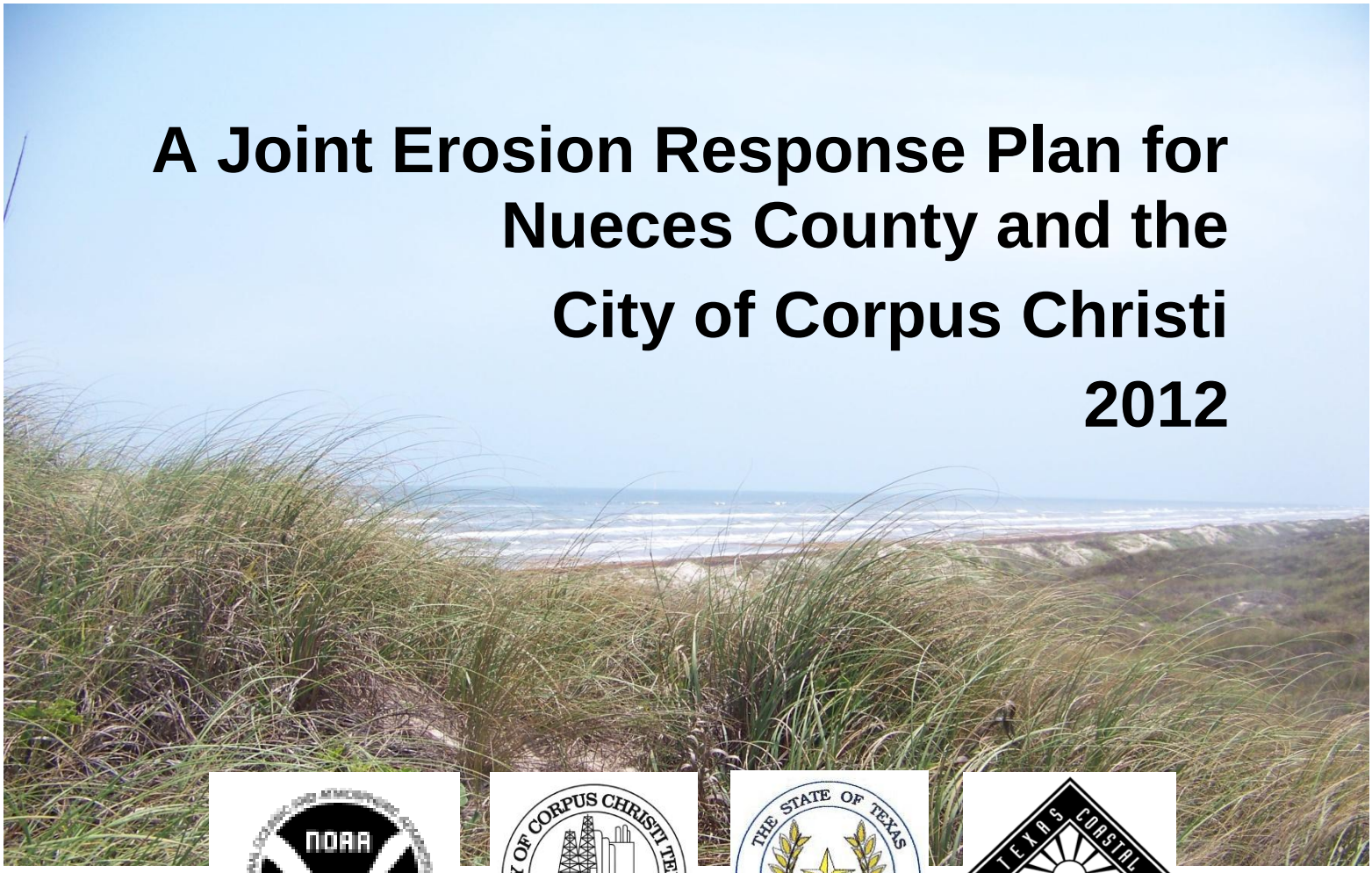

A Joint Erosion Response Plan for Nueces County and the City of Corpus Christi

2012

This study was funded in part by a National Oceanic and Atmospheric Administration grant from the Texas General Land Office

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Executive Summary

The purpose of the Erosion Response Plan is to reduce storm damage along the City and County gulf coastlines. The 81st Legislature amended Chapter 33 of the Natural Resources Code provided authority to the Texas General Land Office to formulate rules for local governments with gulf coast lines in their jurisdictions to create Erosion Response Plans.

