Emmett and GCCPRD President Robert Eckels, in the Harris County Commissioners Court Courtroom on the ninth floor of the Harris County Administration Building, 1001 Preston Avenue, Houston, Texas. This public information session will provide details about the GCCPRD Storm Surge Suppression Study.

Following three major hurricanes, the last of which (Hurricane Ike) was the most expensive in Texas' history, Governor Perry issued an Executive Order creating the Governor's Commission for Disaster Recovery and Renewal. One of the Commission's recommendations was to conduct a study to determine how coastal communities can reduce the damage impact of future storms. In conjunction with that recommendation, the GCCPRD was formed as a local government corporation in 2010 by Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties. The GCCPRD has been leading a technical, scientific-based study funded to investigate opportunities to alleviate the vulnerability of the upper Texas coast to storm surge and flooding from severe storms like Hurricane Ike. The study is funded by the Texas General Land Office through a $3.9 million federal Housing and Urban Development, Community Development Block Grant that was awarded in September 2013. Since then, the GCCPRD has been collecting data and analyzing existing studies and reports.

The study team is collaborating with other organizations and researchers to share data and compare findings. The GCCPRD's study will yield a system of storm surge suppression alternatives that may consist of a variety of natural, structural, and nonstructural methods. Using these findings, the GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and storm surge suppression measures to help protect the six-county region.

Public feedback and participation will be encouraged throughout the life of the study. Thursday's meeting is the first in a series of public scoping meetings across the six-county region. The meetings are intended to provide information about the study and receive input from the affected communities. For more information or to join the study mailing list visit: http://www.gccprd.com/

About the Gulf Coast Community Protection and Recovery District (GCCPRD): The GCCPRD is a local government corporation governed by a Board of Directors comprised of the County Judge of each participating county and three additional appointed members serving three-year terms. Former Harris County Judge Robert Eckels was appointed by the Board to serve as President of the District.

# # #

October 9 Public Information Session Follow-up Press Release (Released October 10, 2014)

FOR IMMEDIATE RELEASE

CONTACT:
Robert Eckels
President, Gulf Coast Community Protection and Recovery District, Inc.
Email: Info@gccprd.com

Re: Gulf Coast Community Protection and Recovery District Hosts Public Information Session on October 9, 2014 at 2:00 p.m., Harris County Commissioners Court

HOUSTON (October 10, 2014) – The Gulf Coast Community Protection and Recovery District (GCCPRD) held a public information session on Thursday, October 9, 2014 hosted by Harris County Judge Ed Emmett and GCCPRD President Robert Eckels. The session provided details about the GCCPRD Storm Surge Suppression Study.

Following three major hurricanes, the last of which (Hurricane Ike) was the most expensive in Texas' history, Governor Perry issued an Executive Order creating the Governor's Commission for Disaster Recovery and Renewal. One of the Commission's recommendations was to conduct a study to determine how coastal communities can reduce the damage of future storms. In conjunction with that recommendation, Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties formed the GCCPRD as a local government corporation. The GCCPRD is leading the Storm Surge Suppression Study, a technical, scientific-based study funded to investigate opportunities to alleviate the vulnerability of the upper Texas coast to storm surge and flooding from events like Hurricane Ike. The study is funded by the Texas General Land Office through a $3.9 million federal Housing and Urban Development, Community Development Block Grant that was awarded in September 2013. Since then, the GCCPRD has been collecting data as well as analyzing existing studies and reports. This study is an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a comprehensive coastal protection plan that meets the needs of the region and the nation.

The Storm Surge Suppression Study will yield a variety of storm surge suppression alternatives that may consist of natural, structural, and nonstructural methods. Using these findings, the GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and storm surge suppression measures to help protect the six-county region. It is anticipated that this study will conclude in fall 2016. Public feedback and participation is encouraged throughout the life of the study. Public scoping meetings will be held in winter 2014 and at key milestones in the study. Future large-scale public scoping meetings will be noticed in advance in local newspapers. For more information or to join the mailing list visit: http://www.gccprd.com/

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# # #

Public Scoping Meetings and Media Briefing Press Release (Released November 17, 2014)

CONTACT:
Robert Eckels, President
Gulf Coast Community Protection and Recovery District, Inc.
Email: info@gccprd.com

FOR IMMEDIATE RELEASE

Re: Gulf Coast Community Protection and Recovery District Public Scoping Meetings and Media Briefing

HOUSTON (November 17, 2014) – The Gulf Coast Community Protection and Recovery District (GCCPRD) will host a series of public scoping meetings in December 2014 to encourage public participation and feedback in the Storm Surge Suppression Study.

In advance of the public scoping meetings, a media briefing will be held on Monday, December 1, 2014, at 10 a.m. at the Harris County Commissioners Court Courtroom on the 9th floor of the Harris County Administration Building, 1001 Preston Avenue, Houston, Texas. Study representatives will be available to answer questions, and a brief presentation will be made. Media representatives are encouraged to attend.

Following three major hurricanes, the last of which (Hurricane Ike) was the most expensive in Texas' history, Governor Perry issued an Executive Order creating the Governor's Commission for Disaster Recovery and Renewal. One of the Commission's recommendations was to conduct a study to determine how coastal communities can reduce the damage impact of future storms. In conjunction with that recommendation, Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties formed the GCCPRD as a local government corporation. The GCCPRD is now leading the Storm Surge Suppression Study, a technical, scientific-based effort to investigate opportunities to alleviate the vulnerability of the upper Texas coast to storm surge and flooding.

The study is funded by the Texas General Land Office through a $3.9 million federal Housing and Urban Development Community Development Block Grant that was awarded in September 2013. Since then, the GCCPRD has been collecting and analyzing existing data, and collaborating with other organizations and universities conducting similar work. The Storm Surge Suppression Study will yield a system of alternatives that may consist of a variety of natural, structural, and nonstructural methods. Using these findings, the GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and surge suppression measures to help protect the six-county region. This effort is an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a plan that meets the needs of the region and the nation.

Public feedback and participation will be encouraged throughout the duration of the study. Public scoping meetings will be held on the following dates and locations:

Thursday, December 4, 2014	**Tuesday, December 9, 2014**	**Thursday, December 11, 2014**
6 p.m. to 8 p.m.	**6 p.m. to 8 p.m.**	**6 p.m. to 8 p.m.**
League City Civic Center	**Harris County Precinct 2**	**Jefferson County Courthouse**
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League City, Texas 77573	**7613 Wade Rd.**	**1001 Pearl St.**
	Baytown, Texas 77521	**Beaumont, Texas 77701**

Materials, presentation, and format will be the same at all three meetings. The open houses will last from 6 p.m. to 8 p.m. Informational displays will be available for public viewing, and GCCPRD representatives will provide information and answer questions. No formal presentation will be made. Materials will be available in English and Spanish.

Comments will be accepted at the public scoping meetings and throughout the duration of the study. Written comments may be mailed to the Gulf Coast Community Protection and Recovery District in care of Col. Christopher Sallese at 3100 West Alabama St., Houston, Texas 77098 or emailed to info@gccprd.com.

For more information about GCCPRD and this study, visit www.gccprd.com.

To protect personal identity, Section 5 is not available for download.

Section 5: Public Scoping Meeting Attendees

Public Scoping Meeting Attendee List

Scanned Attendee Cards

League City Meeting (December 4, 2014)

Baytown Meeting (December 9, 2014)

Beaumont Meeting (December 11, 2014)

Media Briefing (December 1, 2014)

Section 6: Public Scoping Meeting Organization and Materials

Public Scoping Meeting Layouts

"How to Participate" Handout (English and Spanish)

GCCPRD Study Guide (English and Spanish)

Public Meeting Display Materials

Display Board Layouts (English and Spanish)

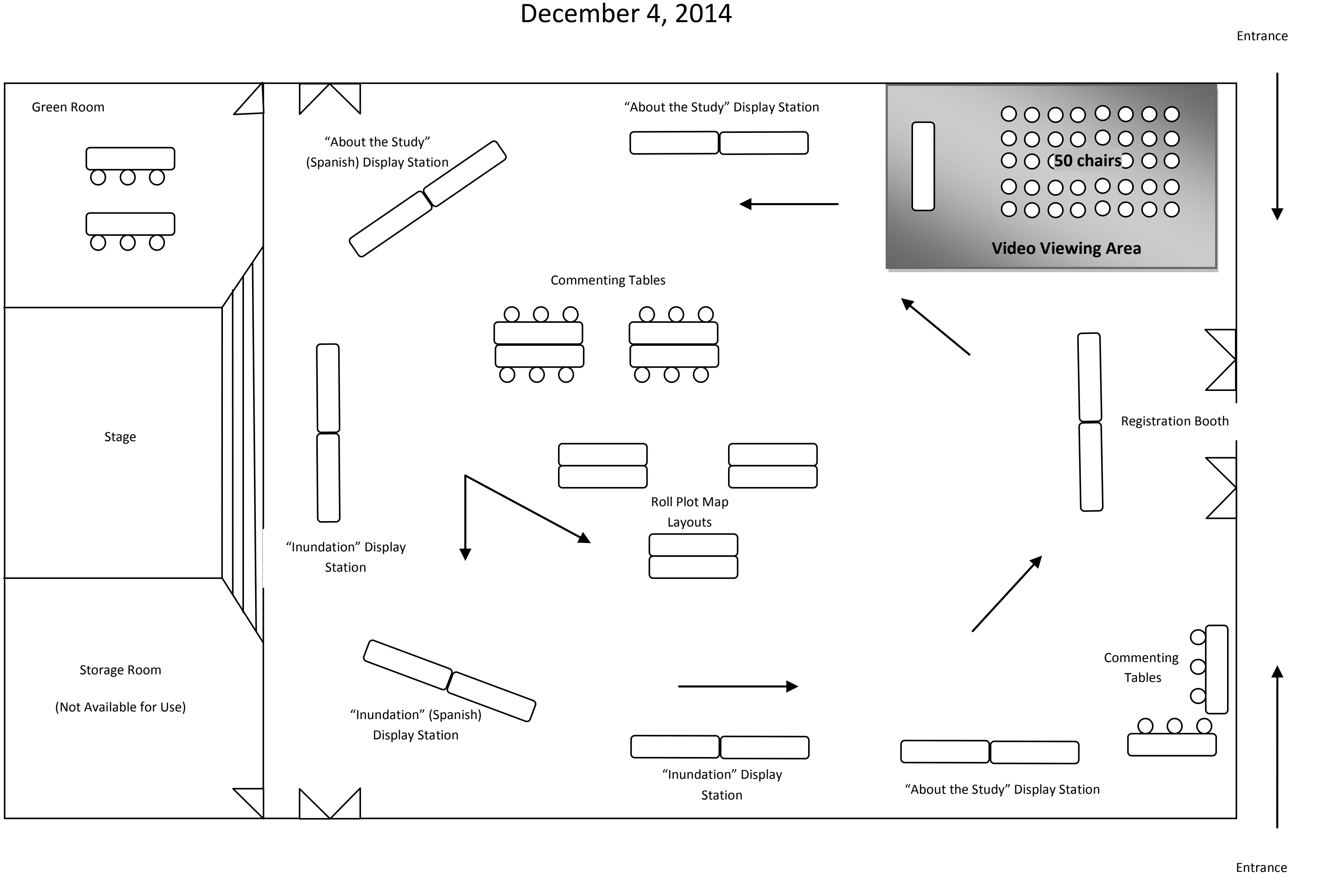
Full-page Displays (English and Spanish)

Digital Displays

Public Scoping Meeting Layouts

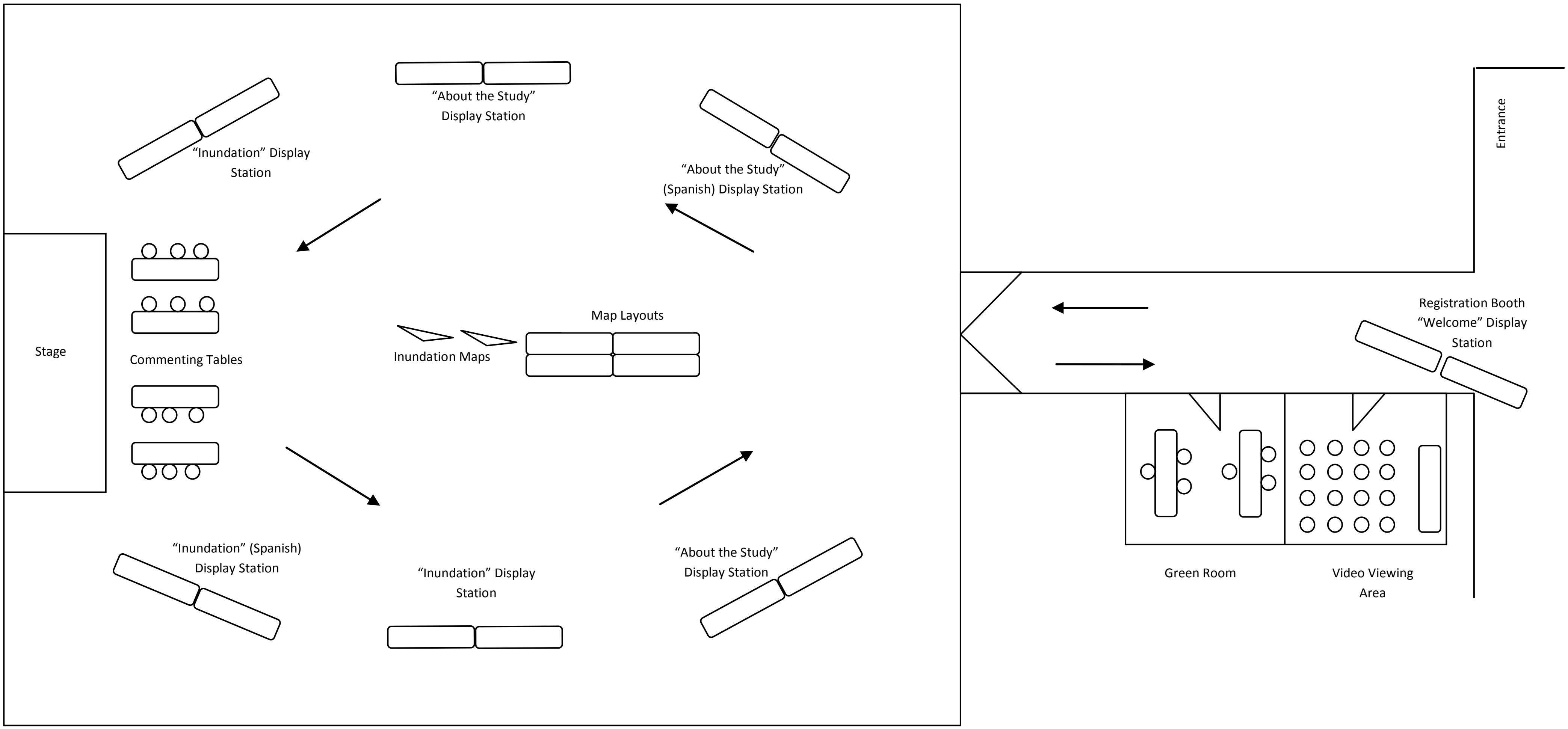
GCCPRD Public Scoping Meeting – League City, Texas

December 4, 2014



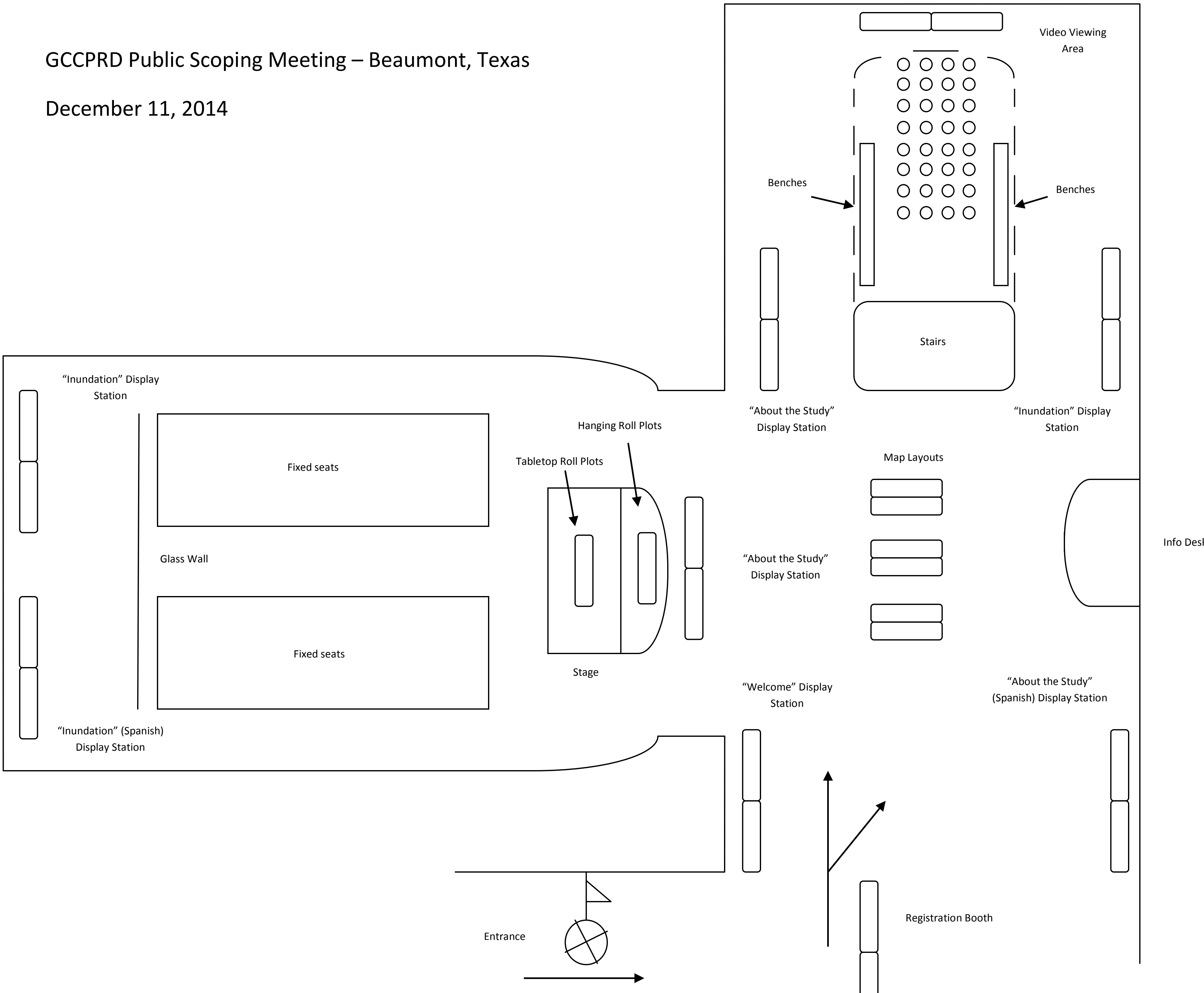
GCCPRD Public Scoping Meeting – Baytown, Texas

December 9, 2014



GCCPRD Public Scoping Meeting – Beaumont, Texas

December 11, 2014



“How to Participate” Handout

(English and Spanish)

GCCPRD

The Gulf Coast Community Protection and Recovery District

One, Two, Threes of Open House Participation:

ONE Watch the Study Video Introduction

The study video is a 5-minute presentation that introduces the GCCPRD, the Storm Surge Suppression Study, and the study process. The video repeats every 6 minutes in the theater area.

After you have watched the video, study team representatives are available to discuss the study with you. Representatives are wearing nametags and looking forward to hearing from you. Please let them know if you have any questions or comments.

TWO Provide Feedback on the Study Region Maps

Please use the pens, markers, and post-it notes to provide the Storm Surge Suppression Study team with information about flooding and inundation in our region.

- Use ***blue markers*** to indicate places within the region that you feel are *susceptible to storm surge and/or localized flooding.*
- Use ***green markers*** to indicate *environmentally sensitive areas.*
- Use ***red markers*** to indicate *critical infrastructure.*
- ***Provide comments and ideas about storm surge suppression measures*** by recording information on post-it notes and placing these notes on the map.

THREE Complete a Comment Form

The Storm Surge Suppression Study team encourages public feedback and participation. Public comments will be accepted throughout the duration of the study. Written comments may be e-mailed to info@gccprd.com or mailed to:

Gulf Coast Community Protection and Recovery District
c/o Col. Christopher Sallese
3100 West Alabama St.
Houston, Texas 77098

For more information about the study or to join the study mailing list, visit www.gccprd.com.

GCCPRD

The Gulf Coast Community Protection and Recovery District

El uno, dos, tres para la participación en la Casa Abierta:

UNO — Mire la video del introducción del estudio

El video del estudio es una presentación de 5 minutos que da a conocer el GCCPRD, el Estudio de Supresión de Marejadas de Tormenta y el proceso del estudio. El video se repite cada 6 minutos en la zona de los teatros.

Después de que usted haya visto el video, los representantes del equipo de estudio estarán disponibles para discutir el estudio con usted. Los representantes usarán etiquetas de identificación y estarán esperando su participación. Por favor, hágales saber si usted tiene alguna pregunta o comentario.

DOS — Proporcione comentarios sobre los mapas de la región del estudio

Por favor use plumas, marcadores y notitas post-it para dar información sobre desbordamiento de aguas e inundaciones en nuestra región para el equipo del Estudio de Supresión de Marejada de Tormenta.

- Use ***marcadores azules*** para indicar los lugares de la región que piensa que sean *susceptibles a desbordamiento de aguas o inundaciones locales*.
- Use ***marcadores verdes*** para indicar áreas *ecológicamente sensibles*.
- Use ***marcadores rojos*** para indicar *infraestructuras esenciales*.
- ➡ ***Ofrezca sus comentarios e ideas sobre medidas para detener el desbordamiento de aguas torrenciales*** en las notitas post-it y póngalas en el mapa.

TRES — Complete un formulario de comentarios

El equipo del Estudio de Supresión de Marejada de Tormenta alienta la retroalimentación y la participación del público. Los comentarios del público serán aceptados durante toda la duración del estudio. Los comentarios escritos pueden enviarse por correo electrónico a: info@gccprd.com o enviarlos por correo regular a:

Gulf Coast Community Protection and Recovery District
c/o Col. Christopher Sallese
3100 West Alabama St.
Houston, Texas 77098

Para obtener más información sobre el estudio o para unirse a la lista de correo de estudio, visite: www.gccprd.com.

GCCPRD Study Guide

(English and Spanish)

GCCPRD | Study Guide

The Gulf Coast Community Protection and Recovery District

Study Background

Following three major hurricanes, the last of which (Hurricane Ike) was the most expensive in Texas' history, Governor Perry issued an Executive Order creating the Governor's Commission for Disaster Recovery and Renewal. One of the Commission's recommendations was to conduct a study to determine how coastal communities can reduce the damage impact of future storms. In conjunction with that recommendation, Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties formed the Gulf Coast Community Protection and Recovery District (GCCPRD) as a local government corporation. The GCCPRD is now leading the Storm Surge Suppression Study, a technical, scientific-based effort to investigate opportunities to alleviate the vulnerability of the upper Texas coast to storm surge and flooding.

Going Forward

The GCCPRD is supported in leading the Storm Surge Suppression Study by a team of engineers, environmental scientists, economists, and community outreach specialists. The study is funded by the Texas General Land Office through a $3.9 million federal Housing and Urban Development Community Development Block Grant that was awarded in September 2013.

Since then, the GCCPRD has been collecting and analyzing existing data, and collaborating with other organizations and universities conducting similar work. This effort is an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a plan that meets the storm surge suppression needs of the region and the nation.

This effort is an opportunity for the GCCPRD to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a plan that meets the needs of the region and the nation.

The Storm Surge Suppression Study will include:

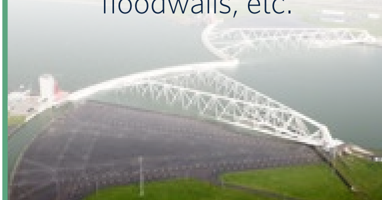
- Public engagement
- Economic analysis
- Hydrologic and hydraulic analysis
- Geotechnical analysis
- Preliminary structural design
- Environmental analysis
- Social analysis
- Archeological analysis
- Surveying and mapping
- Real estate

The Storm Surge Suppression Study will yield a system of alternatives that may consist of a variety of natural, structural, and nonstructural methods. Using these findings, the GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and surge suppression measures to help protect the six-county region.

Methods of Storm Surge Suppression

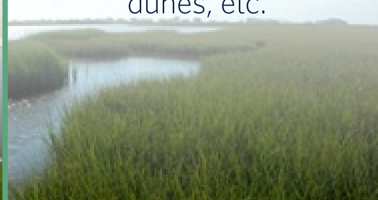
Structural

Levees, gates, floodwalls, etc.



Natural

Oyster reefs, wetlands, dunes, etc.



Nonstructural

Buyouts, building codes, flood proofing, evacuation, elevation, etc.

NATIONAL FLOOD INSURANCE PROGRAM

What is involved in this planning study?

INITIAL STUDY

WE ARE HERE

1 Existing data and information are gathered, reviewed, and studied

2 Public scoping sessions are held, inviting comments and feedback

Public Feedback

3 Stakeholder comments are reviewed and incorporated into the study

Public Feedback

DEVELOPMENT

4 A variety of alternatives are developed based on technical expertise and public input

5 Alternatives are evaluated

6 Public review meetings are held, inviting feedback on study alternatives

Public Feedback

REFINEMENT

7 Stakeholder comments and additional technical data are reviewed and incorporated into the study

Public Feedback

8 Alternatives are refined

RECOMMENDATION

9 The GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and surge suppression measures to help protect the six-county region

The team would like to stress that this is a conceptual planning study. When the GCCPRD identifies a viable system of flood damage reduction and surge suppression measures, *extensive additional* investigation and design will be necessary. The community will be informed and included every step of the way.

The goals of the study are to:

- Determine appropriate actions that may be taken to protect life, health, and safety of the community, and provide environmental and economic resilience within the study area.
- Develop a viable region-wide program that, once implemented, would better protect the region from future natural disasters associated with storm surge flooding events.
- Identify potential funding mechanisms to implement a storm surge suppression system for the six-county region.

Frequently Asked Questions

Why is the study important?

Hurricane Ike caused billions of dollars in damage, the loss of dozens of lives, and is estimated to be the third most destructive hurricane in U.S. history in terms of economic loss. As a result of Ike and its devastating impacts on the upper Texas coast, it is critically important to gather information, evaluate options, and develop a region-wide approach to better protect our communities from future natural disasters.

Why has the study effort been delayed until now?

Huge undertakings like this study take a great deal of thought and planning, all the way from budgeting and commitment of public funds to developing the study process and implementation. To achieve the very best outcome requires meticulous planning and patience. We know we work for you. It is our intention to provide the most cost-effective, efficient recommendation on your behalf, and we invite you to participate in the study process with us for the next year and a half.

What alternatives are being considered?

This study will identify multiple, viable alternatives that would provide storm surge protection for the six-county region. An expert team of technical, environmental, and engineering experts will investigate possible alternatives throughout the study process.

The study team will seek public input throughout the process. Stakeholder meetings and public scoping sessions will occur at intervals during the study, and web-based tools will be created to disseminate information and gather public feedback. Stakeholder ideas, issues, and concerns will be considered as conceptual alternatives are being evaluated by the team.

What happens after the study is complete?

The final report will be presented to the Board of the GCCPRD and the Texas General Land Office (GLO) for review and comment. After review and acceptance by the GLO, the report will be made available to the public through the GCCPRD website and other pertinent public forums.

What is the projected timeline for the study?

It is anticipated that the entire study, including the final report and recommendations, would be complete by summer 2016.

Get Involved

The Storm Surge Suppression Study team encourages public feedback and participation. Public comments will be accepted throughout the duration of the study. Written comments may be e-mailed to info@gccprd.com or mailed to:

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c/o Col. Christopher Sallese
3100 West Alabama St.
Houston, Texas 77098

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GCCPRD

The Gulf Coast Community Protection and Recovery District

Guía de Estudio

Antecedentes del estudio

Después de tres huracanes de gran intensidad, el último de los cuales (el huracán Ike) fue el más costoso en la historia de Texas, el Gobernador Perry emitió un Decreto Ejecutivo para crear la Comisión del Gobernador para la Recuperación y Renovación de Desastres. Una de las recomendaciones de la Comisión fue la de realizar un estudio para determinar cómo pueden reducir las comunidades costeras el impacto de los daños de futuras tormentas. Junto con esa recomendación, los Condados de Brazoria, Chambers, Galveston, Harris, Jefferson y Orange formaron el Gulf Coast Community Protection and Recovery District - Distrito de Protección y Recuperación de la Comunidad de la Costa del Golfo - (GCCPRD) como una corporación del gobierno local. El GCCPRD está dirigiendo el Estudio de Supresión de Marejada de Tormenta, un esfuerzo técnico con base científica, para investigar las oportunidades para mitigar la vulnerabilidad de la costa superior de Texas a las marejadas de tormentas y a las inundaciones.

A partir de ahora

Para la conducción del Estudio de Supresión de Marejada de Tormenta el GCCPRD se apoya en un equipo de ingenieros, científicos ambientales, economistas y especialistas en asistencia comunitaria. El estudio es financiado por la Oficina General de Tierras de Texas a través de una Subvención Federal del Bloque de Desarrollo de la Comunidad, del Desarrollo de Vivienda y Urbano, de $3.9 millones, que fue otorgada en el mes de septiembre de 2013.

Este esfuerzo es una oportunidad para que el GCCPRD asuma un papel de liderazgo y trabaje en colaboración con las autoridades federales, estatales, locales y las instituciones públicas y privadas para desarrollar un plan que satisfaga las necesidades de la región y de la nación.

Desde entonces, el GCCPRD ha estado acumulando y analizando los datos existentes, y colaborando con otras organizaciones y universidades que realizan un trabajo similar. Este esfuerzo es una oportunidad para que el GCCPRD asuma un papel de liderazgo y trabaje en colaboración con las autoridades federales, estatales, locales y las instituciones públicas y privadas para desarrollar un plan que satisfaga las necesidades de supresión de marejada de tormenta de la región y de la nación.

El Estudio de Supresión de Marejada de Tormenta producirá un sistema de alternativas que pueden consistir en una variedad de métodos naturales, estructurales y no estructurales. Usando estos hallazgos, el GCCPRD recomendará un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada para ayudar a proteger la región de los seis condados.

El estudio de una marejada de tormenta incluirá:

- Compromiso del público
- Análisis económico
- Análisis hidrológico e hidráulico
- Análisis geotécnico
- Diseño estructural preliminar
- Análisis ambiental
- Análisis social
- Análisis arqueológico
- Topografía y cartografía
- Bienes Raíces

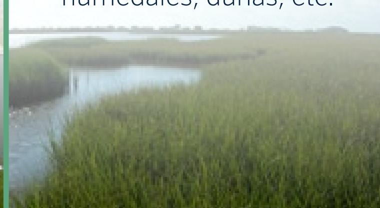
Métodos de supresión de marejada de tormenta

Estructurales

Diques, compuertas, muros de contención, etc.

Naturales

Arrecifes de ostras, humedales, dunas, etc.



No estructurales

Adquisiciones, códigos de construcción, pruebas de inundación, evacuación, elevación, etc.

NATIONAL FLOOD INSURANCE PROGRAM

¿Qué es lo que se encuentra involucrado en este estudio de planificación?

ESTUDIO INICIAL

ESTAMOS AQUÍ

1 Los datos y la información existentes se reúnen, revisan y estudian

2 Las sesiones de exploración pública se llevan a cabo invitando a los comentarios y a la retroalimentación
Comentarios del Público

3 Las observaciones de las partes interesadas son revisadas e incorporadas en el estudio
Comentarios del Público

DESARROLLO

4 Una variedad de alternativas se desarrollan con base en los conocimientos técnicos y en la opinión del público

5 Las alternativas son evaluadas

6 Las reuniones de revisión pública se llevan a cabo invitando a la retroalimentación sobre las alternativas de estudio
Comentarios del Público

REFINAMIENTO

7 Los comentarios de los interesados y los datos técnicos adicionales son revisados e incorporados en el estudio
Comentarios del Público

8 Las alternativas son refinadas

RECOMENDACIÓN

9 El GCCPRD recomendará un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada para ayudar a proteger la región de los seis condados

El equipo desea hacer hincapié en que se trata de un estudio de planificación conceptual. Cuando el GCCPRD identifique un sistema viable de reducción de daños por inundaciones y medidas de supresión de marejadas, serán necesarias actividades de investigación y diseño *adicionales y extensas*. La comunidad será informada y será incluida en cada paso del camino.

Los objetivos del estudio son:

- Determinar las acciones apropiadas que se pueden tomar para proteger la vida, la salud y la seguridad de la comunidad, y proporcionar la capacidad de recuperación ambiental y económica dentro de la zona de estudio.
- Desarrollar un programa de alcance regional viable que, una vez implementado, pueda proteger mejor a la región frente a los desastres naturales futuros, asociados a eventos de inundación por marejadas de tormenta.
- Identificar los posibles mecanismos de financiación para poner en práctica un sistema de supresión de la marejada por tormenta para la región de los seis condados.

Preguntas frecuentes

¿Por qué es importante el estudio?

El huracán Ike causó miles de millones de dólares en daños, la pérdida de decenas de vidas, y se estima que es el tercer huracán más destructivo en la historia de los Estados Unidos, en términos de pérdidas económicas. Como resultado de Ike y sus impactos devastadores en la costa superior de Texas, es sumamente importante recopilar información, evaluar opciones y desarrollar un enfoque regional para proteger mejor a nuestras comunidades contra futuros desastres naturales.

¿Por qué se ha retrasado el esfuerzo de estudio hasta ahora?

Los grandes proyectos, tales como este estudio, tienen una gran cantidad de consideraciones y de planificación, desde la elaboración del presupuesto y la asignación de los fondos públicos, hasta el desarrollo del proceso de estudio e implementación. Para lograr el mejor resultado, se requiere de una planificación meticulosa y de paciencia. Sabemos que trabajamos para ustedes. Es nuestra intención de proporcionarles la recomendación más rentable y eficiente, y les invitamos a participar con nosotros en el proceso de estudio durante el próximo año y medio.

¿Qué alternativas se están considerando?

Este estudio identificará múltiples alternativas viables, que proporcionarían protección contra marejada de tormenta para la región de los seis condados. Un equipo de expertos técnicos, ambientales y de ingeniería investigará posibles alternativas a lo largo del proceso del estudio.

El equipo de estudio buscará la opinión del público en todo el proceso. Las reuniones de las partes interesadas y las sesiones públicas de exploración ocurrirán a intervalos durante el estudio, y se crearán herramientas basadas en la web para difundir la información y el intercambio de las ideas del público. Las ideas de las partes interesadas, los problemas y las preocupaciones serán consideradas como alternativas conceptuales que estén siendo evaluadas por el equipo.

¿Qué sucederá después de que el estudio se haya completado?

El informe final se presentará a la Junta del GCCPRD y a la Oficina General de Tierras de Texas (GLO) para su revisión y comentarios. Después de la revisión y aceptación por parte de la GLO, se pondrá a disposición el informe a la opinión pública a través de la página web del GCCPRD y de otros foros públicos pertinentes.

¿Cuál es el cronograma proyectado para el estudio?

Se prevé que la totalidad del estudio, incluyendo el informe final y las recomendaciones, estaría completa para el verano de 2016.

Participe

El equipo del Estudio de Supresión de Marejada de Tormenta alienta la retroalimentación y la participación del público Los comentarios del público serán aceptados durante toda la duración del estudio. Los comentarios escritos pueden enviarse por correo electrónico a: info@gccprd.com o enviarlos por correo regular a:

Gulf Coast Community Protection and Recovery District
c/o Col. Christopher Sallese
3100 West Alabama St.
Houston, Texas 77098

Para obtener más información sobre el estudio o para unirse a la lista de correo de estudio, visite: www.gccprd.com.

Public Meeting Display Materials

Display Board Layouts (English and Spanish)

Tabletop Display Material

Welcome

1 Booth

Tabletop Display Material

About the Study (English)

2 Booths

GCCPRD
The Gulf Coast Community Protection and Recovery District

About the Study

What is the GCCPRD?

Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties formed the GCCPRD as a local government corporation to lead the Storm Surge Suppression Study to alleviate the vulnerability of the upper Texas coast to storm surge and flooding.

What is the Storm Surge Suppression Study?

The Storm Surge Suppression Study is ***a technical, scientific-based effort*** to investigate opportunities to ***alleviate the vulnerability of the upper Texas coast*** to storm surge and flooding.

What is the purpose of this scoping meeting?

The purpose of this meeting is to:

- **Identify interested parties, significant issues, and alternatives** to be considered during the study process
- **Provide you with information about the study** and how you will be invited to participate in the study process
- **Gather public feedback** including questions, concerns, and issues relating to storm surge suppression in our region

GCCPRD COLLABORATIVE PARTNERS

USGS
FEMA
RICE
TEXAS

What is involved in this planning study?

Planning activities for the study include:

- Public engagement
- Economic analysis
- Hydrologic and hydraulic analysis
- Geotechnical analysis
- Preliminary structural design
- Environmental analysis
- Social analysis
- Archeological analysis
- Surveying and mapping
- Real estate

Who do I contact for more information or to provide comments?

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c/o Col. Christopher Sallese
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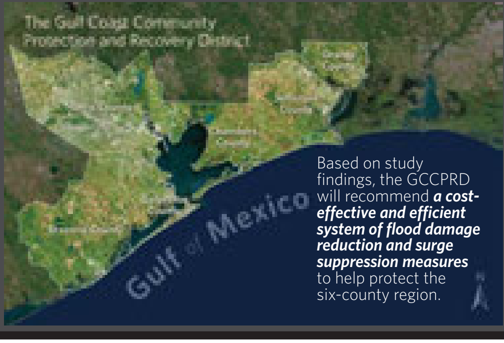
Email: info@GCCPRD.com
Online: www.GCCPRD.com



Based on study findings, the GCCPRD will recommend ***a cost-effective and efficient system of flood damage reduction and surge suppression measures*** to help protect the six-county region.

Tabletop Display Material

Inundation and Your Community (English)

2 Booths

Tabletop Display Material
About the Study (Spanish)
1 Booth

GCCPRD
The Gulf Coast Community Protection and Recovery District

Acerca del Estudio

¿Qué es el GCCPRD?

Los condados de Brazoria, Chambers, Galveston, Harris, Jefferson y Orange formaron el GCCPRD como una corporación del gobierno local para dirigir el Estudio de Supresión de Marejada de Tormenta para aliviar la vulnerabilidad de la costa superior de Texas a la marejada ciclónica y a las inundaciones.

SOCIOS COLABORADORES DEL GCCPRD

¿A quién debo contactar para obtener más información o para formular observaciones ?

Gulf Coast Community Protection and Recovery District
c/o Col. Christopher Sallese
3100 West Alabama St.
Houston, Texas 77098
Correo electrónico: info@GCCPRD.com
En línea: www.GCCPRD.com

¿Qué es el Estudio de Supresión de Marejada de Tormenta?

El Estudio de Supresión de Marejada de Tormenta, es un **esfuerzo técnico, con base científica**, para investigar las oportunidades para **mitigar la vulnerabilidad de la costa superior de Texas** a las marejadas de tormentas y a las inundaciones.

¿Qué es lo que se encuentra involucrado en este estudio de planificación?

ESTUDIO INICIAL

1 Los datos y la información existentes se reúnen, revisan y estudian

ESTAMOS AQUÍ

2 Las sesiones de exploración pública se llevan a cabo invitando a los comentarios y a la retroalimentación
Comentarios del Público

3 Las observaciones de las partes interesadas son revisadas e incorporadas en el estudio
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8 Las alternativas son refinadas

RECOMENDACIÓN

9 El GCCPRD recomendará un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada para ayudar a proteger la región de los seis condados

¿Cuál es el propósito de esta reunión de exploración y/o detección de necesidades?

El propósito de esta reunión es:

- **Identificar a las partes interesadas, a las cuestiones significativas y a las alternativas** que se han de tener en cuenta durante el proceso de estudio
- **Brindarle información sobre el estudio** y cómo se le invitará a participar en el proceso del estudio
- **Reunir información pública** incluyendo preguntas, preocupaciones y cuestiones relativas a la supresión de las marejadas de tempestad en nuestra región

Las actividades de planificación para el estudio incluyen:

- Compromiso del público
- Análisis económico
- Análisis hidrológico e hidráulico
- Análisis geotécnico
- Diseño estructural preliminar
- Análisis ambiental
- Análisis social
- Análisis arqueológico
- Topografía y cartografía
- Bienes raíces

Tabletop Display Material

Inundation and Your Community (Spanish)

1 Booth

Public Meeting Display Materials

Full-page Displays (English and Spanish)

GCCPRD

The Gulf Coast Community Protection and Recovery District

Welcome

Welcome to the Public Scoping Meeting for the Storm Surge Suppression Study!

Thank you for joining us this evening.

This study is the ***GCCPRD's opportunity to assume a leadership role*** and ***work collaboratively*** with federal, state, local, and public and private institutions to develop a plan that will ***meet the needs of the region and the nation***.

What is the GCCPRD?

Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties formed the GCCPRD as a local government corporation to lead the Storm Surge Suppression Study to alleviate the vulnerability of the upper Texas coast to storm surge and flooding.

GCCPRD COLLABORATIVE PARTNERS

USGS
science for a changing world

U.S. Department of Homeland Security
FEMA

National Oceanic and Atmospheric Administration
NOAA
U.S. Department of Commerce

United States Environmental Protection Agency

U.S. Fish & Wildlife Service
Department of the Interior

Texas General Land Office
Established 1836

US Army Corps of Engineers.
Galveston District

TEXAS HISTORICAL COMMISSION
real places telling real stories

South East Texas Regional Planning Commission

TEXAS PARKS & WILDLIFE
Life's better outside.®

SSPEED

Texas Department of Transportation

H-GAC

THE UNIVERSITY OF TEXAS AT AUSTIN

RICE

A&M Galveston

Rijkswaterstaat
Ministry of Infrastructure and the Environment

Port of Beaumont
Beaumont, Texas

Port of Houston Authority
PHA
Houston, Texas

Port of Galveston

What is the purpose of this scoping meeting?

The purpose of this meeting is to:

- **Identify interested parties, significant issues, and alternatives** to be considered during the study process
- **Provide you with information about the study** and how you will be invited to participate in the study process
- **Gather public feedback** including questions, concerns, and issues relating to storm surge suppression in our region

We are here tonight to **give you information** about the study and to **give you the opportunity to participate** in the study process.

We want to hear from *you*.

Who do I contact for more information or to provide comments?

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c/o Col. Christopher Sallese
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Houston, Texas 77098
Email: **info@GCCPRD.com**
Online: **www.GCCPRD.com**

GCCPRD

The Gulf Coast Community Protection and Recovery District

About the Study

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GCCPRD COLLABORATIVE PARTNERS

USGS
science for a changing world

U.S. Department of Homeland Security

FEMA

National Oceanic and Atmospheric Administration
NOAA
U.S. Department of Commerce

United States Environmental Protection Agency

U.S. Fish & Wildlife Service
Department of the Interior

Texas General Land Office
Established 1836

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HGAC

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RICE

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Ministry of Infrastructure and the Environment

Port of Beaumont
Beaumont, Texas

Port of Houston Authority
PHA
Houston, Texas

Port of Galveston

Who do I contact for more information or to provide comments?

Gulf Coast Community Protection and Recovery District
c/o Col. Christopher Sallese
3100 West Alabama St.
Houston, Texas 77098
Email: **info@GCCPRD.com**
Online: **www.GCCPRD.com**

What is the Storm Surge Suppression Study?

The Storm Surge Suppression Study is ***a technical, scientific-based effort*** to investigate opportunities to ***alleviate the vulnerability of the upper Texas coast*** to storm surge and flooding.

What is involved in this planning study?

INITIAL STUDY

WE ARE HERE

1 Existing data and information are gathered, reviewed, and studied

2 Public scoping sessions are held, inviting comments and feedback

Public Feedback

3 Stakeholder comments are reviewed and incorporated into the study

Public Feedback

DEVELOPMENT

4 A variety of alternatives are developed based on technical expertise and public input

5 Alternatives are evaluated

6 Public review meetings are held, inviting feedback on study alternatives

Public Feedback

REFINEMENT

7 Stakeholder comments and additional technical data are reviewed and incorporated into the study

Public Feedback

8 Alternatives are refined

RECOMMENDATION

9 The GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and surge suppression measures to help protect the six-county region

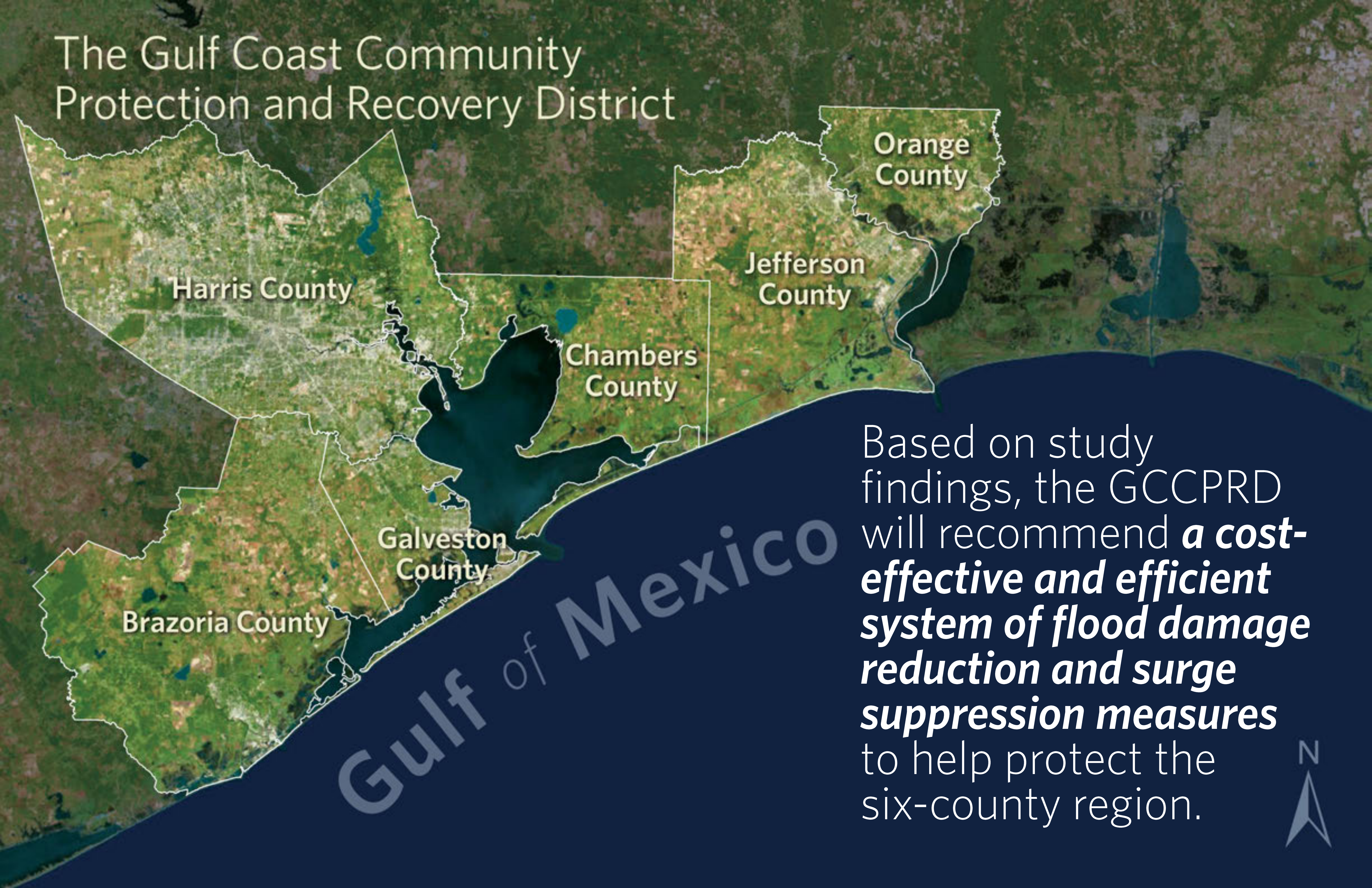
What is the purpose of this scoping meeting?

The purpose of this meeting is to:

- **Identify interested parties, significant issues, and alternatives** to be considered during the study process
- **Provide you with information about the study** and how you will be invited to participate in the study process
- **Gather public feedback** including questions, concerns, and issues relating to storm surge suppression in our region

Planning activities for the study include:

- Public engagement
- Economic analysis
- Hydrologic and hydraulic analysis
- Geotechnical analysis
- Preliminary structural design
- Environmental analysis
- Social analysis
- Archeological analysis
- Surveying and mapping
- Real estate

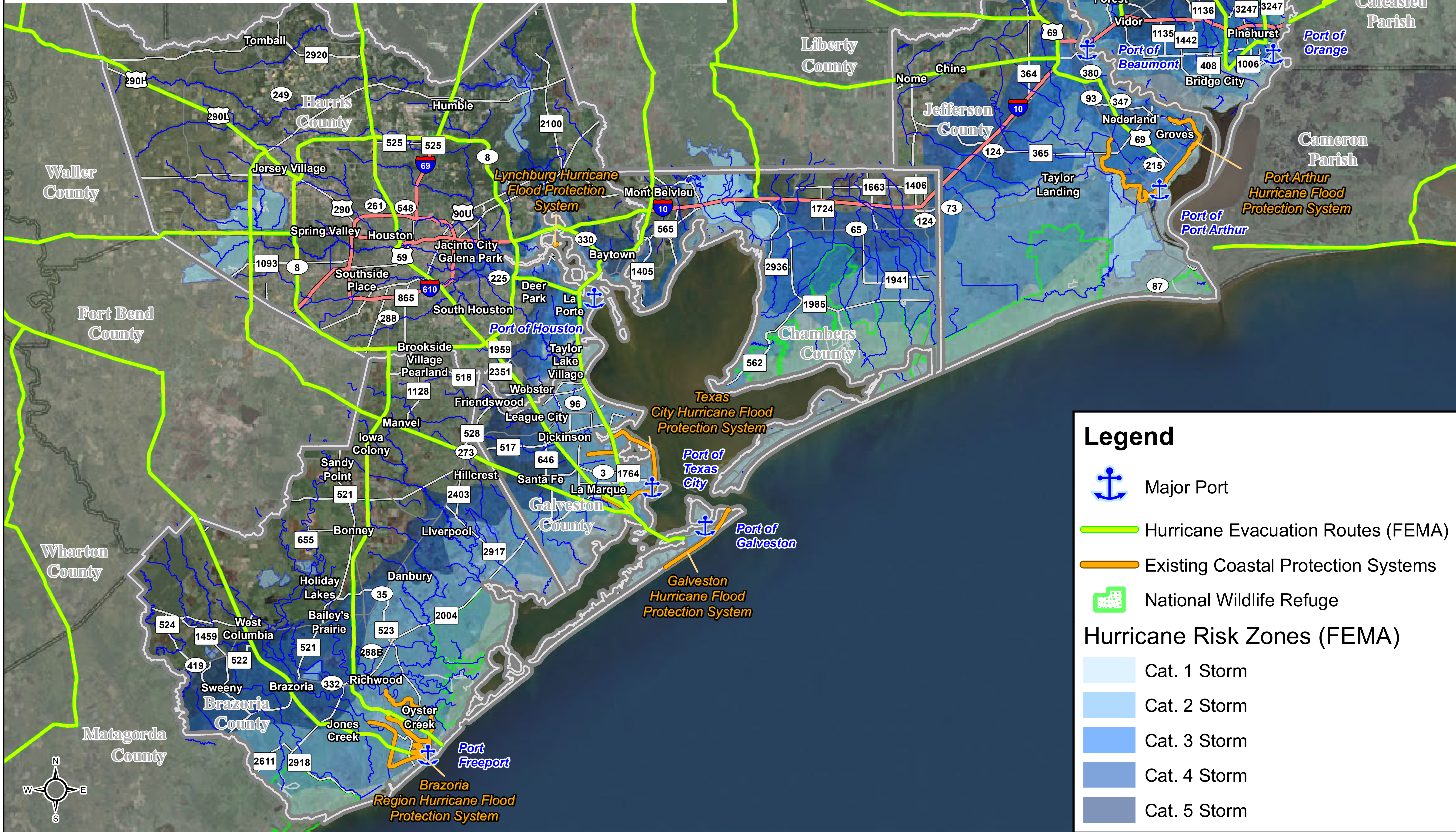

The Gulf Coast Community
Protection and Recovery District
Harris County
Chambers County
Jefferson County
Orange County
Galveston County
Brazoria County
Gulf of Mexico
Based on study findings, the GCCPRD will recommend ***a cost-effective and efficient system of flood damage reduction and surge suppression measures*** to help protect the six-county region.
N

GCCPRD

The Gulf Coast Community Protection and Recovery District

Inundation and Your Community

FEMA Hurricane Risk Zones



What is inundation?

Water covering normally dry land is a condition known as ***inundation***.