The Erosion Response Plan will be used by the General Land Office to qualify local governments for certain GLO grants. The Plan will be used by the City and the County to justify submission of grants for GLO funding for beach renourishment, dune system enhancements and improvements for public beach access.

A draft City Erosion Response Plan was presented to City Council in June 2011. The City Council recommended the draft plan, with changes, to be submitted to the Texas General Land Office. (GLO) Part of City Council direction to staff was to develop a final plan that is as similar to the County's as possible. The GLO provided comments on the draft plan by October 2011. The Planning Department then formed an informal group of County officials and City officials to develop the final plan document. The informal group included representatives from the City Beach Dune Committee, the County Beach Management and Dune Protection Advisory Committee, the Water Shore Advisory Committee, and the Island Strategic Action Advisory Committee.

The Erosion Response Plan Addresses:

- Assessment of the foredune ridge in the Corpus Christi and Nueces County jurisdictions.
- Review of scientific studies concerning storm surge, coastal erosion, and sea level rise.
- Review of FEMA velocity zones on Mustang and Padre Islands.
- The plan identifies the beach as the first line of defense to storm surge and the foredune ridge as the second line of defense.
- The plan defines the minimum width of the public beach for provision of public beach access as 100 feet wide from the Line of Vegetation to the wet/dry line on the beach.
- The goal for enhancing the foredune ridge is to establish a dune system of at least 14 feet high, 350 foot deep, and containing at least 50% vegetative coverage.
- Mitigation sites for enhancing the foredune ridge are identified and prioritized.
- Establishment of a 350 foot building setback line located 350 feet landward of the Line of Vegetation along the gulf beach. The building setback line will prevent new construction of residential or commercial buildings within the foredune ridge.
- Land that is landward of the seawall is exempt from the Building Setback.
- Existing structures are exempt from the building setback prohibition, provided there is no practicable alternatives, that the foot print of the building is not increased and that the new structure meets new construction guidelines.
- The plan addresses enhancements to public beach access. Generally, these enhancements to public access focus on designs to reduce damage to the public access ways after storm events.
- The criteria for potential acquisition of property seaward of the Building Setback Line.

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Appendix 1: Packery Channel Development Plan
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I. Introduction

The 81st Legislature amended Chapter 33 of the Natural Resources Code to require local governments with jurisdiction over Gulf of Mexico Shorelines to adopt an Erosion Response Plan (ERP). The changes to Chapter 33 of the Code also requires the Land Commissioner to consider whether a jurisdiction has completed an ERP before awarding Coastal Erosion Planning and Response Account funds for projects within the local jurisdiction. The Texas General Land Office (GLO) adopted rules specifying the requirements that may be considered when developing an Erosion Response Plan. In addition, the rules establish the dates for submittal of the ERP to the GLO in order for it to be considered for each Coastal Erosion Planning and Response Act (CEPRA) biennium. The rules require the plans to be submitted by July 1, 2011 for the current grant cycle. The ultimate purpose of the plan is to minimize future storm damage to public and private property along the Gulf Coast within the local government's jurisdiction.

During the course of developing an Erosion Response Plan the County and the City have worked closely to gather to create plans that are compatible. As the two plans neared completion, by direction of the Commissioner's Court and the City Council, to make the plans as similar as possible, the two separate plans have been merged into this joint Erosion Response Plan.

Nueces County's jurisdiction, with respect to this plan, includes that portion of Mustang Island that is not inside the Corpus Christi City limits and that portion of North Padre Island that is north of Kleberg County. Within this area, Nueces County maintains Dune Permitting authority through its Beach Management Plan. The Dune Permitting area is located 1,000 feet landward of mean high tide except for two exceptions: Mustang Island State Park; and land that is landward of the toe of the seawall on North Padre Island. This Erosion Response Plan will become an addendum to Nueces County's Beach Management Plan.