Inundation in Galveston from Hurricane Ike in September 2008

There are four primary causes of inundation:

1 Storm surge

Storm surge results from severe storms such as tropical cyclones (e.g., hurricanes) as strong winds combined with low pressure drive water onshore

2 Tsunamis

Tsunamis are large waves generated by an abrupt disturbance of the sea surface (e.g., from an earthquake or landslide)

3 Inland floods

Inland floods occur when moderate precipitation falls over several days, intense precipitation falls over a short period, or a dam or levee failure causes a water body to overflow

4 Shallow coastal flooding

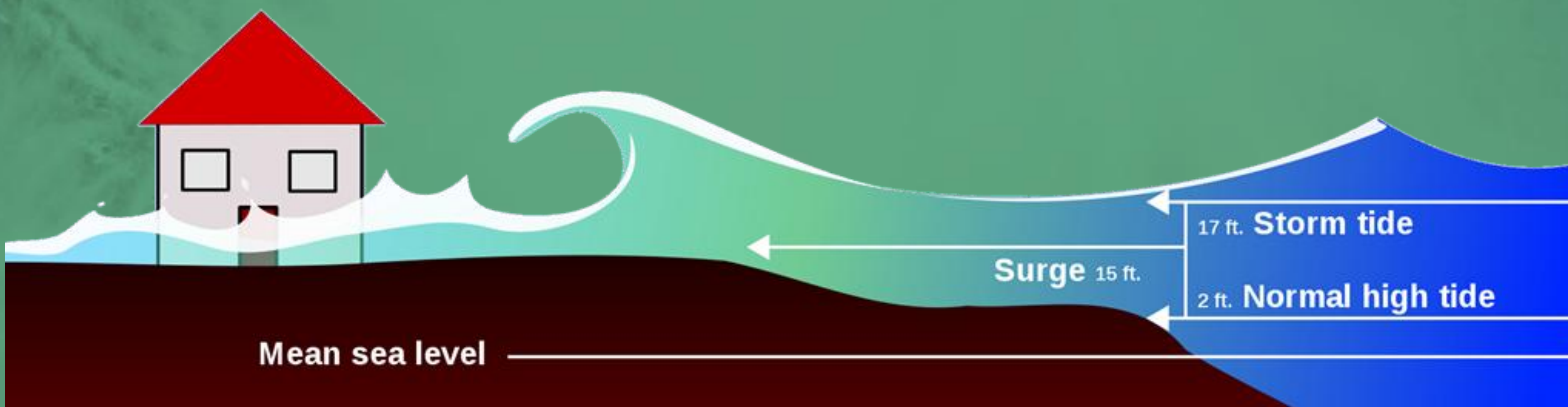
Shallow coastal flooding is flooding that occurs in low-lying coastal areas during extreme high tides

Anywhere it rains, it ***can*** flood.

Just because you have not experienced a flood in the past, it does not mean your property will not flood in the future. Many conditions can result in a flood: hurricanes, overtopped levees, outdated or clogged drainage systems, and rapid accumulation of rainfall.

What is storm surge?

Storm surge is defined as an abnormal rise of water generated by a storm, over and above the predicted astronomical tides. This rise in water level can cause extreme flooding in coastal areas, particularly when storm surge coincides with normal high tide. *(National Weather Service, 2014)*



What are storm surge suppression measures that the study will consider?

The Storm Surge Suppression Study will yield a system of alternatives that may consist of a variety of natural, structural, and nonstructural methods.

Structural

Levees, gates, floodwalls, etc.

Natural

Oyster reefs, wetlands, dunes, etc.

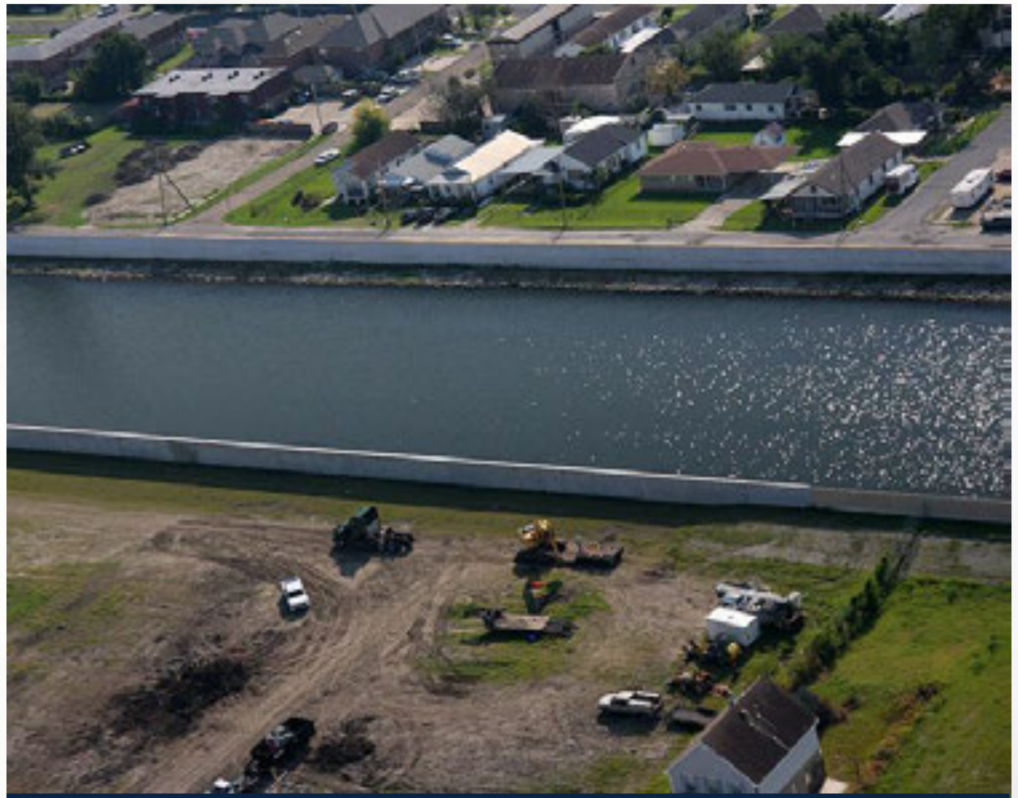
Nonstructural

Buyouts, building codes, flood proofing, evacuation, elevation, etc.

NATIONAL FLOOD INSURANCE PROGRAM

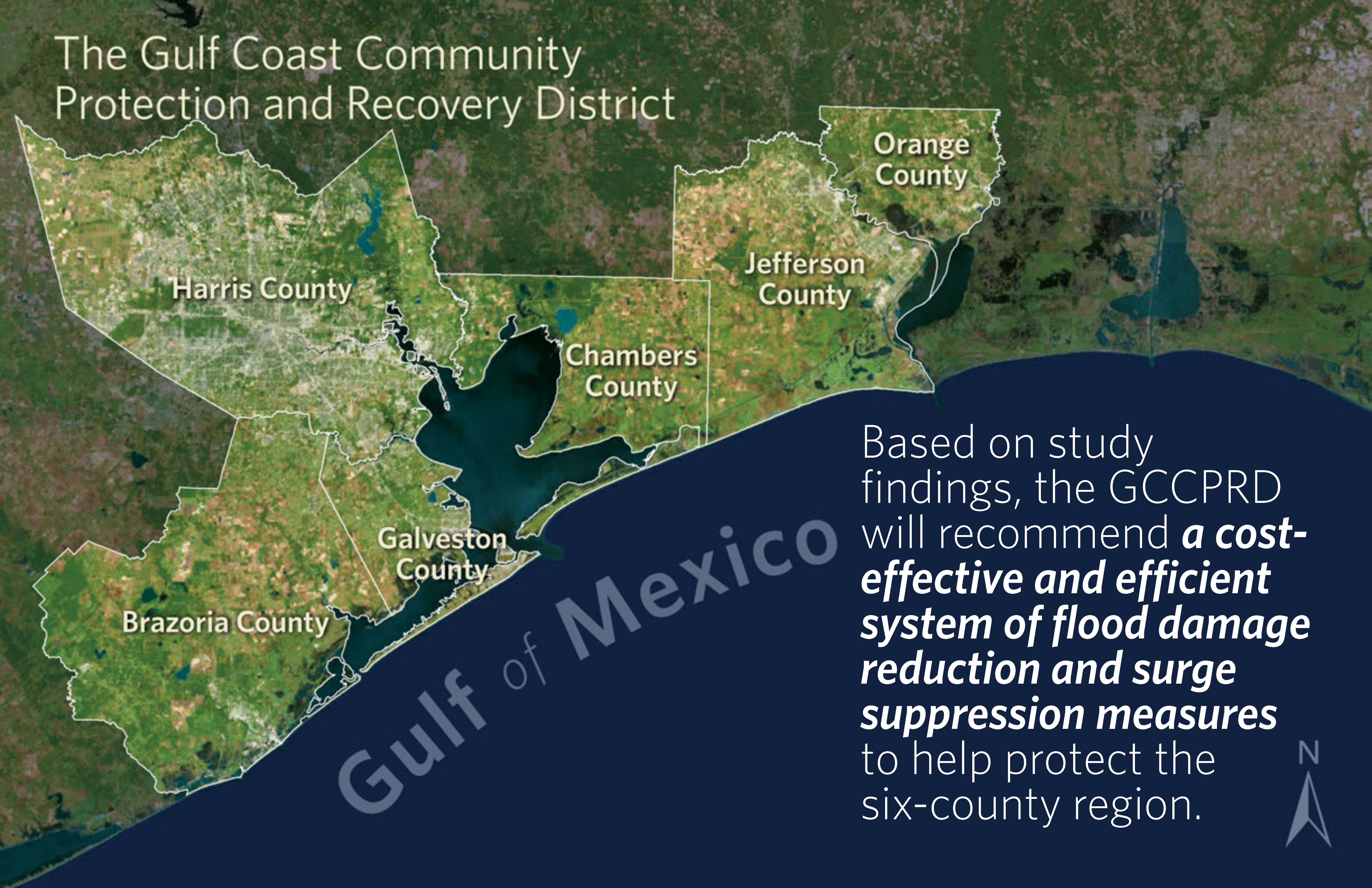
This study will consider proven flood damage reduction and storm surge suppression measures ***worldwide***.

Malamocco Tidal Gates, Venice, Italy



Reconstructed Levees, New Orleans, Louisiana

Storm Surge Barrier, Maeslantkering, Netherlands


The Gulf Coast Community
Protection and Recovery District
Orange County
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GCCPRD

The Gulf Coast Community Protection and Recovery District

Acerca del Estudio

¿Qué es el GCCPRD?

Los condados de Brazoria, Chambers, Galveston, Harris, Jefferson y Orange formaron el GCCPRD como una corporación del gobierno local para dirigir el Estudio de Supresión de Marejada de Tormenta para aliviar la vulnerabilidad de la costa superior de Texas a la marejada ciclónica y a las inundaciones.

SOCIOS COLABORADORES DEL GCCPRD

USGS
science for a changing world

U.S. Department of Homeland Security
FEMA

National Oceanic and Atmospheric Administration
NOAA
U.S. Department of Commerce

United States Environmental Protection Agency

U.S. Fish & Wildlife Service
Department of the Interior

Texas General Land Office
Established 1836

US Army Corps of Engineers.
Galveston District

Texas Historical Commission
real places telling real stories

South East Texas Regional Planning Commission

Texas Parks & Wildlife
Life's better outside.®

SSPEED

Texas Department of Transportation

H-GAC

The University of Texas at Austin

Rice

A&M Galveston

Rijkswaterstaat
Ministry of Infrastructure and the Environment

Port of Beaumont
Beaumont, Texas

Port of Houston Authority
PHA
Houston, Texas

Port of Galveston

¿A quién debo contactar para obtener más información o para formular observaciones ?

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Correo electrónico: **info@GCCPRD.com**
En línea: **www.GCCPRD.com**

¿Qué es el Estudio de Supresión de Marejada de Tormenta?

El Estudio de Supresión de Marejada de Tormenta, es un **esfuerzo técnico, con base científica**, para investigar las oportunidades para **mitigar la vulnerabilidad de la costa superior de Texas** a las marejadas de tormentas y a las inundaciones.

¿Qué es lo que se encuentra involucrado en este estudio de planificación?

ESTUDIO INICIAL

ESTAMOS AQUÍ

1 Los datos y la información existentes se reúnen, revisan y estudian

2 Las sesiones de exploración pública se llevan a cabo invitando a los comentarios y a la retroalimentación

Comentarios del Público

3 Las observaciones de las partes interesadas son revisadas e incorporadas en el estudio

Comentarios del Público

DESARROLLO

4 Una variedad de alternativas se desarrollan con base en los conocimientos técnicos y en la opinión del público

5 Las alternativas son evaluadas

6 Las reuniones de revisión pública se llevan a cabo invitando a la retroalimentación sobre las alternativas de estudio

Comentarios del Público

REFINAMIENTO

7 Los comentarios de los interesados y los datos técnicos adicionales son revisados e incorporados en el estudio

Comentarios del Público

8 Las alternativas son refinadas

RECOMENDACIÓN

9 El GCCPRD recomendará un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada para ayudar a proteger la región de los seis condados

¿Cuál es el propósito de esta reunión de exploración y/o detección de necesidades?

El propósito de esta reunión es:

- **Identificar a las partes interesadas, a las cuestiones significativas y a las alternativas** que se han de tener en cuenta durante el proceso de estudio
- **Brindarle información sobre el estudio** y cómo se le invitará a participar en el proceso del estudio
- **Reunir información pública** incluyendo preguntas, preocupaciones y cuestiones relativas a la supresión de las marejadas de tempestad en nuestra región

Las actividades de planificación para el estudio incluyen:

- Compromiso del público
- Análisis económico
- Análisis hidrológico e hidráulico
- Análisis geotécnico
- Diseño estructural preliminar
- Análisis ambiental
- Análisis social
- Análisis arqueológico
- Topografía y cartografía
- Bienes raíces

The Gulf Coast Community Protection and Recovery District

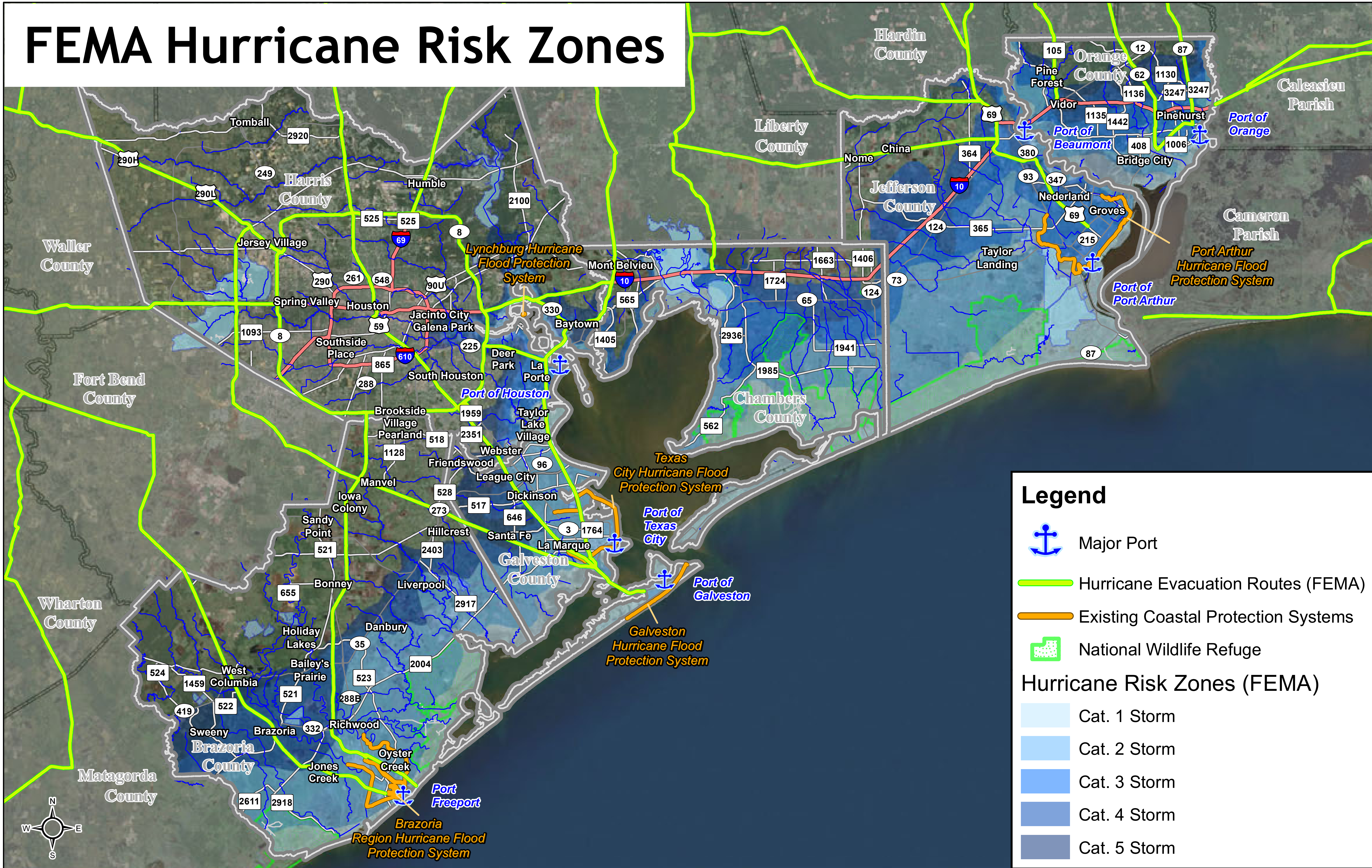
Usando estos hallazgos, el GCCPRD recomendará **un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada** para ayudar a proteger la región de los seis condados.

GCPRD

The Gulf Coast Community Protection and Recovery District

La Inundación y su Comunidad

FEMA Hurricane Risk Zones



¿Qué es una inundación?

El agua que cubre la tierra normalmente seca es una condición conocida como una ***inundación***.

Inundación en Galveston del Huracán Ike, en septiembre de 2008

Hay cuatro causas principales de una inundación:

1 Marejada de tormenta

La marejada de tormenta resulta de tormentas severas, tales como ciclones tropicales (por ejemplo, huracanes) tales como vientos combinados con baja presión que impulsan el agua hacia la tierra

2 Tsunamis

Los tsunamis son grandes olas generadas por una perturbación brusca de la superficie del mar (por ejemplo, de un terremoto o de un deslizamiento de tierra)

3 Inundaciones tierra adentro

Se producen inundaciones interiores cuando una precipitación moderada cae durante varios días, una intensa precipitación cae durante un período corto de tiempo, o una presa o bordo se colapsa y causa que un cuerpo de agua se desborde

4 Inundaciones costeras poco profundas

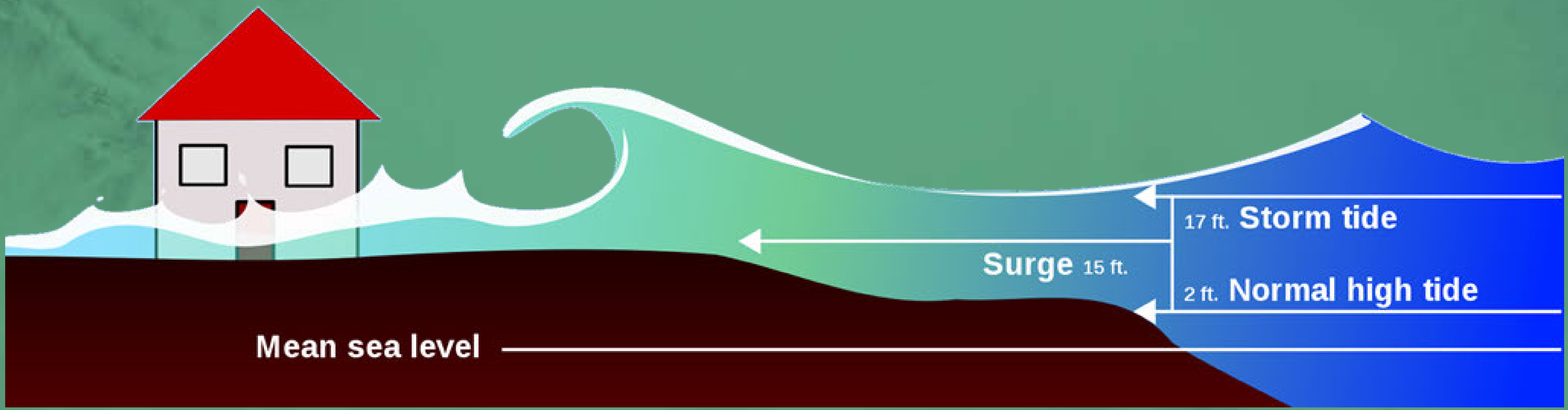
Las inundaciones costeras poco profundas es una inundación que se producen en las zonas costeras de baja altitud, durante las mareas altas extremas

En cualquier lugar que llueva, puede haber una inundación.

Solamente porque usted no ha experimentado una inundación en el pasado, eso no significa que su propiedad no se inundará en el futuro. Muchas condiciones pueden dar lugar a una inundación: huracanes, diques sobrepasados, sistemas de drenaje obsoletos o tapados y la rápida acumulación de las lluvias.

¿Qué es una Marejada de Tormenta?

La marejada de tormenta se define como un aumento anormal de agua generada por una tormenta, por encima de las mareas astronómicas pronosticadas. Este aumento en el nivel del agua puede causar inundaciones extremas en las zonas costeras, sobre todo cuando la marejada de tormenta coincide con la marea alta normal.*(National Weather Service, 2014)*



¿Cuáles son las medidas de supresión de marejadas de tormenta que el estudio tendrá en cuenta?

El Estudio de Supresión de Marejada de Tormenta producirá un sistema de alternativas que puede consistir en una variedad de métodos naturales, estructurales y no estructurales.

Estructurales

Diques, compuertas, muros de contención, etc.

Naturales

Arrecifes de ostras, humedales, dunas, etc.

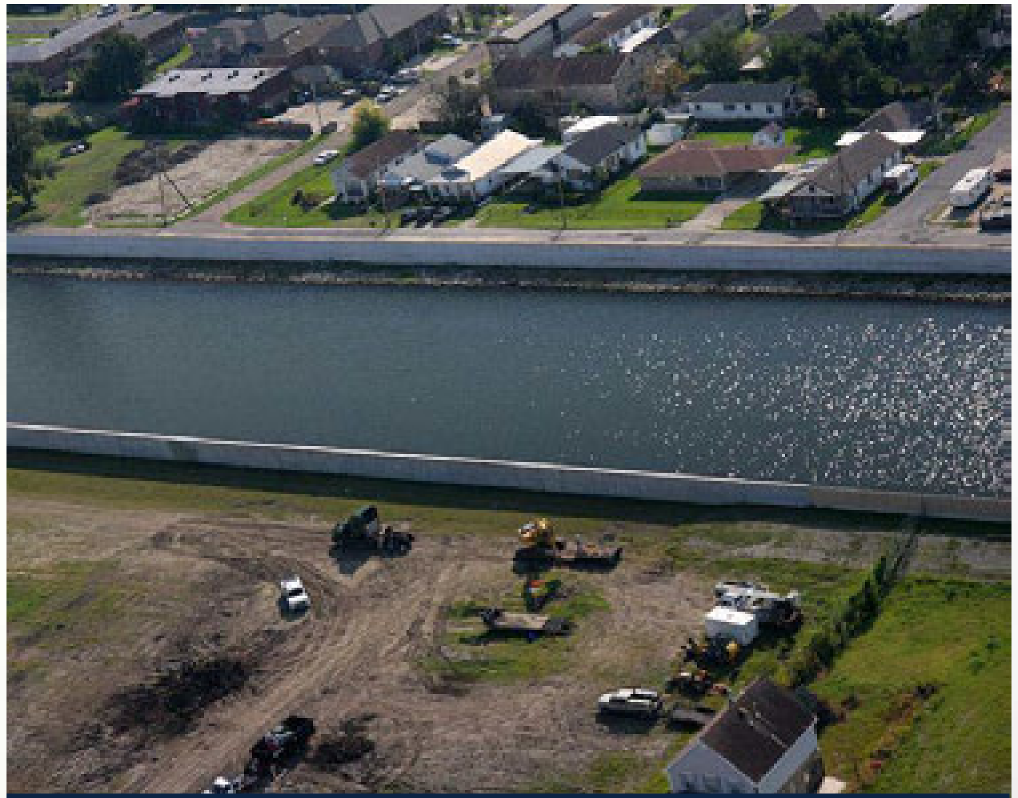
No estructurales

Adquisiciones, códigos de construcción, pruebas de inundación, evacuación, elevación, etc.

NATIONAL FLOOD INSURANCE PROGRAM

Este estudio tendrá en cuenta las medidas con eficacia probada para la reducción de daños por inundaciones y marejadas de tormenta *en todo el mundo.*

Compuertas contra las mareas de Malamocco, Venecia, Italia



Bordos reconstruidos, New Orleans, Louisiana

Barrera contra marejada de tormenta, Maeslantkering, Países Bajos

The Gulf Coast Community Protection and Recovery District

Usando estos hallazgos, el GCCPRD recomendará **un sistema rentable y eficaz de reducción de daños por inundaciones y medidas de supresión de marejada** para ayudar a proteger la región de los seis condados.

¿A quién debo contactar para obtener más información o para formular observaciones ?

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Houston, Texas 77098
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En línea: **www.GCCPRD.com**

Public Meeting Display Materials

Digital Displays

What is the GCCPRD?

Brazoria, Chambers, Galveston, Harris, Jefferson, and Orange Counties formed the GCCPRD as a local government corporation to lead the Storm Surge Suppression Study to alleviate the vulnerability of the upper Texas coast to storm surge and flooding.

This study is the ***GCCPRD's opportunity to assume a leadership role*** and ***work collaboratively*** with federal, public and private institutions to develop a plan that will ***meet the needs of the region and the nation***.

What is the purpose of this scoping meeting?

The purpose of this meeting is to:

- **Identify interested parties, significant issues, and alternatives** to be considered during the study process
- **Provide you with information about the study** and how you will be invited to participate in the study process
- **Gather public feedback** including questions, concerns, and issues relating to storm surge suppression in our region

We are here tonight to **give you information** about the study and to **give you the opportunity to participate** in the study process.

We want to hear from you.

Protect yourself from flooding

Standard homeowners insurance ***does not cover flooding***. It is important to have protection from flooding associated with hurricanes, tropical storms, heavy rains, and other conditions that impact our region.

For more information about the National Flood Insurance Program, visit www.floodsmart.gov.

NATIONAL FLOOD
INSURANCE PROGRAM

How is the study being funded?

The study is funded through the Texas General Land Office (GLO) with a $3.9 million federal Housing and Urban Development Community Development Block Grant (CDBG) that was awarded in September 2013.

Environmental considerations

The study team will review and consider environmental effects associated with proposed alternatives that result from the Storm Surge Suppression Study.

Environmental considerations include:

- Wetlands and Waters of the U.S.
- Critical Wildlife and Fish Habitats
- Hurricane Risk Zones
- Hazardous Materials Sites
- National Wildlife Refuge Areas
- Statewide Floodplains
- Historic and Culturally Sensitive Areas
- Among Others

Did you know?

Along the coast, **storm surge** is often *the greatest threat to life and property* from a hurricane.

Aftermath of Hurricane Ike, Bolivar Peninsula

Did you know?

From 1990-2008, population density increased by *32% in Gulf coastal counties.* *(U.S. Census Bureau, 2010)*

Immediate aftermath of Hurricane Ike, Galveston Island

Did you know?

Over half of the nation's economic productivity is located within coastal zones.
(National Weather Service, 2014)

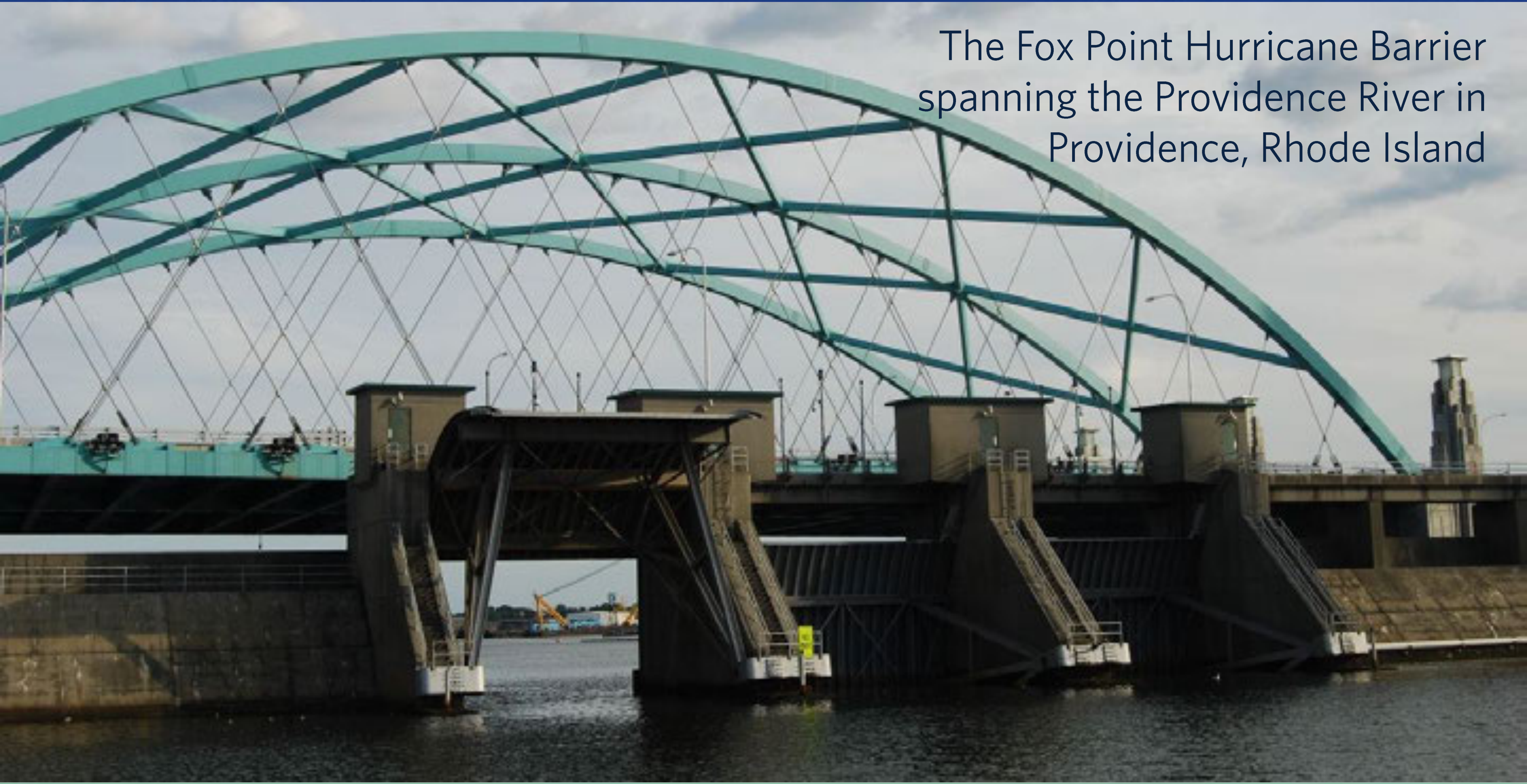
This study will consider proven flood damage reduction and storm surge suppression measures ***worldwide***.

Malamocco Tidal Gates,
Venice, Italy

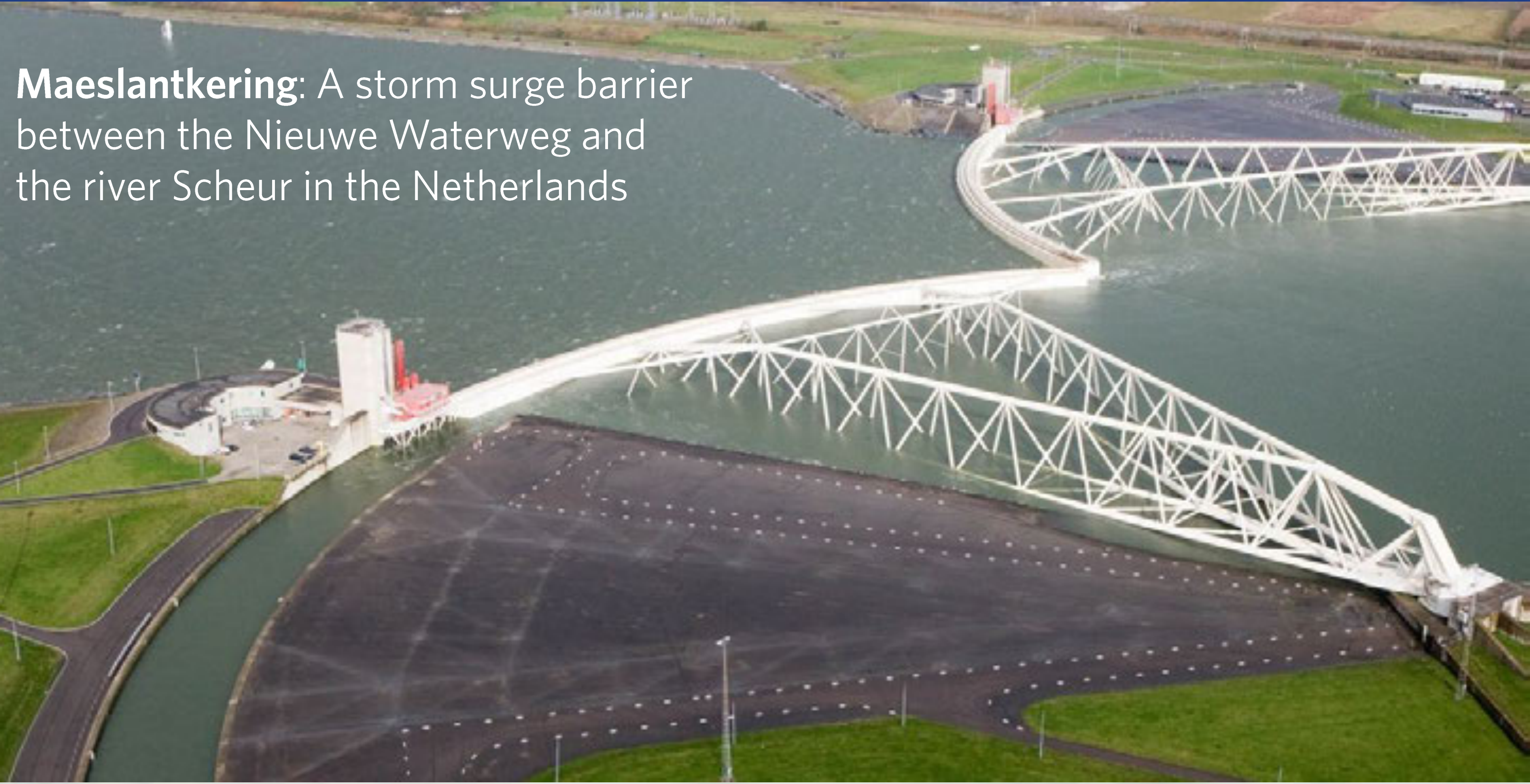
Reconstructed Levees,
New Orleans, Louisiana

Storm Surge Barrier,
Maeslantkering, Netherlands


Oosterscheldekering: A storm surge barrier between the islands
Schouwen-Duiveland and Noord-Beveland in the Netherlands
(Photo by Vladimir Siman)



The Fox Point Hurricane Barrier spanning the Providence River in Providence, Rhode Island



Maeslantkering: A storm surge barrier between the Nieuwe Waterweg and the river Scheur in the Netherlands

The Thames Barrier located downstream of central London, United Kingdom

(Photo by Andy Roberts)

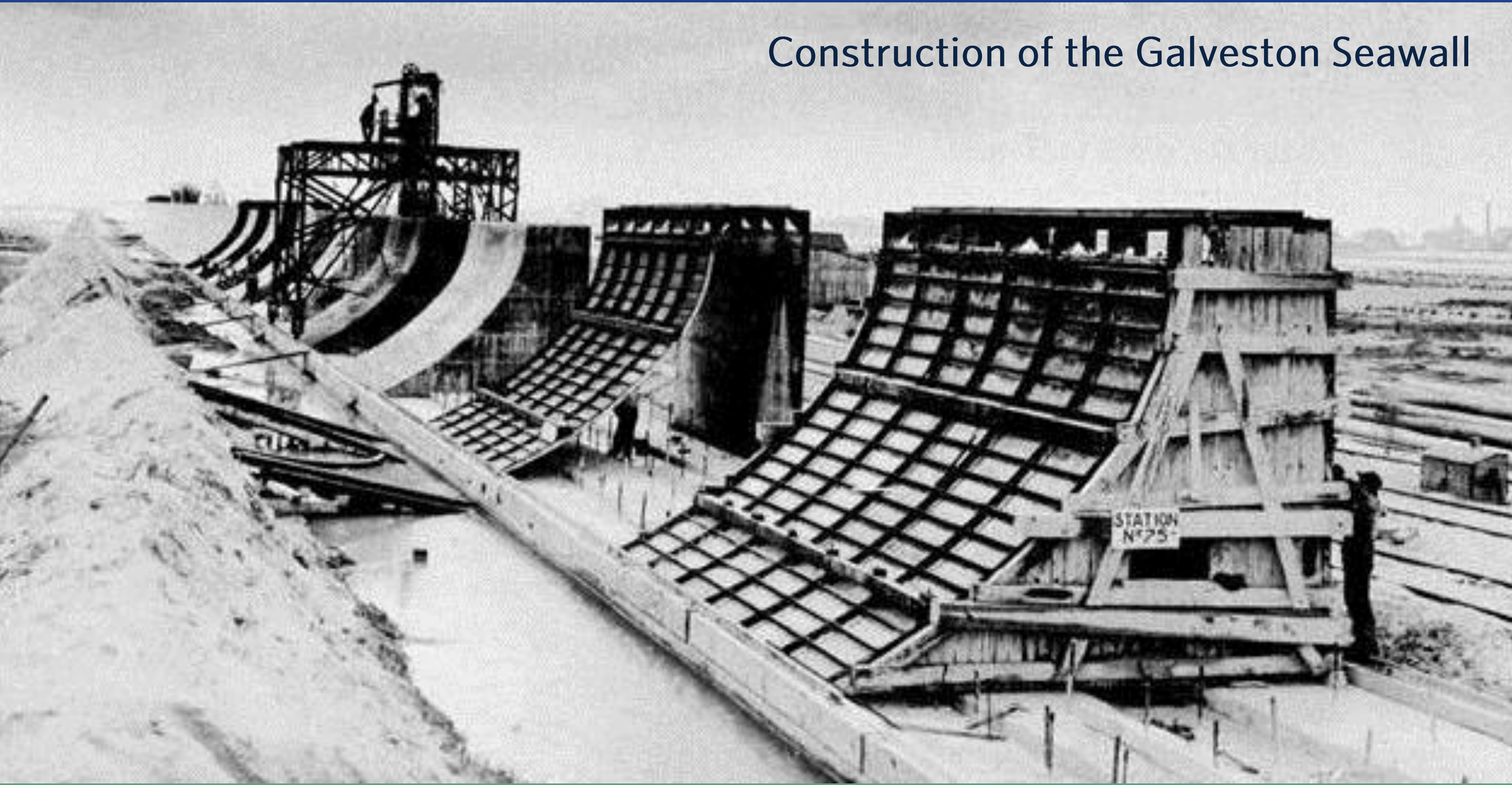
Chioggia Inlet, Italy: Rows of mobile gates are installed to temporarily isolate the Venetian Lagoon from the Adriatic Sea during high tides

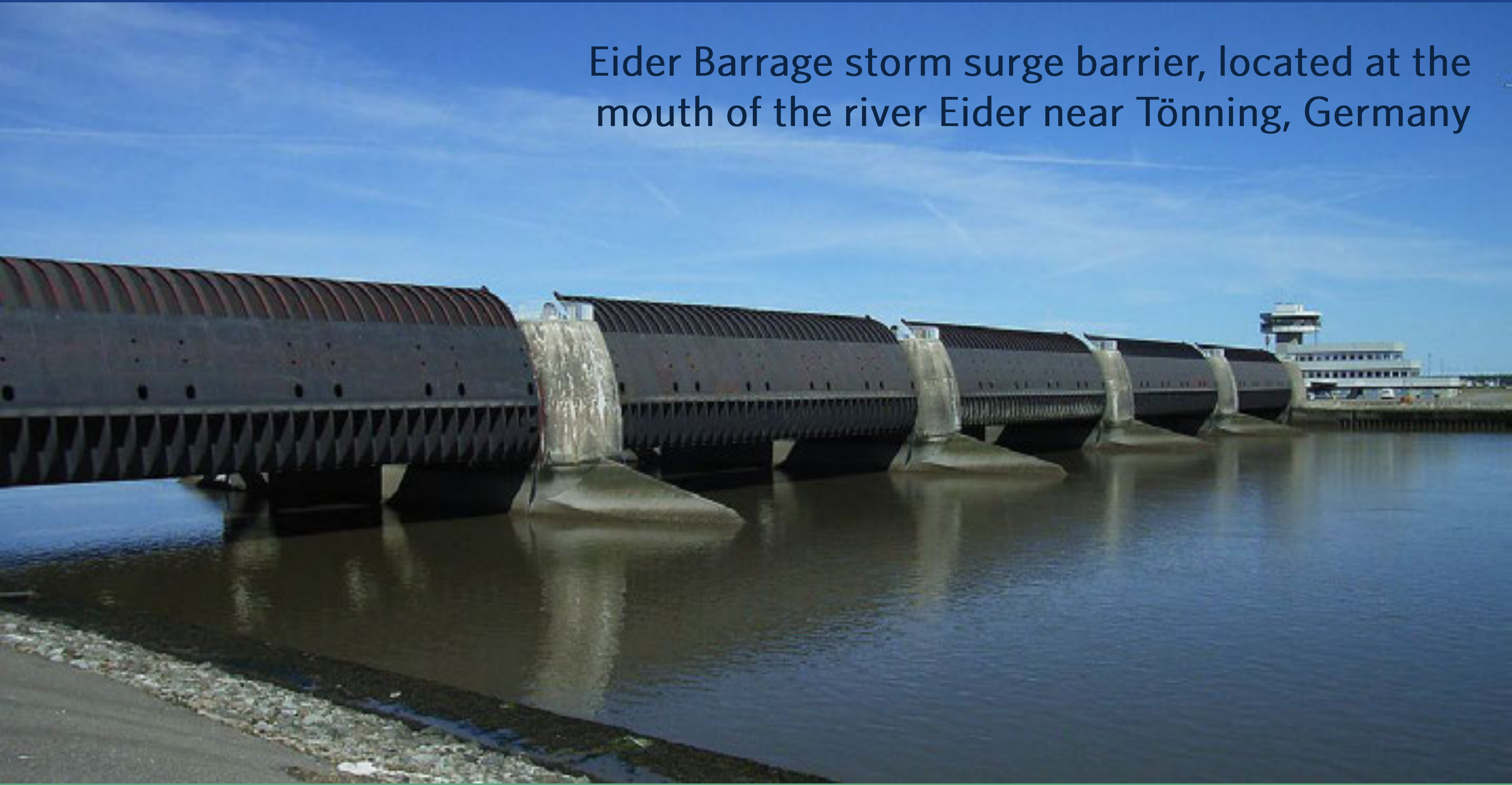
(Photo by Magistrato alle Acque di Venezia)

17th Street Canal levees in New Orleans, Louisiana

(Photo by Jacinta Quesada)

Construction of the Galveston Seawall



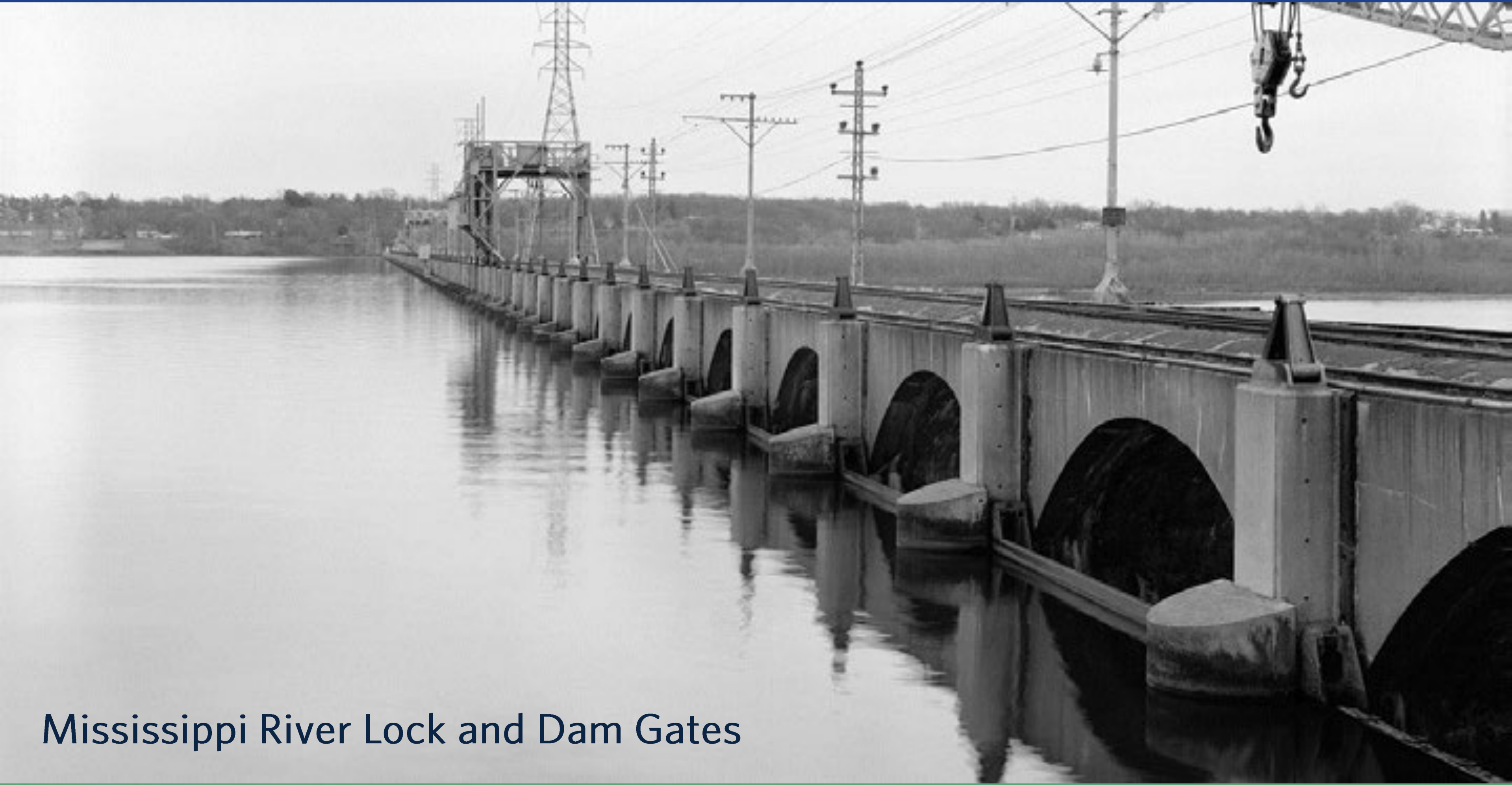


Eider Barrage storm surge barrier, located at the mouth of the river Eider near Tönning, Germany

Hartelkering storm surge barrier in Spijkenisse, Netherlands

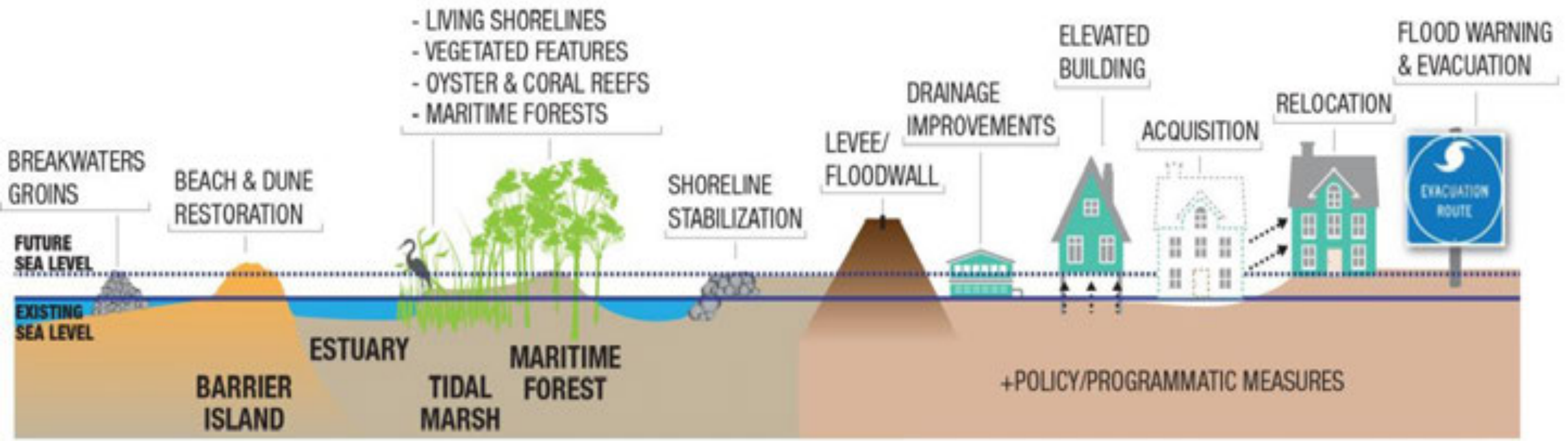
(Photo by Quistnix)

The Inner Harbor Navigation Canal (IHNC) Lake Borgne Surge Barrier near the confluence of the Gulf Intercoastal Waterway (GIWW) and the Mississippi River Gulf Outlet (MRGO) near New Orleans, Louisiana



Mississippi River Lock and Dam Gates

Multiple "Lines of Defense"



Multiple lines – combination of natural and structural features

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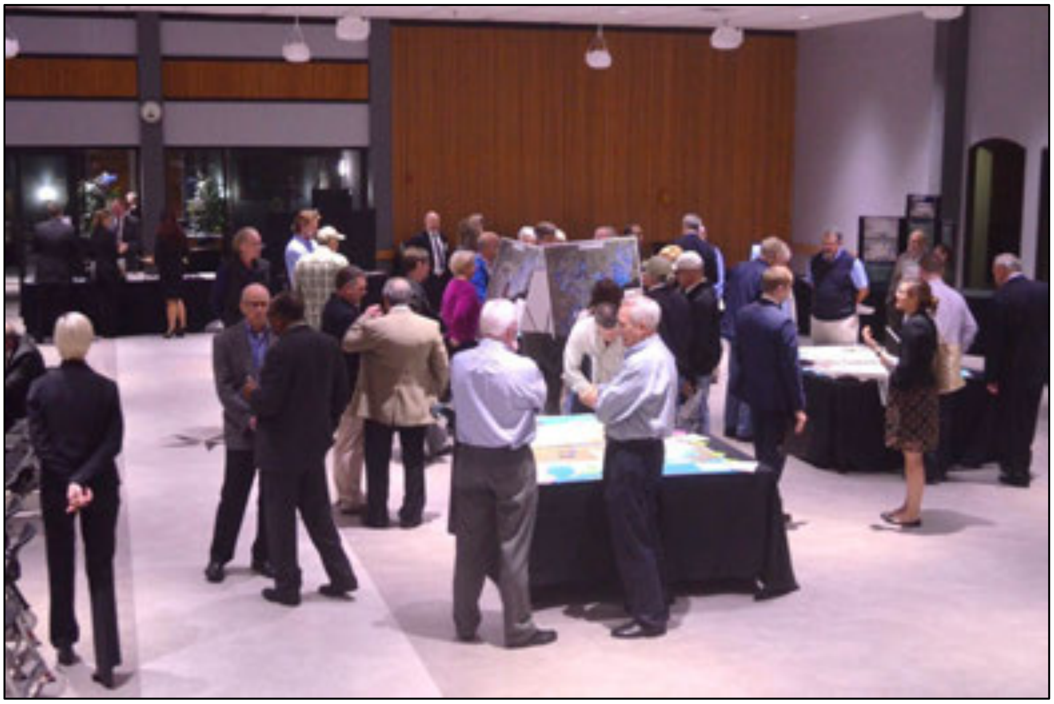
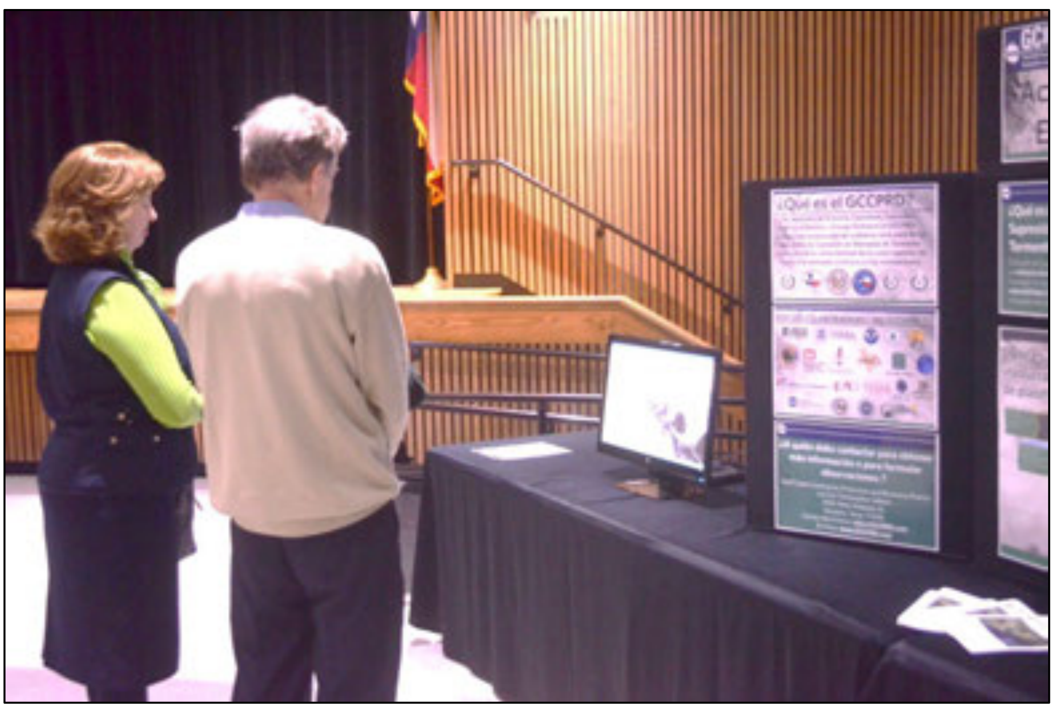
Section 7: Photographs of Public Scoping Meetings



The first of three public scoping meetings was held in League City on December 4, 2014. The meeting was conducted in an open-house format, and GCCPRD study representatives were present to discuss the study.