The City of Corpus Christi's jurisdiction, including inside city limits and the Extraterritorial Jurisdiction (ETJ), contain 25 miles of public beach. There are currently 20 miles of public gulf beach inside city limits and 5 miles of gulf beach in the City's five mile extraterritorial jurisdiction. Of the 25 miles of public beach only 6 miles or 24% of the City's beach frontage abuts private lands.

This plan is an addendum to the City of Corpus Christi Code of Ordinances, Chapter 10: Beachfront Management and Construction.. Chapter 10 addresses Beachfront Construction Certificates which are required by state statue for construction activities to protect the public's right of access to and along Gulf of Mexico Beaches. The Beachfront Construction area is generally located between mean high tide and the first paralleling public road or 1,000 feet landward of mean high tide, whichever is greater. There are two exceptions where a Beachfront Construction Certificate is not required: Mustang Island State Park; and the Padre Island National Seashore.

Chapter 10 also addresses protection of the beach dune system through the Dune Protection Permit. The City has been granted the authority to issue Dune Protection Permits in Kleberg County but Nueces County has not granted Dune Protection Permit authority to the City within Nueces County. However, Chapter 10 is constructed to automatically accommodate Dune Protection Permit authority should Nueces County authorize the City of Corpus Christi to issue Dune Protection Permits in Nueces County. The Dune Protection Permit area is an area that is 1,000 feet landward of mean high tide, except for the area adjacent to the North Padre Island sea wall. Adjacent to the seawall, the Dune Permit area is between mean high tide and the "toe" of the seawall. A Dune Protection Permit is not required for either Mustang Island State Park or the Padre Island National Seashore.

In order to develop the Erosion Response Plan, the Texas General Land Office (GLO), Nueces County and City Staff compiled a work plan and subsequently obtained a GLO grant. The City provided an in-kind match consisting of mapping, research, formulating the ERP and other tasks necessary for developing the ERP.

The primary reason for completing an Erosion Response Plan (ERP) is to reduce future storm damage and to protect public access to the Gulf Beach for future generations.

An important secondary reason for completing a local ERP is so that the City and County will continue to be eligible for Texas General Land Office CEPRA grants. A criterion for the award of future grants is that the city must have an Erosion Response Plan approved by the Texas General Land Office. Texas Administrative Code 15.41 contains a two stage evaluation process for Coastal Erosion Studies and Projects with the second stage establishing whether a "…local government has implemented an Erosion Response Plan for reducing public expenditures due to erosion and storm damage losses."

The essential elements that are included in this Erosion Response Plan (ERP), per the work plan developed by the GLO and the City, include the following:

- A construction setback line landward of the Line of Vegetation (LOV);
- Criteria for establishing the setback line;
- Criteria for construction within the setback area;
- Allowances for exemptions to the setback criteria for existing structures or where there is no practicable alternative;
- Conditions for construction of exempt structures;
- An inventory of all existing and proposed public beach access amenities and access ways;
- Procedures for preserving and enhancing the public's right of access to and use of the public beach after a storm event;
- Post storm damage assessment and requirements for rehabilitation;

- Procedures for preserving, restoring and enhancing critical sand dunes for natural storm protection;
- Requirement for public input and public meetings prior to City Council action;
- Criteria for voluntary acquisition of property seaward of the building setback line; and
- Ensuring the City's Chapter 10 Beachfront Management and Construction code or any other City codes are changed for consistency with the Erosion Response Plan.

Creation of this plan required the City and the County to review the Bureau of Economic Geology's (BEG) 2007 erosion rates for consistency with the most recent natural or manmade beach erosion trends. The BEG's Erosion Rates for the area used by the GLO are based on data collected since 1937, a study period of 70 years. As part of this review staff obtained scientific assistance from local, state and national experts and or studies of sea level rise and coastal erosion.