Large-scale regional maps were available as a method for meeting attendees to provide comments and feedback at the public scoping meetings.

The study video introduction was featured as the primary presentation at the public scoping meetings and played continuously throughout the duration of each meeting.



Informational display booths containing both print and electronic content were arranged around the open-house meeting spaces. Display information was presented in both English and Spanish and it is available in Section 6 of this Appendix.

The second public scoping meeting was held in Baytown on December 9, 2014. Meeting attendees discussed the study with GCCPRD study representatives during the open-house style meeting.

Upon arrival, attendees were asked to sign in using attendee cards. A record of all public scoping meeting attendees is available in Section 5 of this Appendix.

Meeting attendees and a GCCPRD study representative discuss the FEMA 100-year flood zone map at the Baytown public scoping meeting.

An attendee at the Baytown public scoping meeting reads one of the informational displays. Attendees were also provided with a study guide and a written comment form.

An attendee signs in at the third and final public scoping meeting in Beaumont on December 11, 2014.

A meeting attendee provides feedback on the regional input maps at the Beaumont public scoping meeting.

A GCCPRD study representative discusses the study with Beaumont public scoping meeting attendees.

Large-scale regional maps were available at the public scoping meetings as a method for meeting attendees to provide comments and feedback. Attendees were provided with written comment forms, and comments are also accepted through the study website.

Section 8: Additional Outreach Activities

GCCPRD Study Overview PowerPoint Presentation

GCCPRD Study Overview PowerPoint Presentation

GCCPRD

The Gulf Coast Community Protection and Recovery District

Storm Surge Suppression Study

www.gccprd.com

Purpose

To investigate the feasibility of reducing the vulnerability of the upper Texas coast to hurricane surge and flood damages through the study of an integrated flood protection system that relies on natural or nature-based features, non-structural and structural interventions.

Method

To define flood risk management and surge suppression requirements within the region through a technical analysis of potential alternatives.

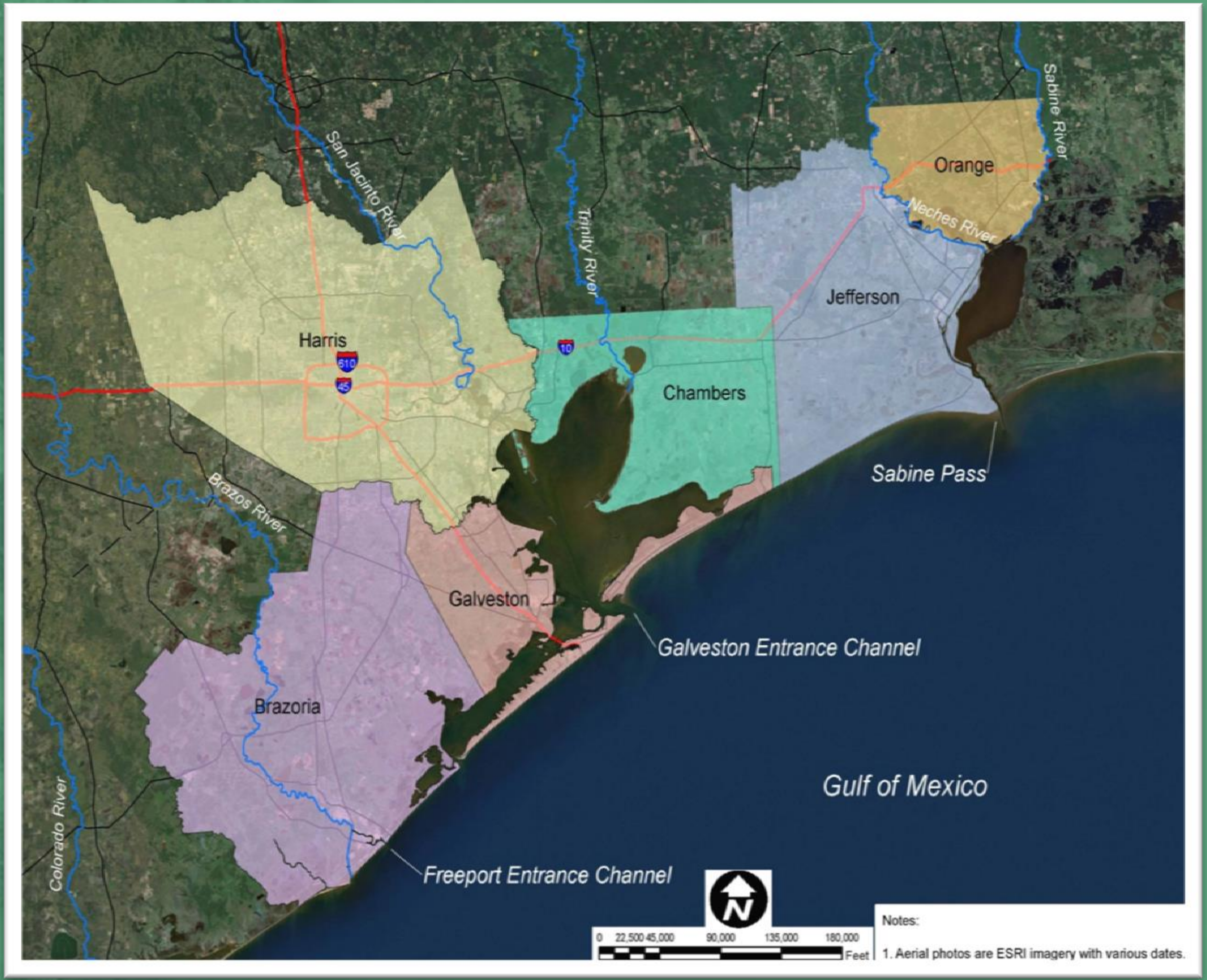
Answer the following questions:

- **What is the threat?**
  - Defined by modeling the physics and hydraulic loads
  - Models: ADCIRC, SLOSH, HEC-RAS
- **What needs to be protected?**
  - Defines the level of safety for people, industry and the environment
  - Models: regional economic model, environmental impacts
- **How will we protect?**
  - Integrate surge and flood defense system
  - Develop and evaluate technical structural and nonstructural alternatives
  - Compare cost of technical solutions to economic losses prevented to determine the Benefit-to-Cost Ratio (BCR) for alternatives
- **How do we finance the final project?**
  - Federal, state, local funds
  - Private investment
  - Public-private-partnership

End State

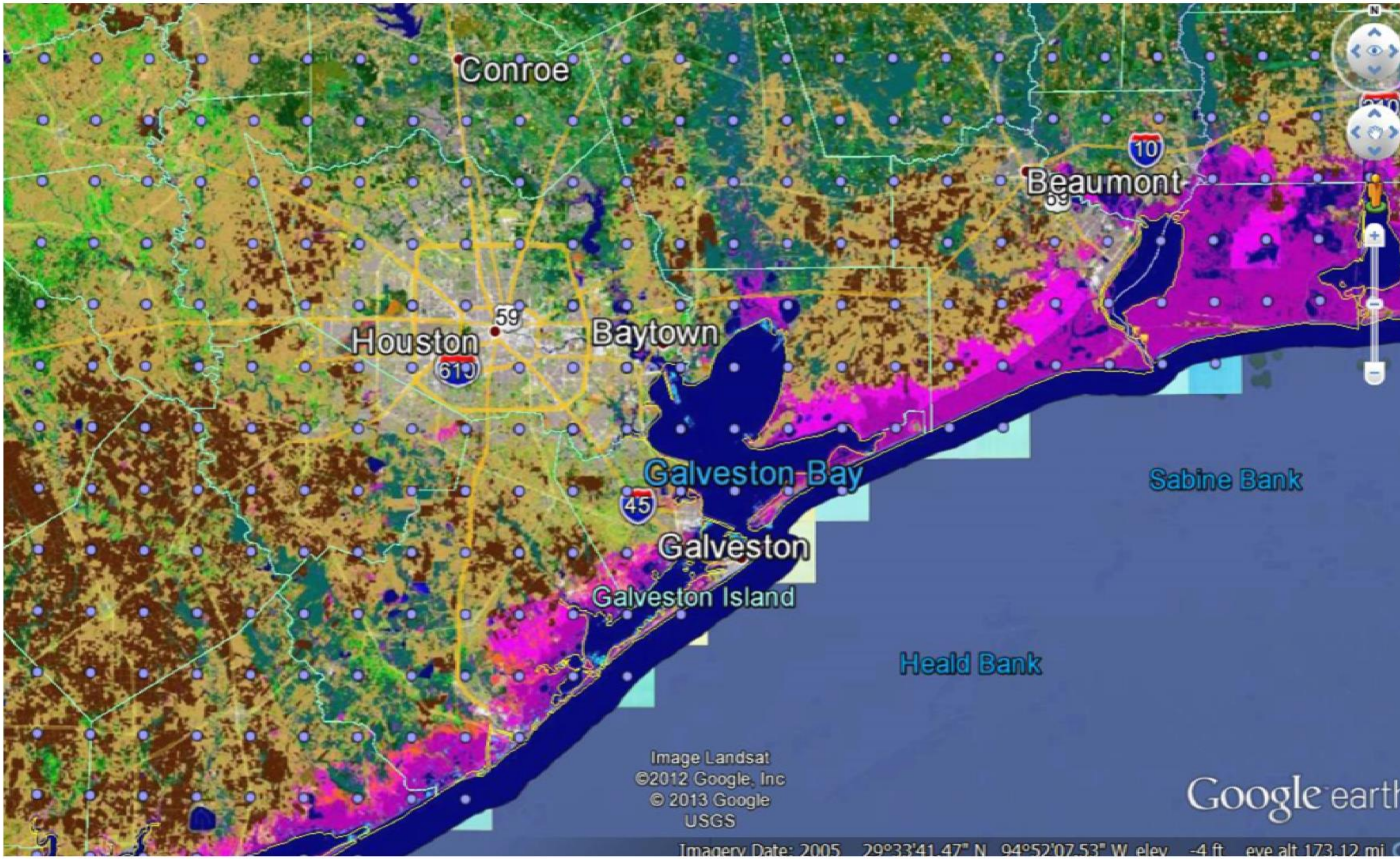
A defined suite of alternatives based on sound technical and economic analysis that creates an integrated protection system that reduces risk to the public, the economy and the environment within the six county study region.

Study Area



San Jacinto River
Trinity River
Sabine River
Neches River
Brazos River
Colorado River
Orange
Jefferson
Harris
Chambers
Galveston
Brazoria
610
45
10
Sabine Pass
Galveston Entrance Channel
Freeport Entrance Channel
Gulf of Mexico
N
0 22,500 45,000 90,000 135,000 180,000
Feet
Notes:
1. Aerial photos are ESRI imagery with various dates.

NOAA Coastal Map



Study Area Facts

- Population of over 5 million people and growing
- America's largest concentration of energy, petrochemical and refining industries
  - 25% of the nation's petroleum refining capability
  - 40% of the nation's capacity for downstream chemical production
  - Fastest growing LNG industry in the nation
- Contains the following ports: (national ranking in 2012)
  - Houston (2)
  - Beaumont (4)
  - Texas City (10)
  - Port Arthur (25)
  - Freeport (27)
  - Galveston (41)
  - Orange
- Home to NASA
- Booming fisheries and tourism industry
- A coastal estuary system of national significance
- A regional economy linked to all of Texas, the national economy and to national security

Scope of Work

The scope of the GCCPRD Coastal Protection Study includes all the planning activities associated with the development of viable long-term plans and strategies to protect coastal communities region-wide from storm surge and flooding caused by natural disasters. The study region consists of coastal areas that could be impacted by storm surges in or around Brazoria, Chambers, Galveston, Harris, Jefferson and Orange Counties, Texas.

Methodology:

- Identify the threat to the region by modeling the physics and hydraulic loads associated with historical storms (determine storm of highest probability).
- Develop a regional economics baseline for life, safety, health, industry outputs and national security.
- Develop structural and non-structural alternatives to limit damage and evaluate their impacts to the environment.
- Compare final costs of alternatives to benefits to determine BCR's.
- Develop financing solutions.

INITIAL STUDY

WE ARE HERE

1 Existing data and information are gathered, reviewed, and studied

2 Public scoping sessions are held, inviting comments and feedback

Public Feedback

3 Stakeholder comments are reviewed and incorporated into the study

Public Feedback

DEVELOPMENT

4 A variety of alternatives are developed based on technical expertise and public input

5 Alternatives are evaluated

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7 Stakeholder comments and additional technical data are reviewed and incorporated into the study

Public Feedback

8 Alternatives are refined

RECOMMENDATION

9 The GCCPRD will recommend a cost-effective and efficient system of flood damage reduction and surge suppression measures to help protect the six-county region

Phase 1: Data Collection

Tasks:

- Collect and analyze existing studies, reports, concepts and background data pertinent to the region.
    1. Existing topographic and GIS data pertinent to the six county areas and the Gulf of Mexico
    2. Data documentation collected by universities and planning agencies (Houston-Galveston Area Council, Jefferson and Orange County Councils of Government, Rice, Texas A&M and the University of Houston)
    3. Data and documentation collected by the Federal Emergency Management Agency, the US Army Corps of Engineers and respective drainage districts
- Develop and coordinate data related to the economic and potential national security impacts of a severe storm along the six county areas.
- Review and analyze information regarding international solutions to prevent or mitigate flooding damage resulting from extreme storms surges and repetitive water events.
- Prepare an organized library of data gathered throughout the study for use by GCCPRD, the GLO, other government entities and the public.

Phase 1 Deliverables:

- An organized library
- A final written report of all the data gathered during Phase 1. The report findings and recommendations for Phase 1 will be presented to the GCCPRD board and the GLO. After review and acceptance by the GLO, the report findings will be disseminated to the public via the GCCPRD planning website.

Phase 1 Schedule:

- Phase 1 is to be completed by Feb 2015.

Phase 2: Mitigation Technical Study

Phase 2 consists of a major technical study to further refine the recommendations from Phase 1 and the direction purposed by the GLO. The technical study will be used to develop and confirm the optimal solutions and plans for adoption by the GLO.

Tasks:

- Further refine the scope of the study through stakeholder interviews and public scoping meetings.
- Identify and report technical and construction requirements and needs.
- Evaluate protection methodologies and impacts on the environment, cities, industry and shore line improvements.
- Confirm and implement computer models to evaluate effects of storm magnitudes and location within the study area.
- Develop a cost/benefit analysis of economic, housing, national security, refinery, pipeline and other industrial impacts.

Phase 2 Deliverables:

- A mitigation technical study report encompassing all Phase 2 tasks outlined above.
- The mitigation technical study report and recommendations for Phase 3 will be presented to the GCCPRD board and the GLO. After review, the report will also be presented to the public for comment via the GCCPRD website and any other pertinent public forums.

Phase 2 Schedule:

- Phase 2 will be completed Jan 2016.

Phase 3: Final Report and Recommendations

Tasks:

- Once the mitigation technical study is completed, a final report will be developed. The final report shall include, but is not limited to the following elements:
  - Mitigation and design strategies, and
  - Recommendations of resources necessary to move forward with the results. This would include local, state and national resources as well as corporate partners to see that the chosen solutions are implemented. (Financial Plan)
- Present the final report to the GCCPRD board and the GLO for review and comment. After review and acceptance by the GLO, the report will be made available to the public via the GCCPRD website and any other pertinent public forums.

Phase 3 Deliverables:

- A final report and recommendation as described above.

Phase 3 Schedule:

- Phase 3 is estimated to be completed by July 2016.

Planning Activities

A Leadership Role

GCCPRD

USACE

Ike Dike (TAMU)

Centennial Gate (SSPEED)

Orange/Jefferson County Report

Viable Coastal Protection Plan

The GCCPRD has an opportunity to assume a leadership role and work collaboratively with federal, state, local, and public and private institutions to develop a comprehensive coastal protection plan that meets the needs of the region and the nation.

Public Scoping Meetings

Thursday, December 4, 2014
6 p.m. to 8 p.m.
League City Civic Center
400 West Walker St.
League City, Texas 77573

Tuesday, December 9, 2014
6 p.m. to 8 p.m.
Harris County Precinct 2 J.D. Walker Community Center
7613 Wade Rd.
Baytown, Texas 77521

Thursday, December 11, 2014
6 p.m. to 8 p.m.
Jefferson County Courthouse – Jury Impaneling Room
1001 Pearl St.
Beaumont, Texas 77701

Questions?

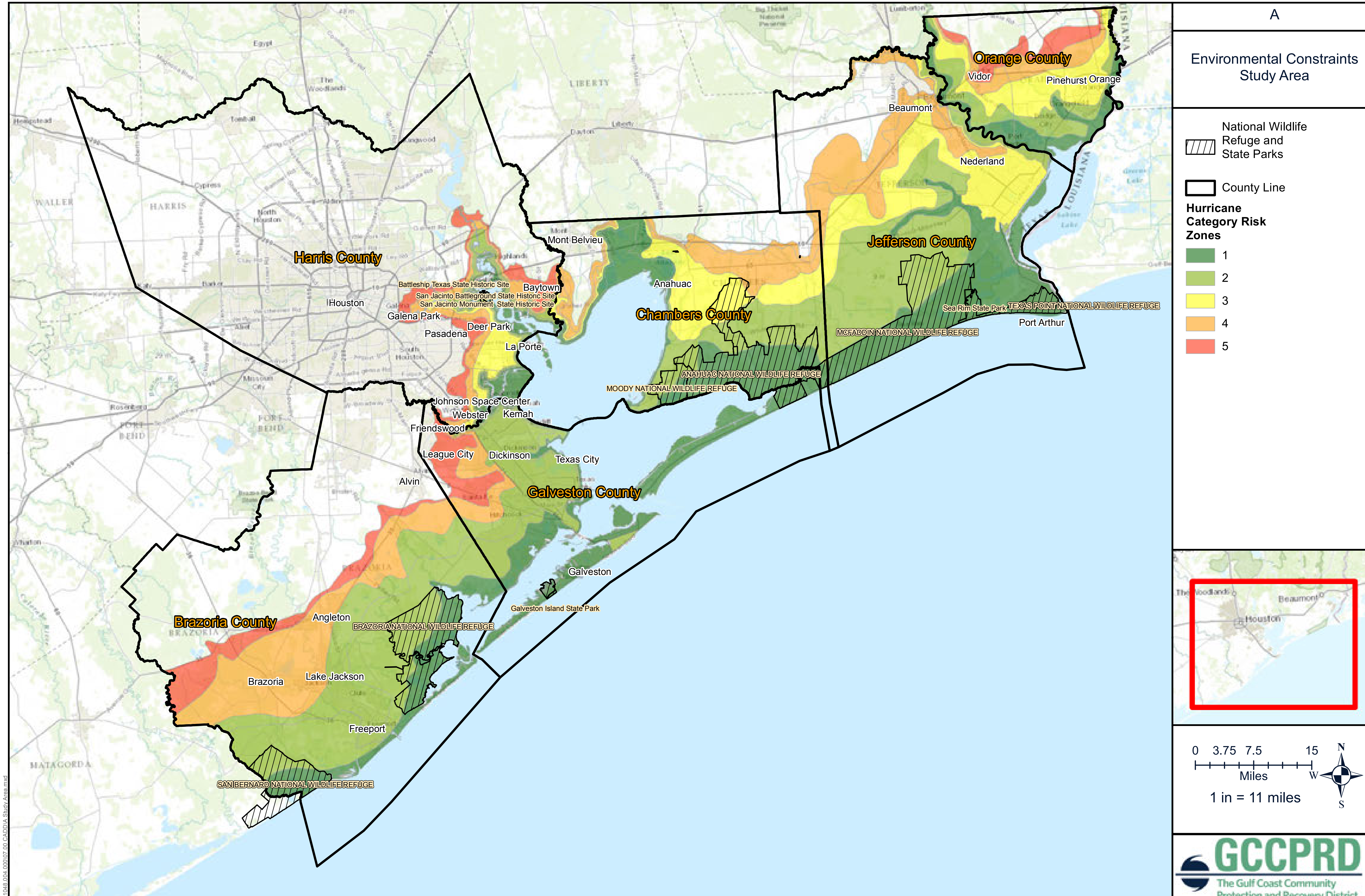
www.gccprd.com

To protect personal identity, Section 9 is not available for download.

Section 9: Phase 1 Public Comments

Comment Form
Public Comment Database
Scanned Comment Documents
Public Input Maps

Appendix D: Exhibits



A
Environmental Constraints Study Area
National Wildlife Refuge and State Parks
County Line
Hurricane Category Risk Zones
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Miles
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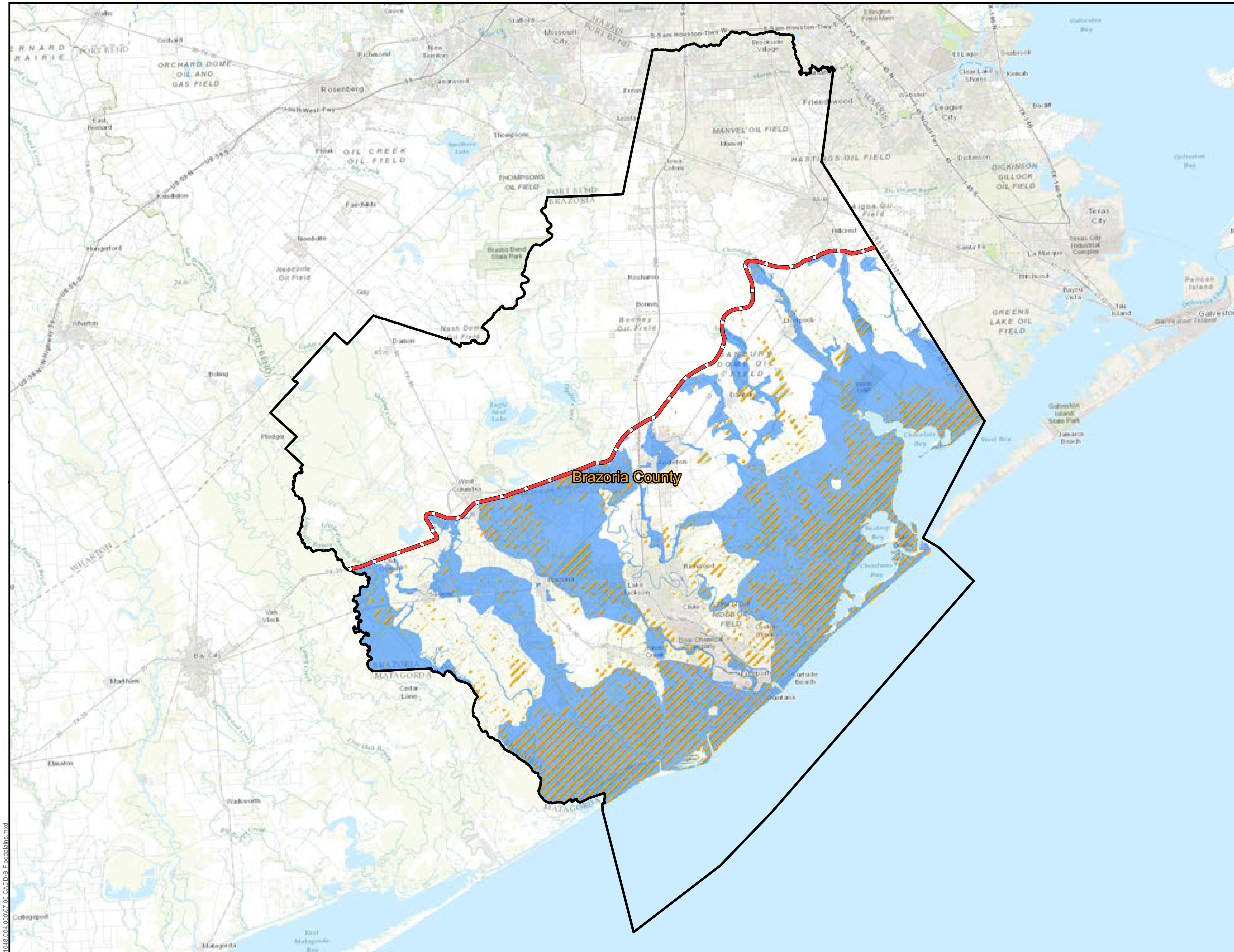
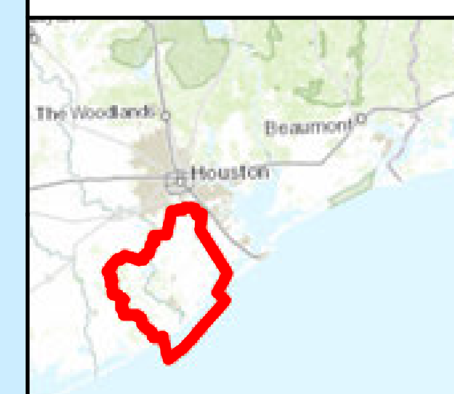
GCCPRD
The Gulf Coast Community Protection and Recovery District
Orange County
Vidor
Pinehurst
Orange
Beaumont
Nederland
Jefferson County
Port Arthur
Sea Rim State Park
TEXAS POINT NATIONAL WILDLIFE REFUGE
MCFADDIN NATIONAL WILDLIFE REFUGE
Mont Belvieu
Anahuac
Chambers County
ANAHUAC NATIONAL WILDLIFE REFUGE
MOODY NATIONAL WILDLIFE REFUGE
Harris County
Houston
Baytown
Battleship Texas State Historic Site
San Jacinto Battleground State Historic Site
San Jacinto Monument State Historic Site
Galena Park
Pasadena
Deer Park
La Porte
Johnson Space Center
Webster
Kemah
Friendswood
League City
Dickinson
Texas City
Alvin
Galveston County
Galveston
Galveston Island State Park
Brazoria County
Angleton
BRAZORIA NATIONAL WILDLIFE REFUGE
Brazoria
Lake Jackson
Freeport
SAN BERNARD NATIONAL WILDLIFE REFUGE
LOUISIANA

B-1

National Wetlands Inventory and Floodplains Brazoria County



Study Limits
Wetlands
100 Year Floodplain
County Line



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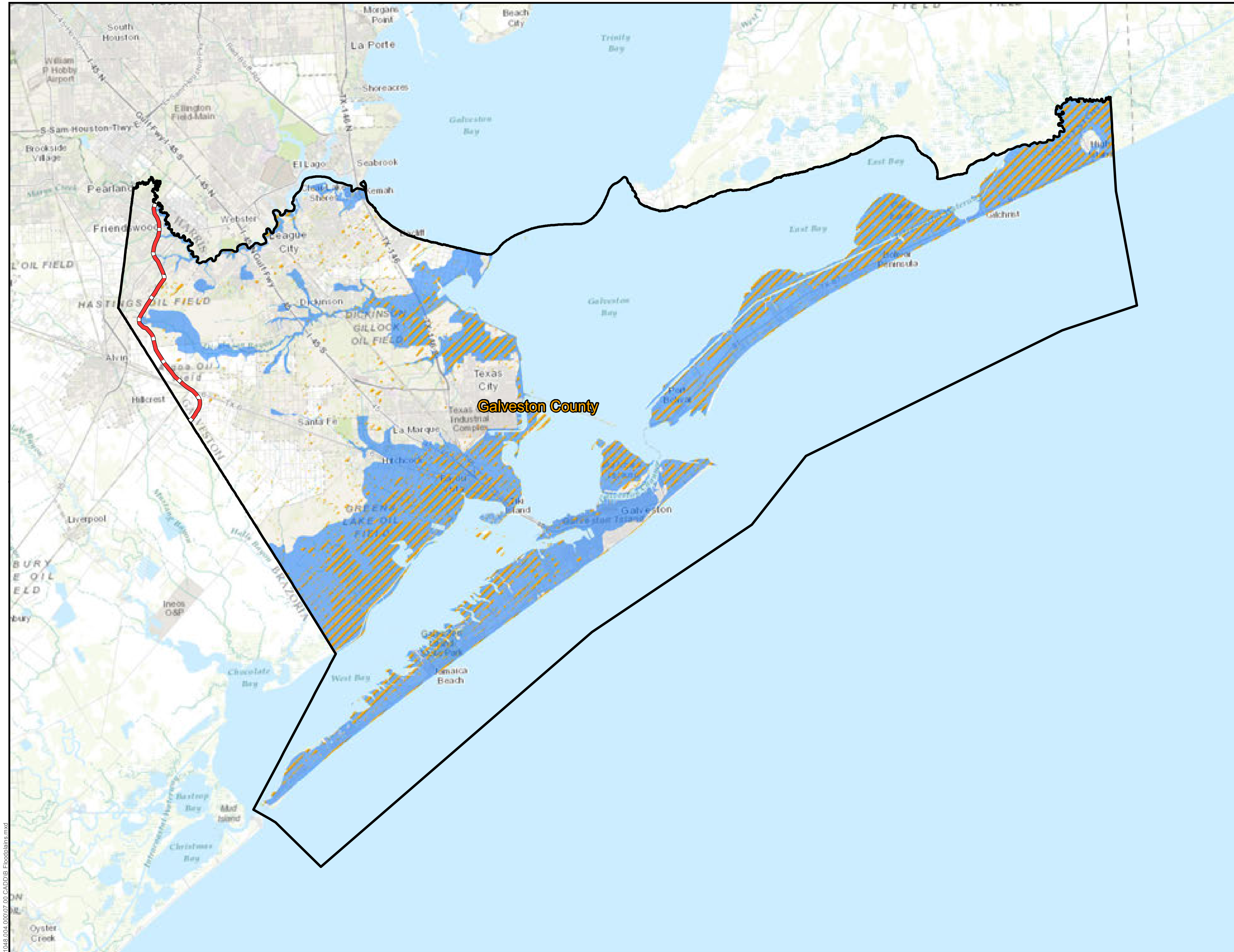
B-2

National Wetlands Inventory and Floodplains Galveston County

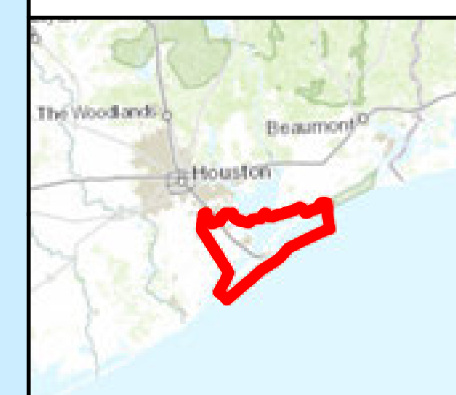


Study Limits

Wetlands

100 Year Floodplain

County Line



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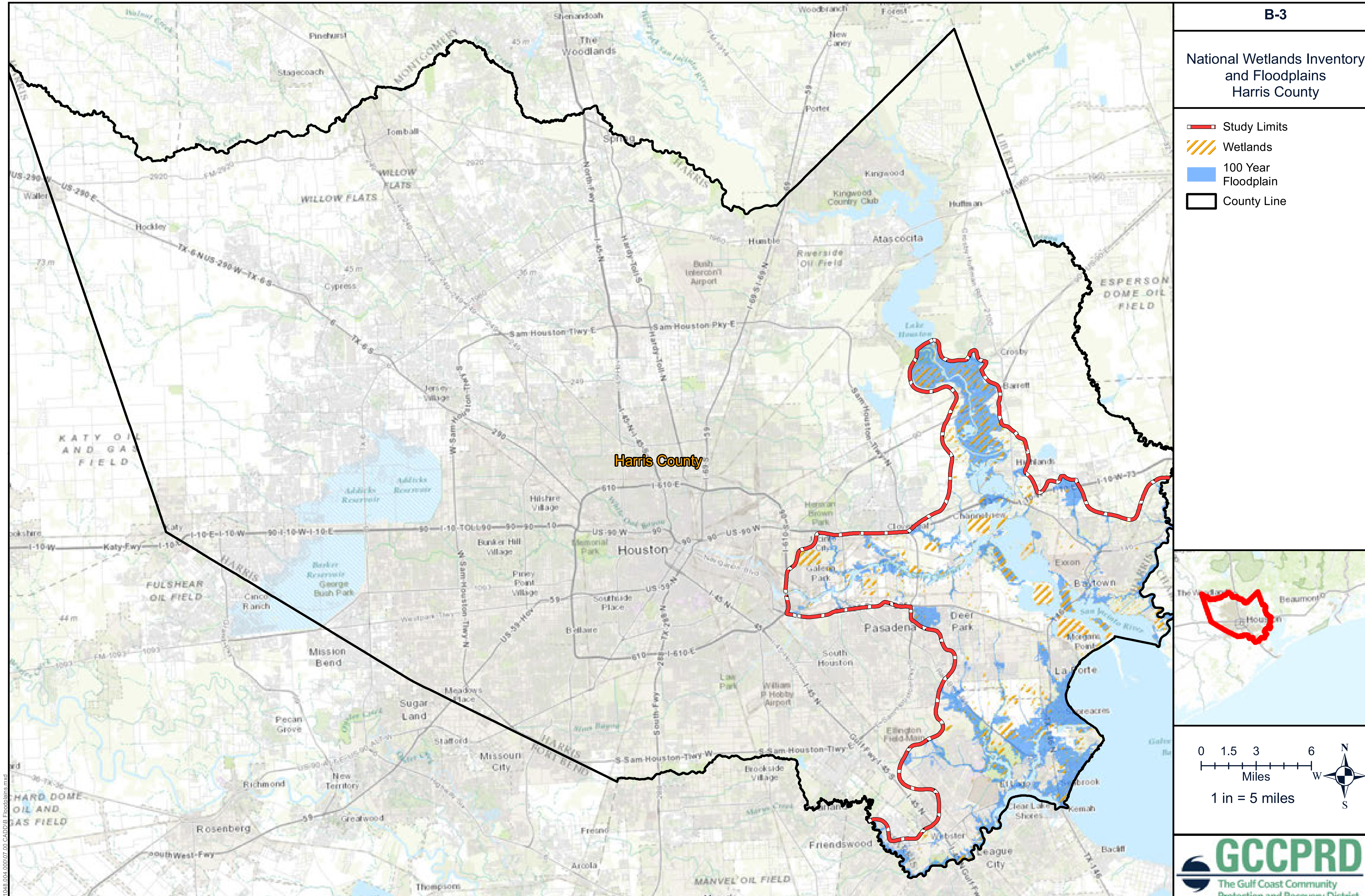
B-3
National Wetlands Inventory and Floodplains Harris County
Study Limits
Wetlands
100 Year Floodplain
County Line
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GCCPRD
The Gulf Coast Community Protection and Recovery District
Harris County
Houston
Pasadena
Deer Park
Baytown
La Porte
Atascocita
Humble
Kingwood
Spring
Tomball
Cypress
Katy
Sugar Land
Missouri City
Pearland
Friendswood
League City
Webster
Seabrook
Kemah
Channelview
Highlands
Crosby
Galena Park
South Houston
Bellaire
Addicks Reservoir
Barker Reservoir
Lake Houston
The Woodlands
Richmond
Rosenberg
Mission Bend
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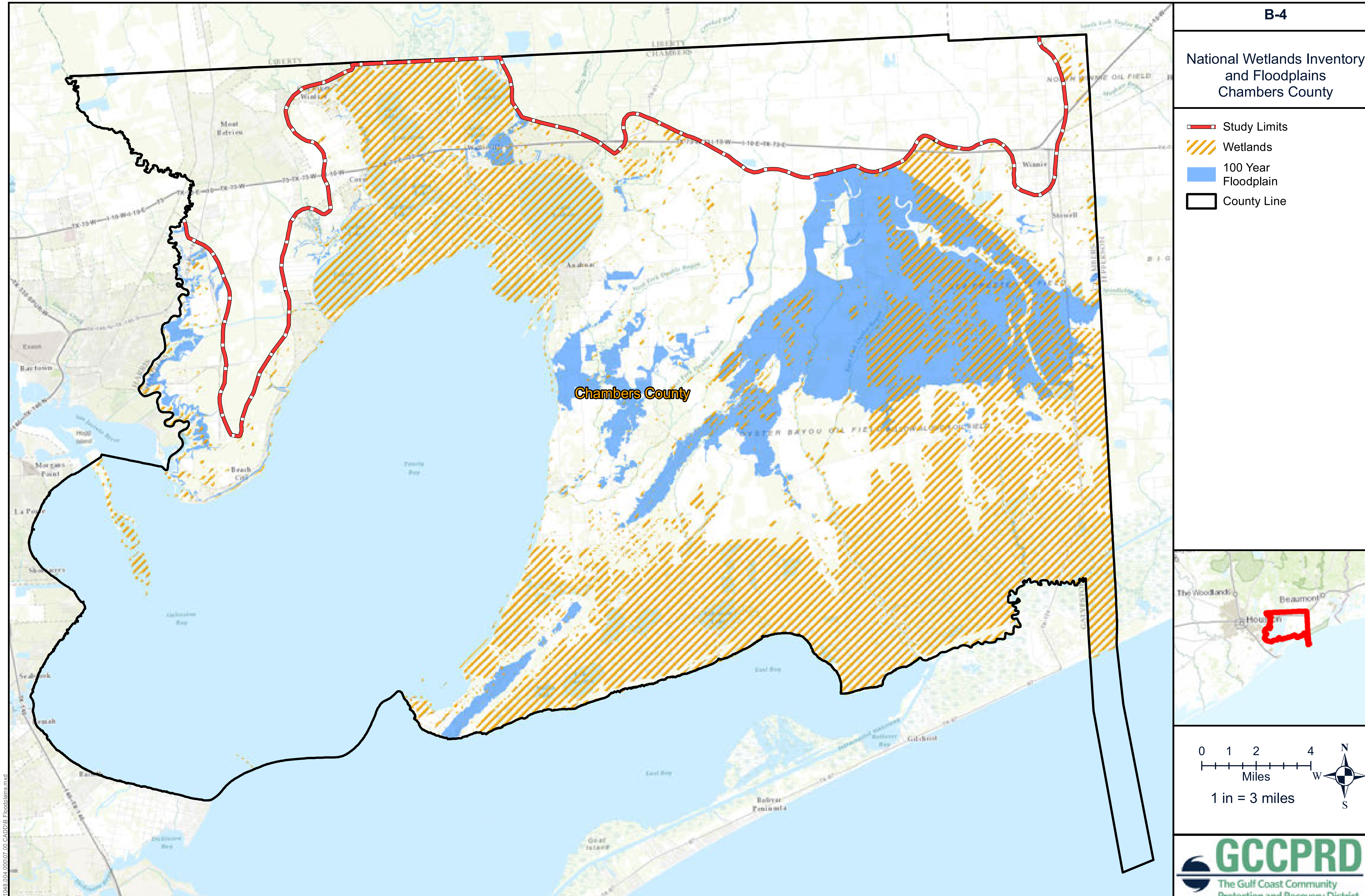
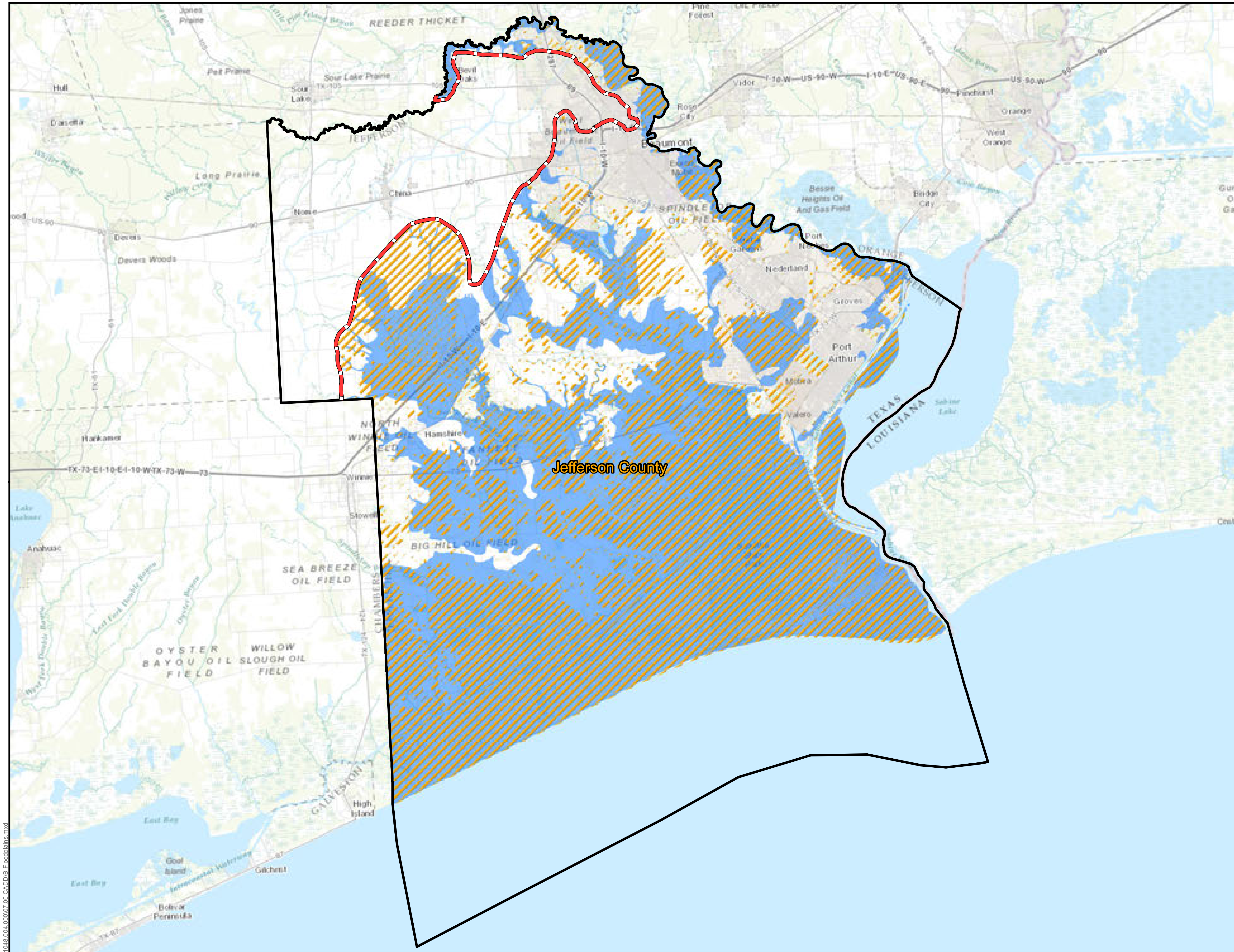
B-4

National Wetlands Inventory and Floodplains Chambers County

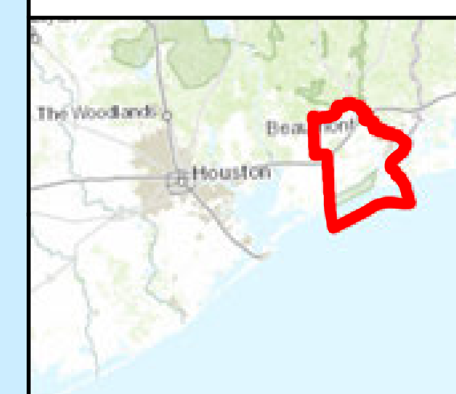


GCCPRD The Gulf Coast Community Protection and Recovery District

National Wetlands Inventory and Floodplains Jefferson County



- Study Limits
- Wetlands
- 100 Year Floodplain
- County Line



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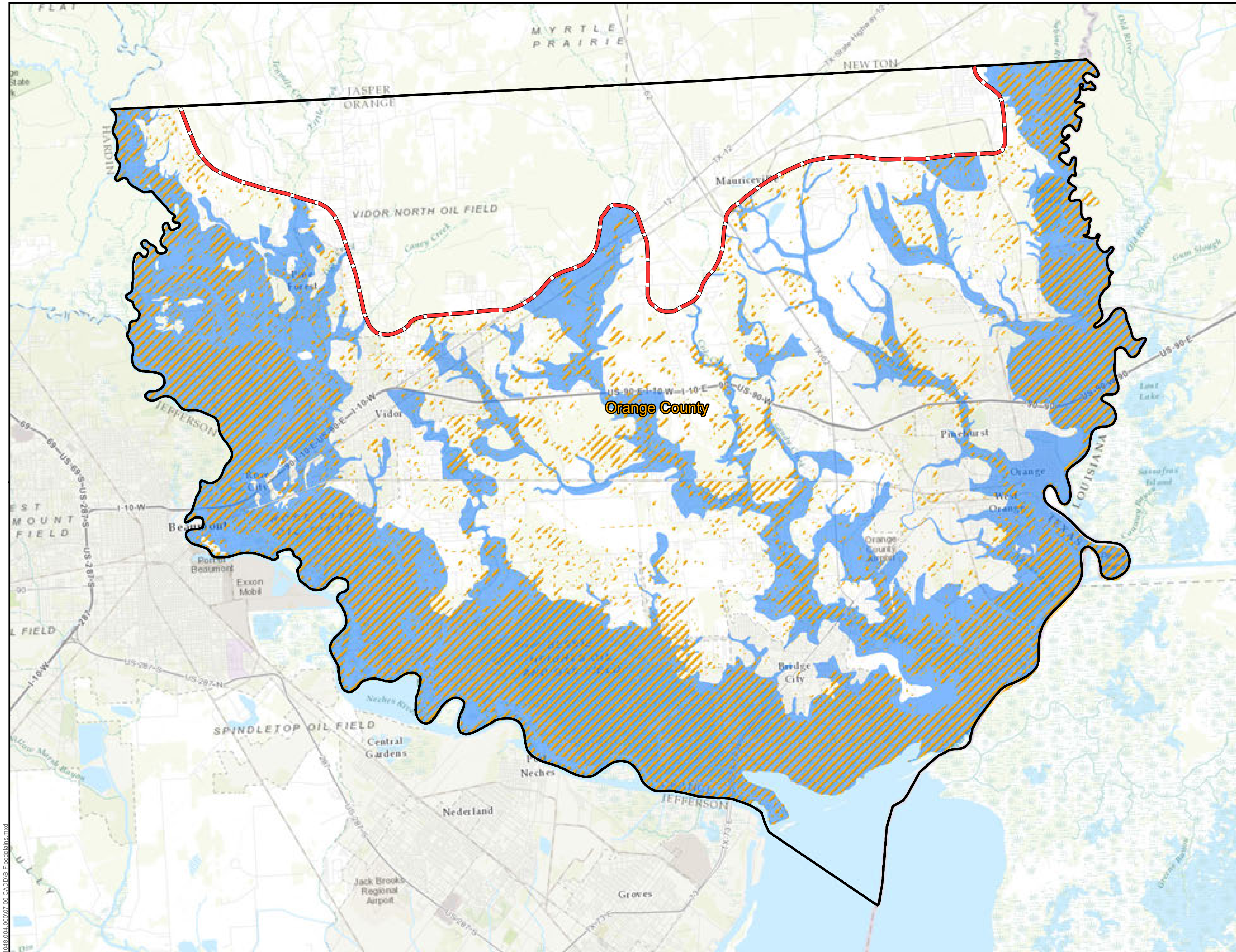
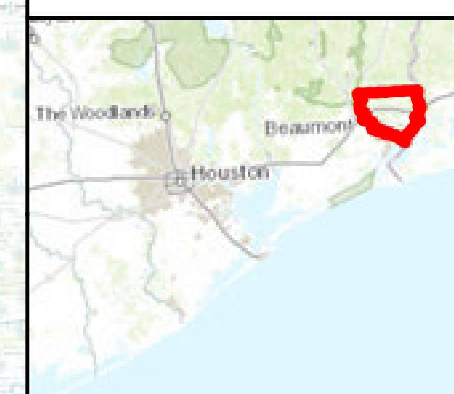


B-6

National Wetlands Inventory and Floodplains Orange County

Study Limits
Wetlands
100 Year Floodplain
County Line



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The Gulf Coast Community Protection and Recovery District

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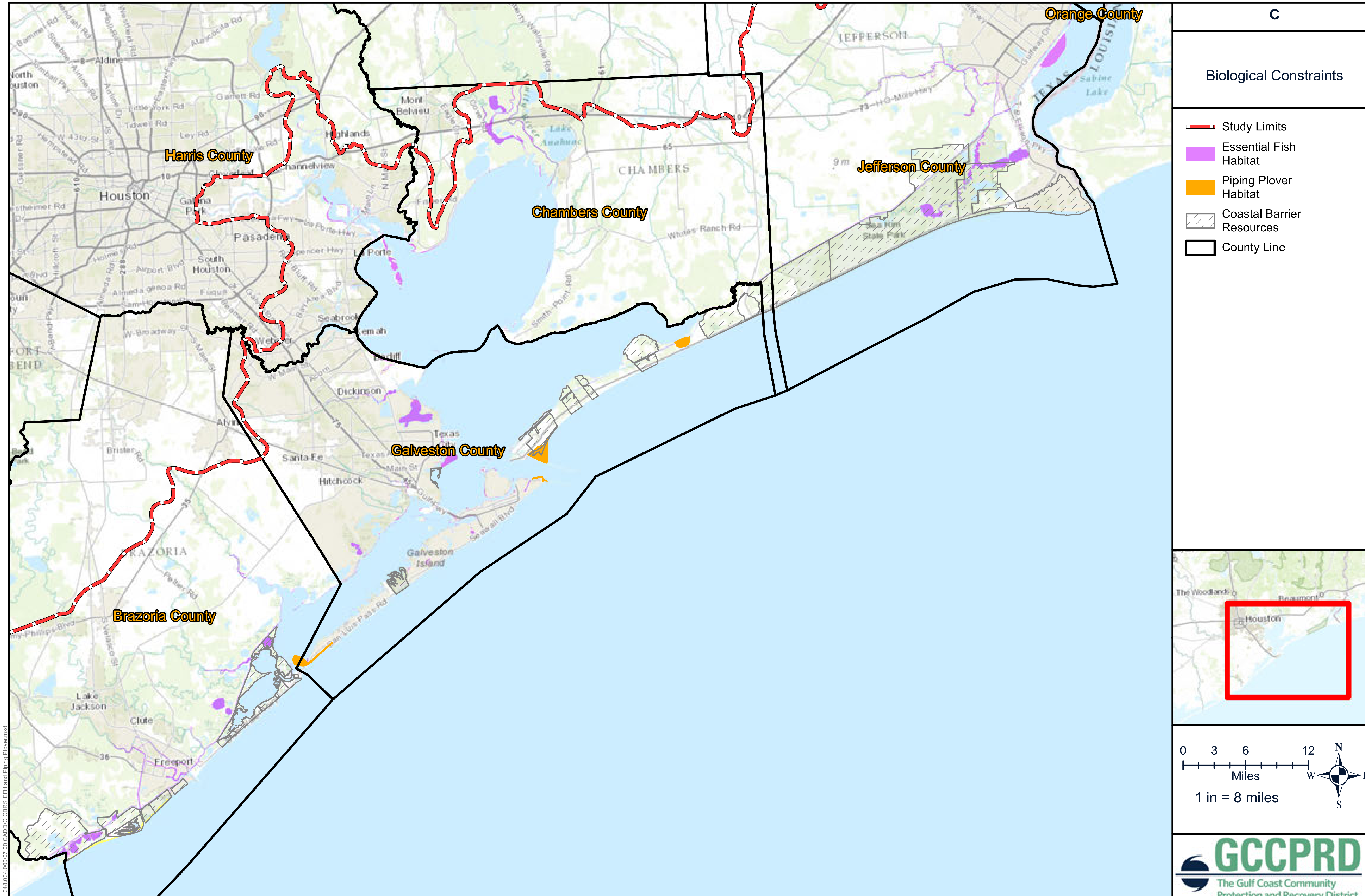
C
Biological Constraints
Study Limits
Essential Fish Habitat
Piping Plover Habitat
Coastal Barrier Resources
County Line
Harris County
Chambers County
Jefferson County
Orange County
Galveston County
Brazoria County
Houston
Pasadena
La Porte
Seabrook
Dickinson
Texas City
Santa Fe
Hitchcock
Galveston Island
Lake Jackson
Clute
Freeport
Mont Belvieu
Highlands
Channelview
South Houston
Webster
Alvin
Sabine Lake
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GCCPRD
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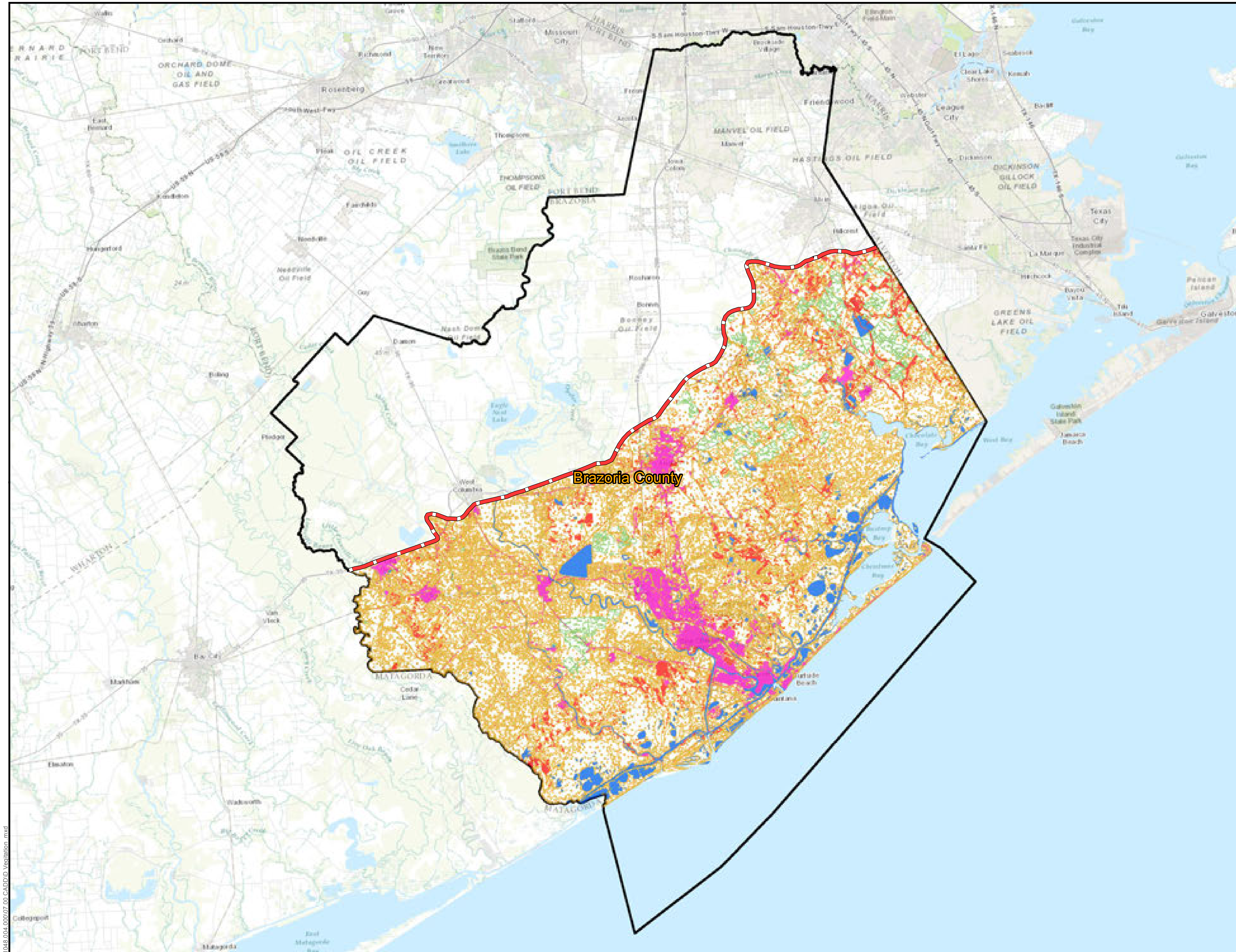
D-1

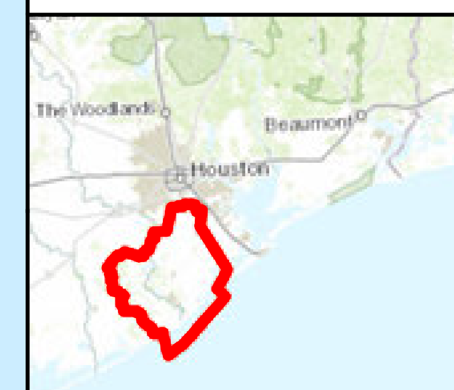
Vegetation Map
Brazoria County



Study Limits

Vegetation Types

- Gulf Coast Prairies and Marshes
- Barren
- Invasive Vegetation
- Water
- Pineywoods
- Agriculture
- Urban
- County Line



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Miles
1 in = 6 miles

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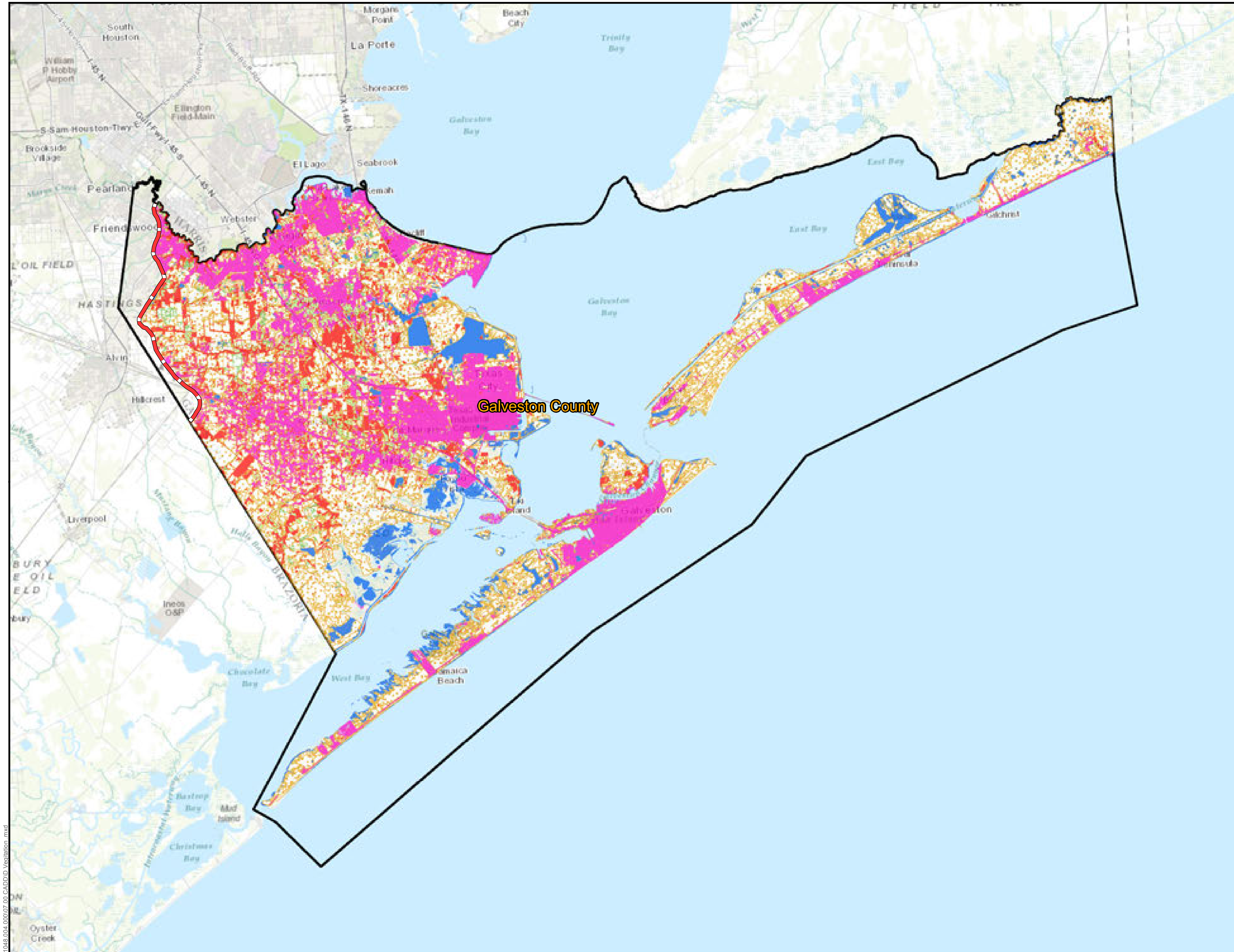
D-2

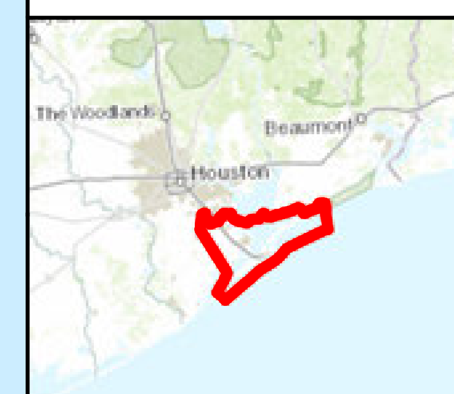
Vegetation Map
Galveston County



Study Limits

Vegetation Types

- Gulf Coast Prairies and Marshes
- Barren
- Invasive Vegetation
- Water
- Pineywoods
- Agriculture
- Urban
- County Line



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Miles
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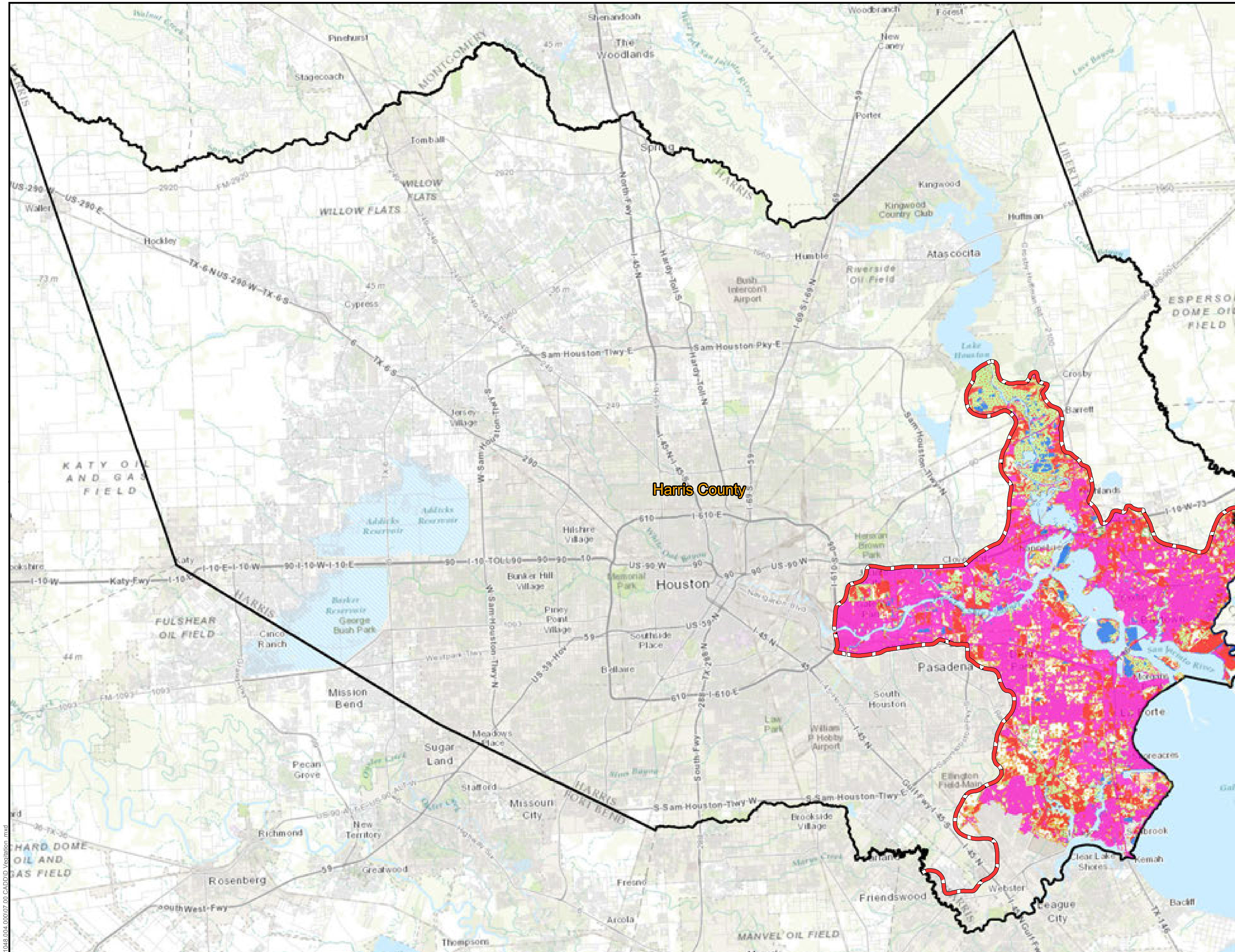
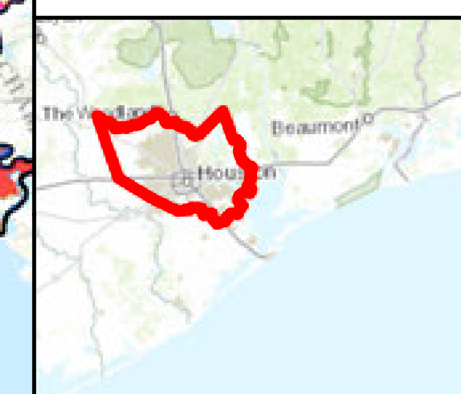
D-3

Vegetation Map
Harris County





- Study Limits

Vegetation Types

- Gulf Coast Prairies and Marshes
- Barren
- Invasive Vegetation
- Water
- Pineywoods
- Agriculture
- Urban
- County Line

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Miles
1 in = 5 miles

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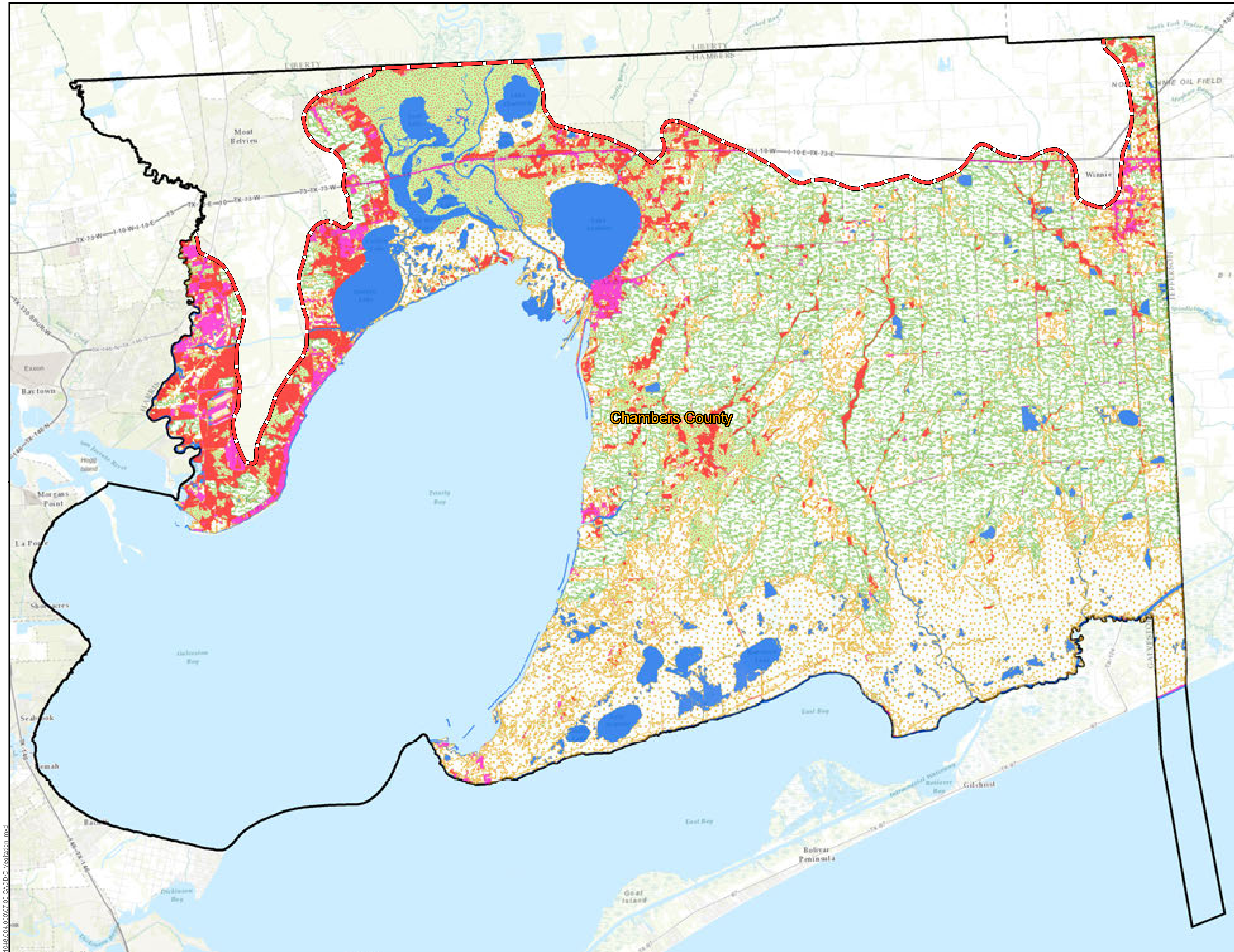
D-4

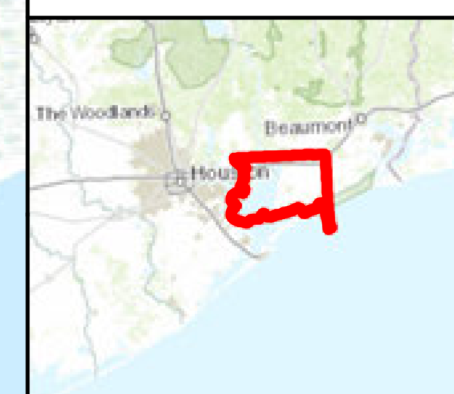
Vegetation Map
Chambers County



Study Limits

Vegetation Types

- Gulf Coast Prairies and Marshes
- Barren
- Invasive Vegetation
- Water
- Pineywoods
- Agriculture
- Urban
- County Line



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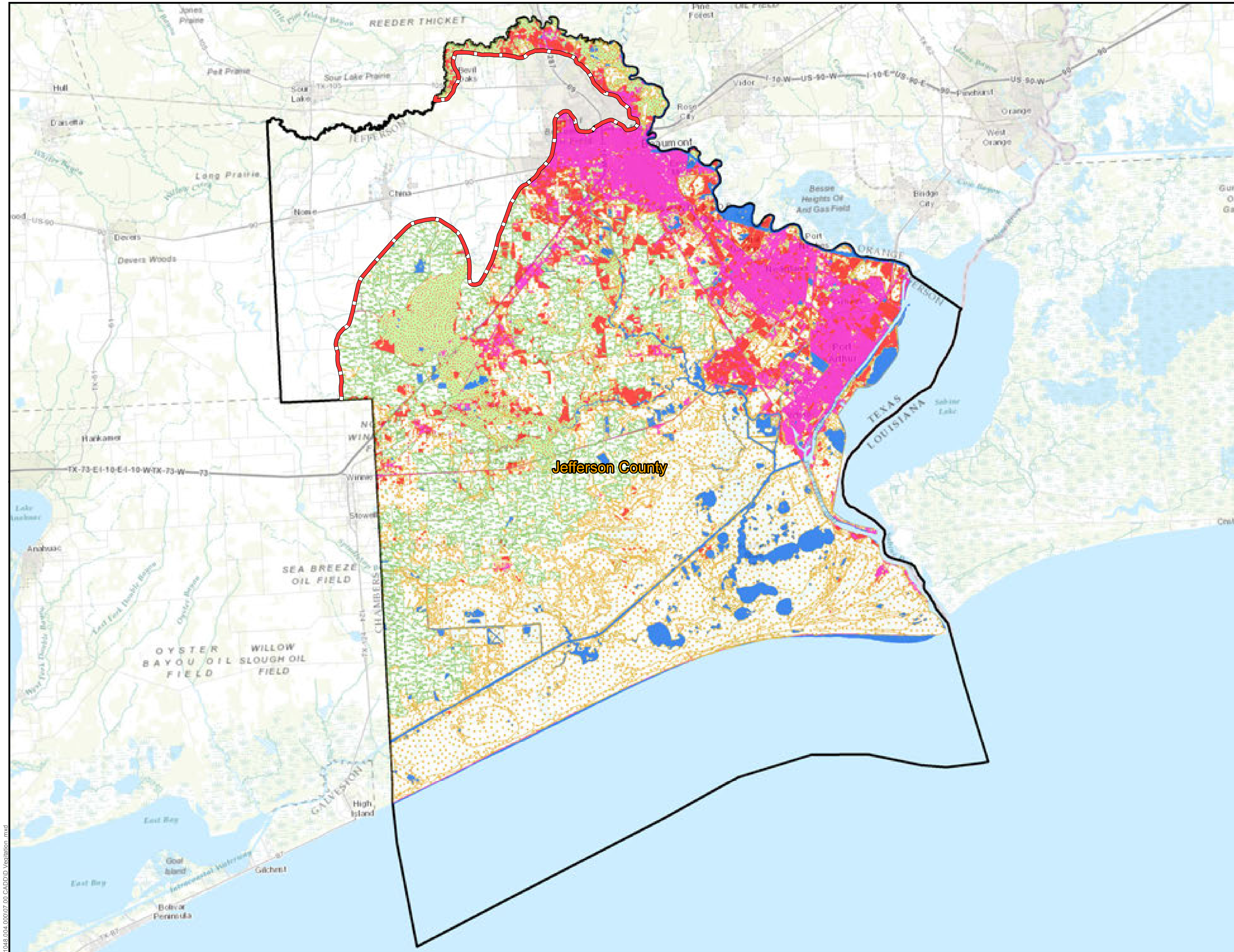
GCCPRD
The Gulf Coast Community Protection and Recovery District



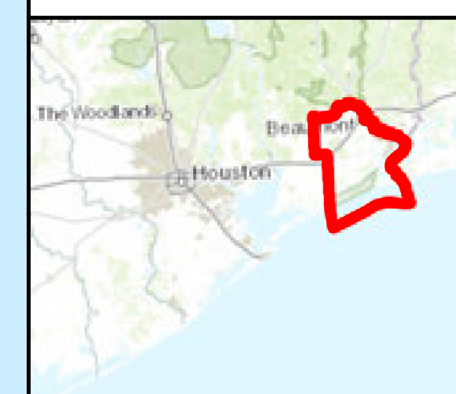
D-5

Vegetation Map
Jefferson County

Study Limits

Vegetation Types

- Gulf Coast Prairies and Marshes
- Barren
- Invasive Vegetation
- Water
- Pineywoods
- Agriculture
- Urban
- County Line



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GCCPRD
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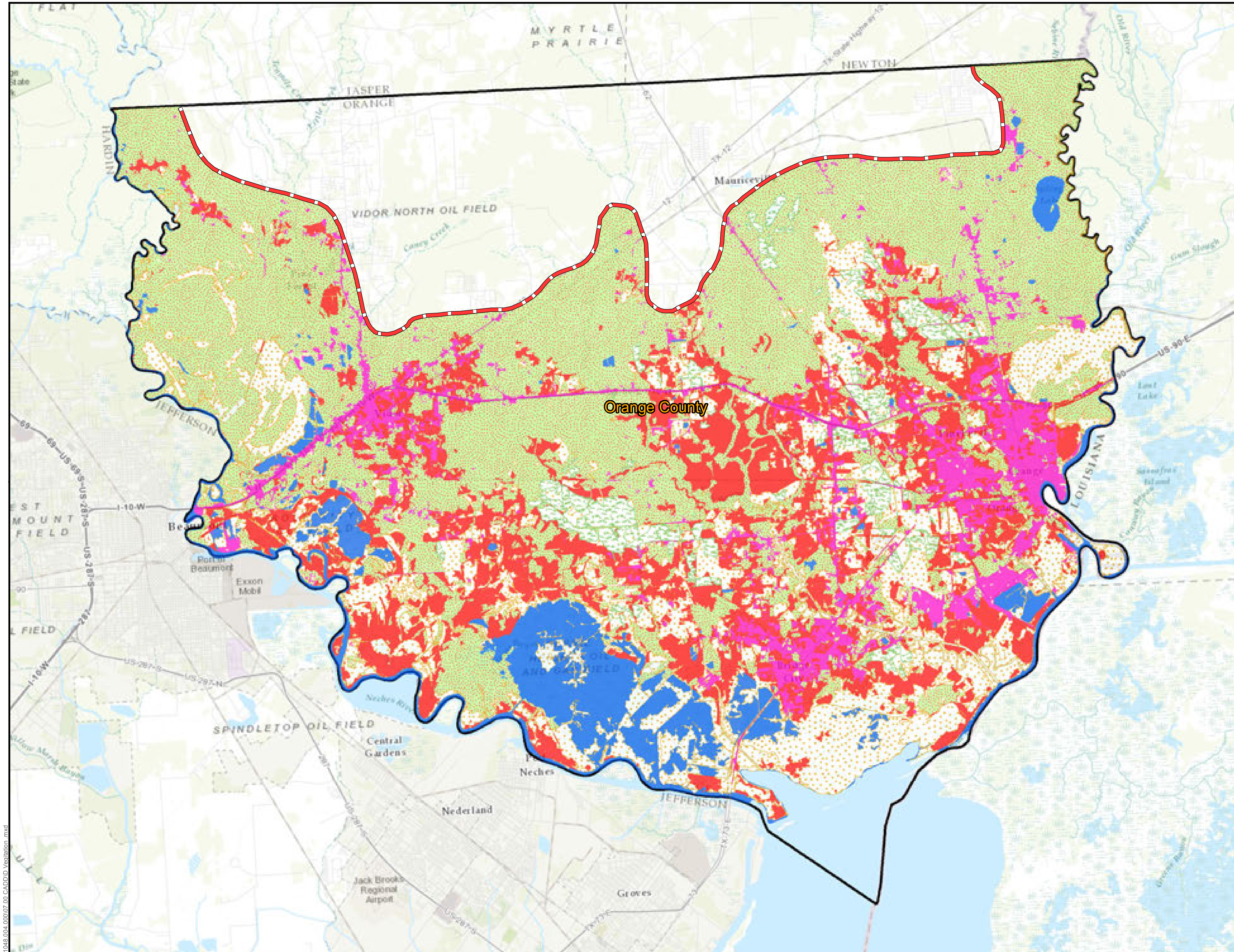
D-6

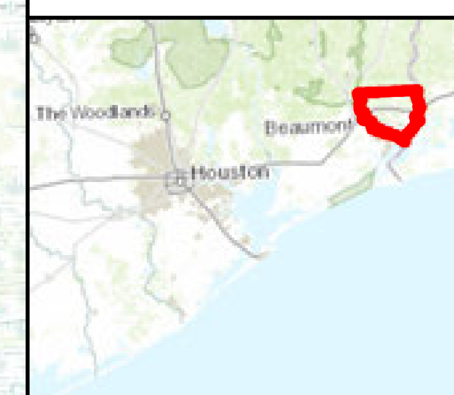
Vegetation Map
Orange County



- Study Limits

Vegetation Types

- Gulf Coast Prairies and Marshes
- Barren
- Invasive Vegetation
- Water
- Pineywoods
- Agriculture
- Urban
- County Line



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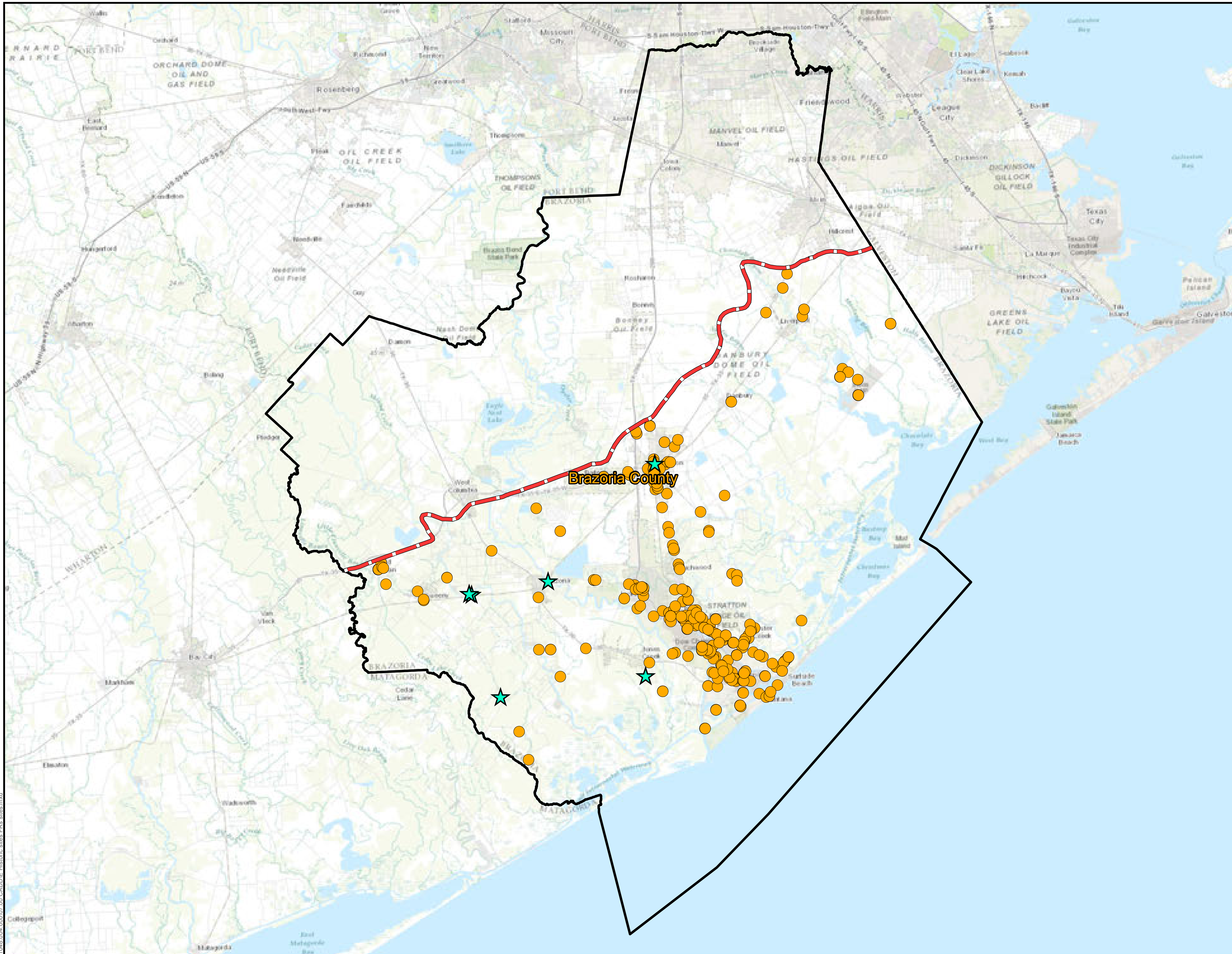
Miles
1 in = 2 miles

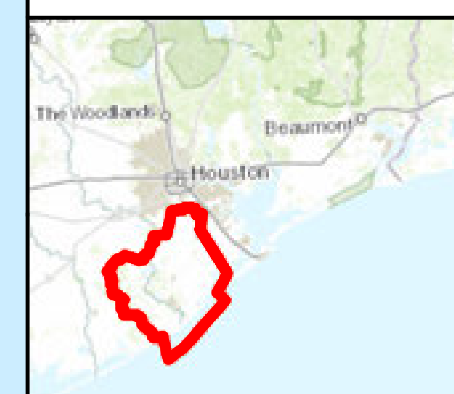
GCCPRD
The Gulf Coast Community Protection and Recovery District

E-1

Historical Sites and Hazardous Materials Sites Brazoria County



- Study Limits
- Historic Sites
- Hazardous Materials Sites
- County Line



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Miles
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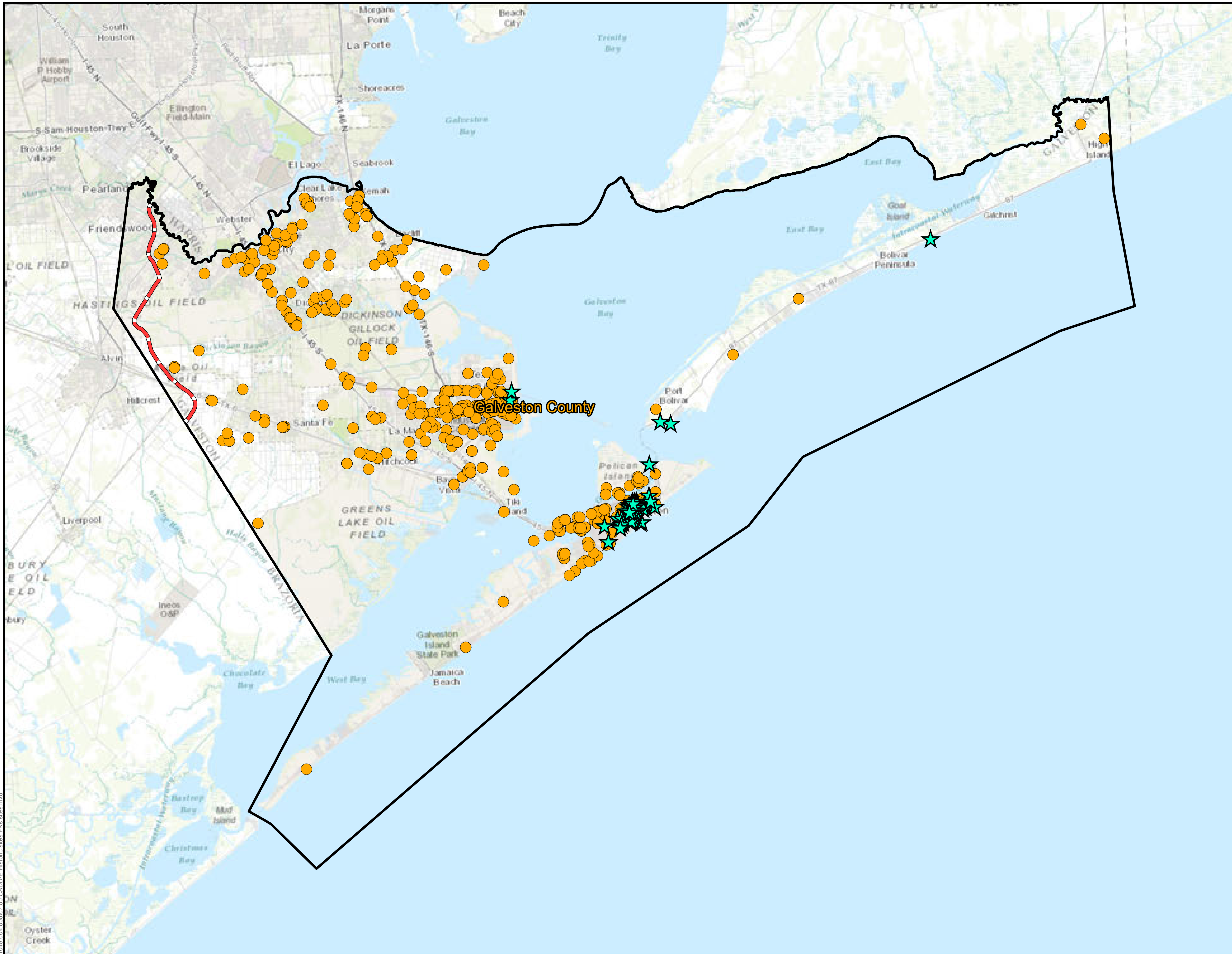
GCCPRD
The Gulf Coast Community Protection and Recovery District

E-2

Historical Sites and Hazardous Materials Sites Galveston County

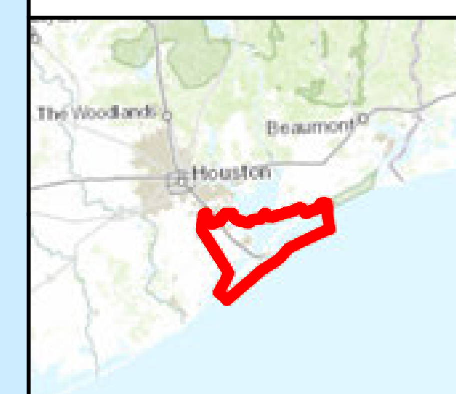


Study Limits

Historic Sites

Hazardous Materials Sites

County Line



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Miles

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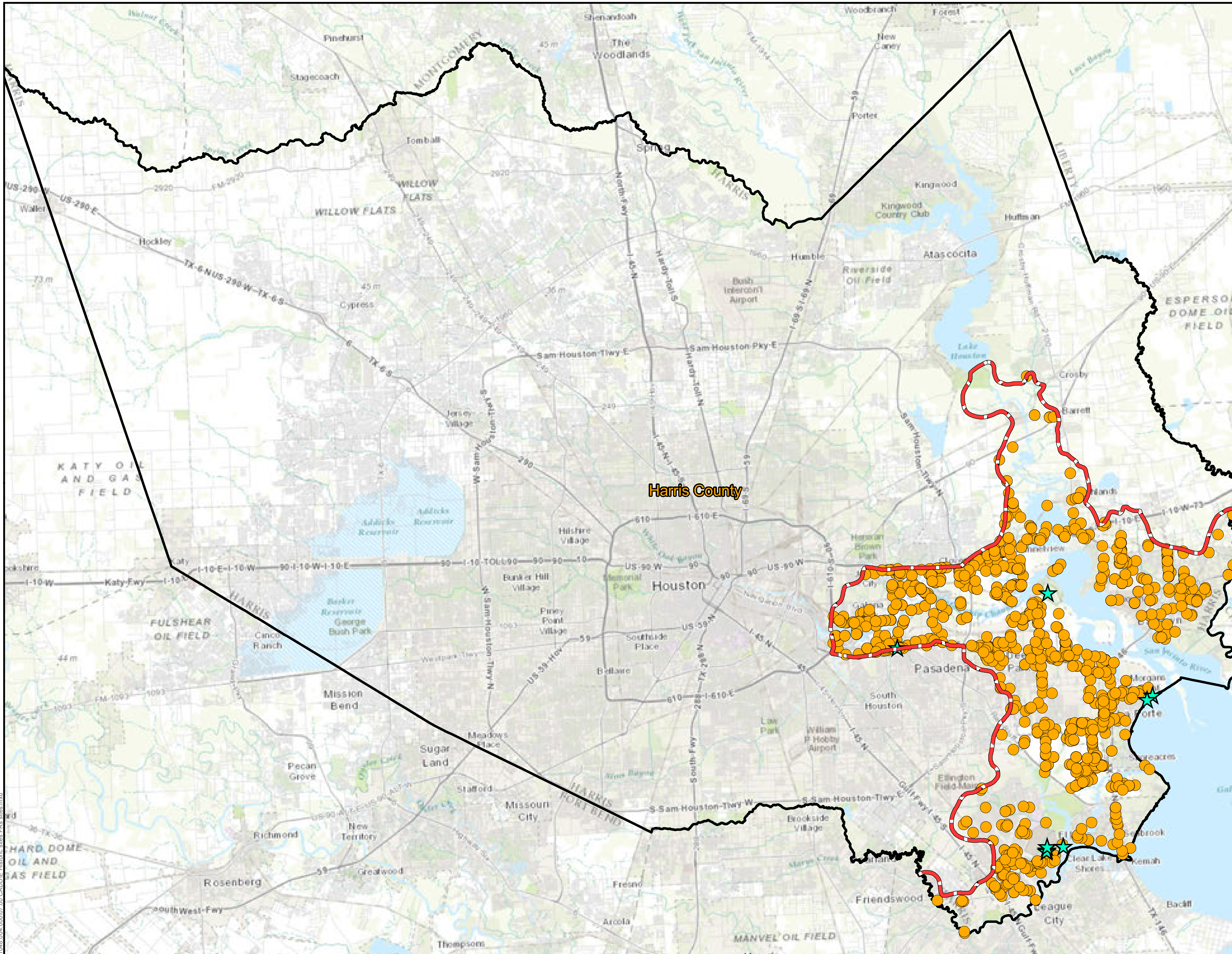
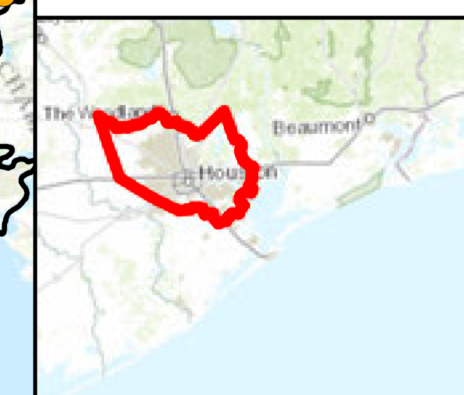
GCCPRD

The Gulf Coast Community Protection and Recovery District

E-3

Historical Sites and Hazardous Materials Sites Harris County





- Study Limits
- Historic Sites
- Hazardous Materials Sites
- County Line

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GCCPRD
The Gulf Coast Community Protection and Recovery District

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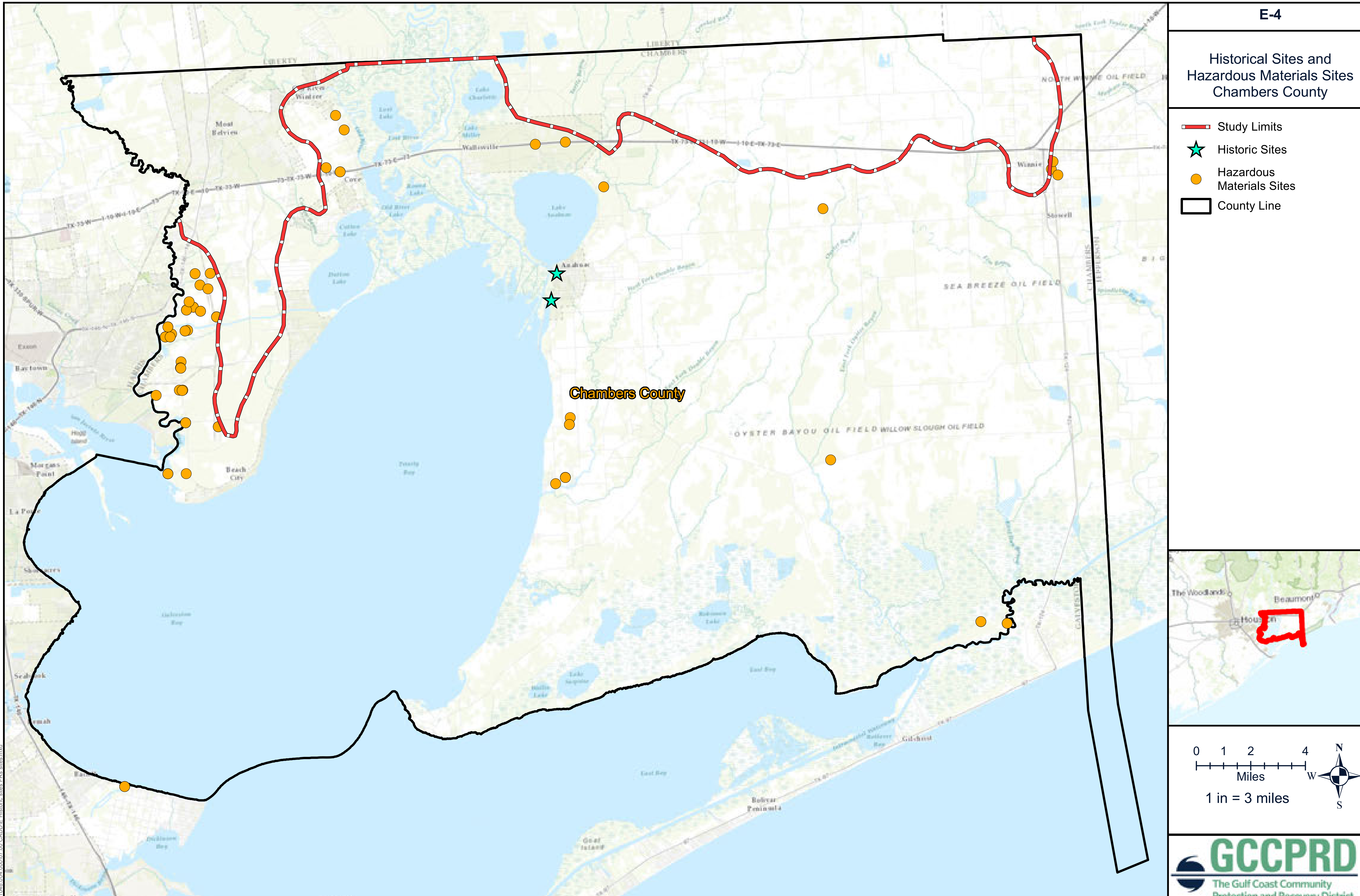
E-4
Historical Sites and Hazardous Materials Sites Chambers County
Study Limits
Historic Sites
Hazardous Materials Sites
County Line
Chambers County
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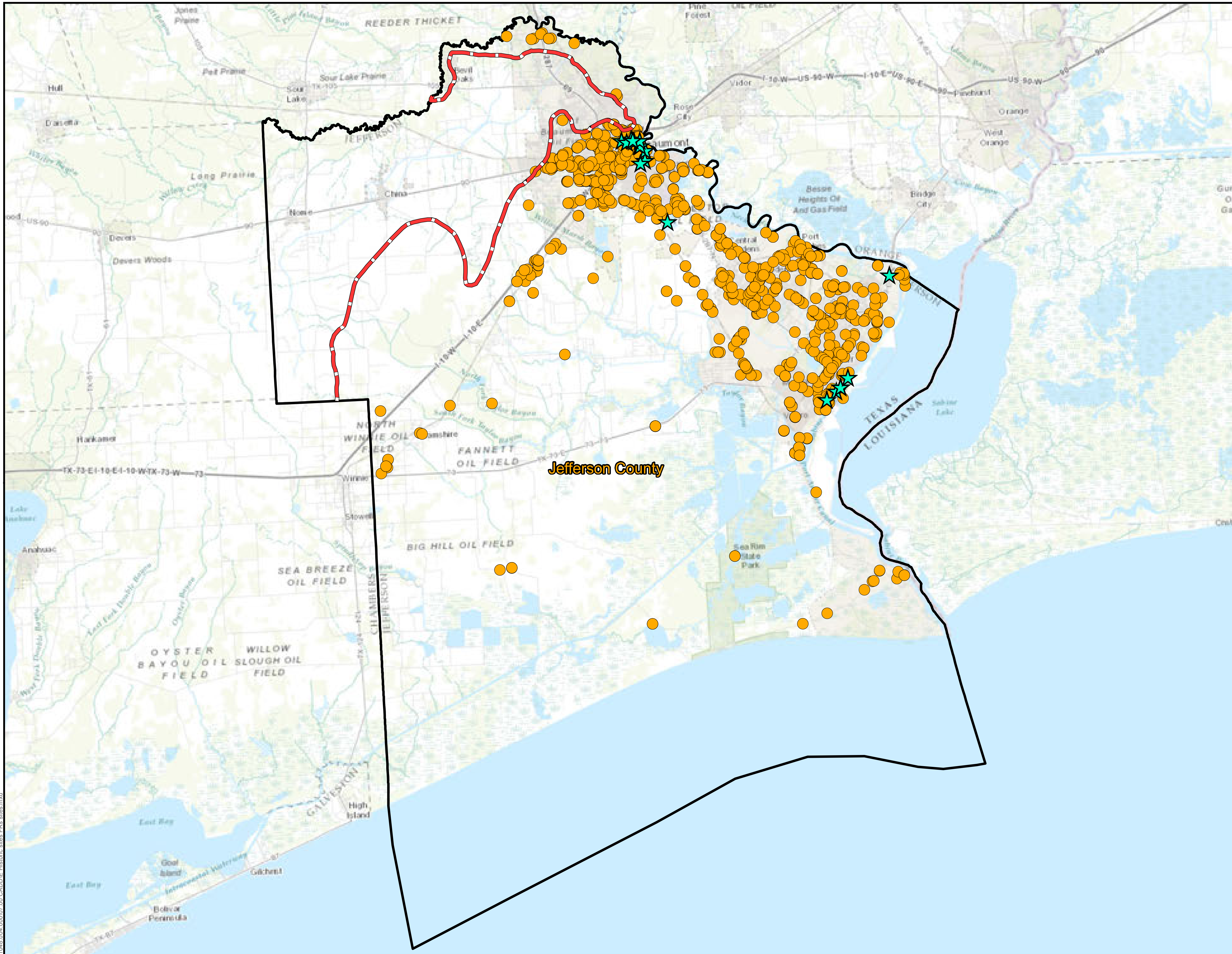
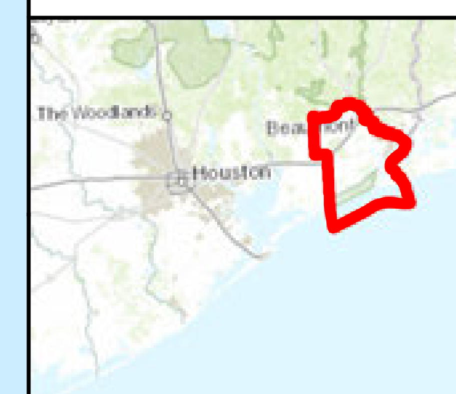
The Woodlands
Beaumont
Houston
GCCPRD
The Gulf Coast Community Protection and Recovery District
Anahuac
Winnie
Stowell
Wallisville
Cove
Beach City
Baytown
Exxon
Morgans Point
La Porte
Seabrook
Old River Winfree
Mont Belvieu
Lake Anahuac
Trinity Bay
Galveston Bay
East Bay
Bolivar Peninsula
Gilchrist
SEA BREEZE OIL FIELD
OYSTER BAYOU OIL FIELD
WILLOW SLOUGH OIL FIELD
NORTH WINNIE OIL FIELD
LIBERTY
CHAMBERS

E-5

Historical Sites and Hazardous Materials Sites Jefferson County



- Study Limits
- Historic Sites
- Hazardous Materials Sites
- County Line



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Miles
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GCCPRD
The Gulf Coast Community Protection and Recovery District

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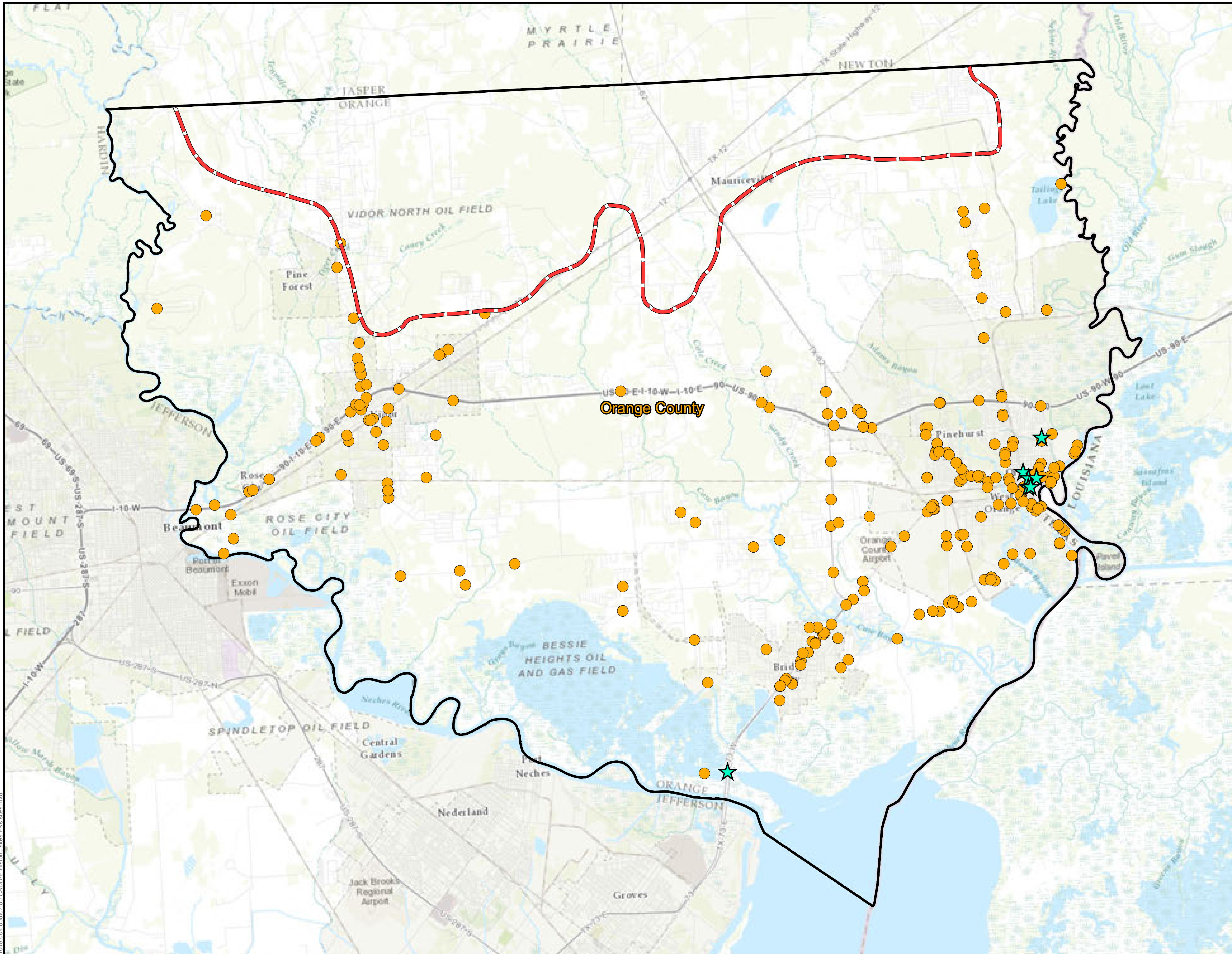
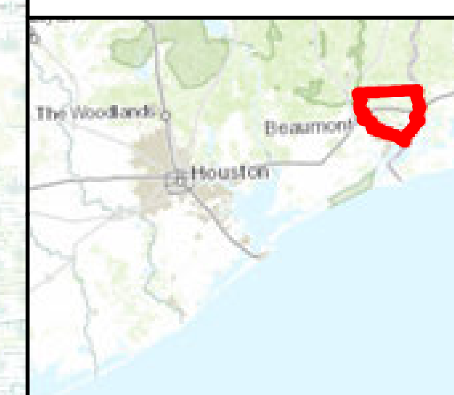
E-6

Historical Sites and Hazardous Materials Sites Orange County





- Study Limits
- Historic Sites
- Hazardous Materials Sites
- County Line

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Miles
1 in = 2 miles

GCCPRD
The Gulf Coast Community Protection and Recovery District