Historical Conversion of Agriculture Island Usage to Urbanization and the Impact on Island Erosion

Land use on North Padre and Mustang Island prior to 1950 was for livestock grazing. From 1950 to 1971 land use went to development and recreation, first with the Nueces County portion of Padre Island in 1950, Mustang Island in 1968 and Kleberg County in 1971.[1] With this change of use the area of un-vegetated (active) dunes went from 6,732 acres to 614 acres. [2] Significant primary and foredune ridges were established on North Padre Island between Bob Hall Pier and White Cap Blvd and on Mustang Island between the current Packery Channel and the Mustang Island State Park Fish Pass.

[1] Small scale grazing still exists on Mustang Island

[2] Land and Water resources, historical changes, and dune criticality: Mustang & North Padre Islands. White et al 1978 University of Texas BEG

Figure 1: Bob Hall Pier to White Cap 1948, sand flats with coppice dunes

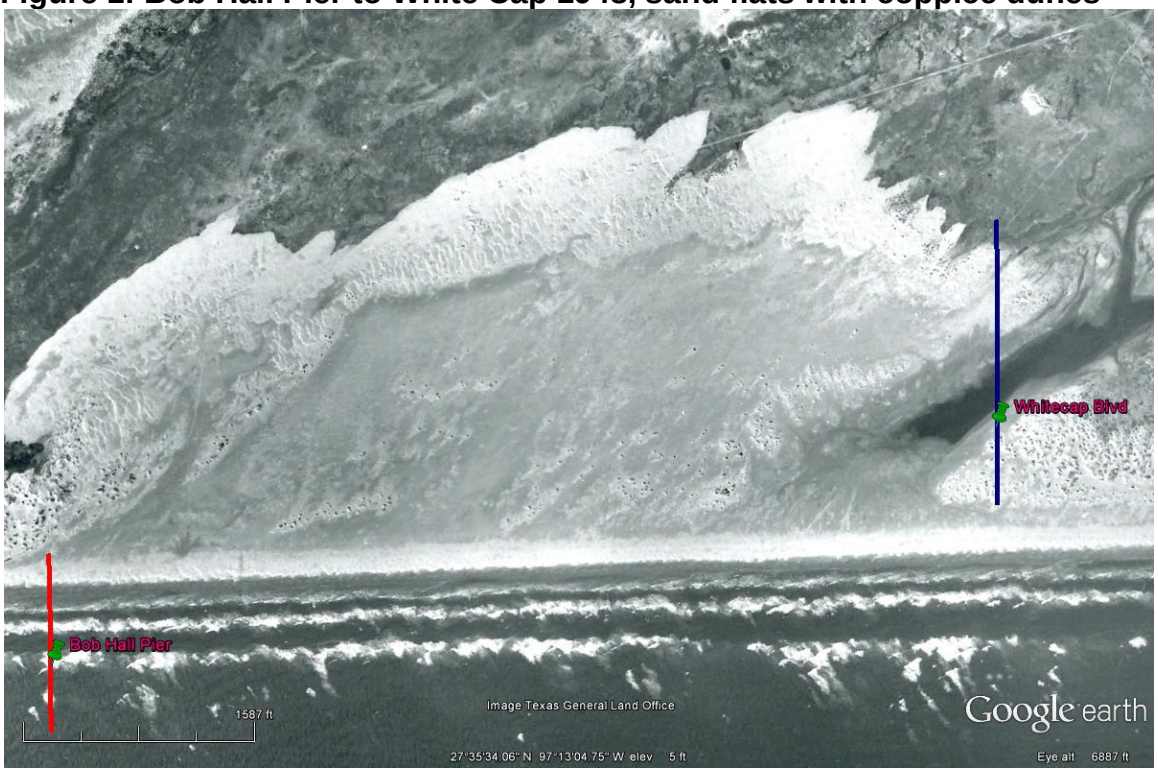


Figure 2: Bob Hall Pier to Whitecap Blvd. 2009 Aerial with 2005 Lidar Topography

Light green line 12’ contour, green line 15’ contour, yellow line 18’ contour

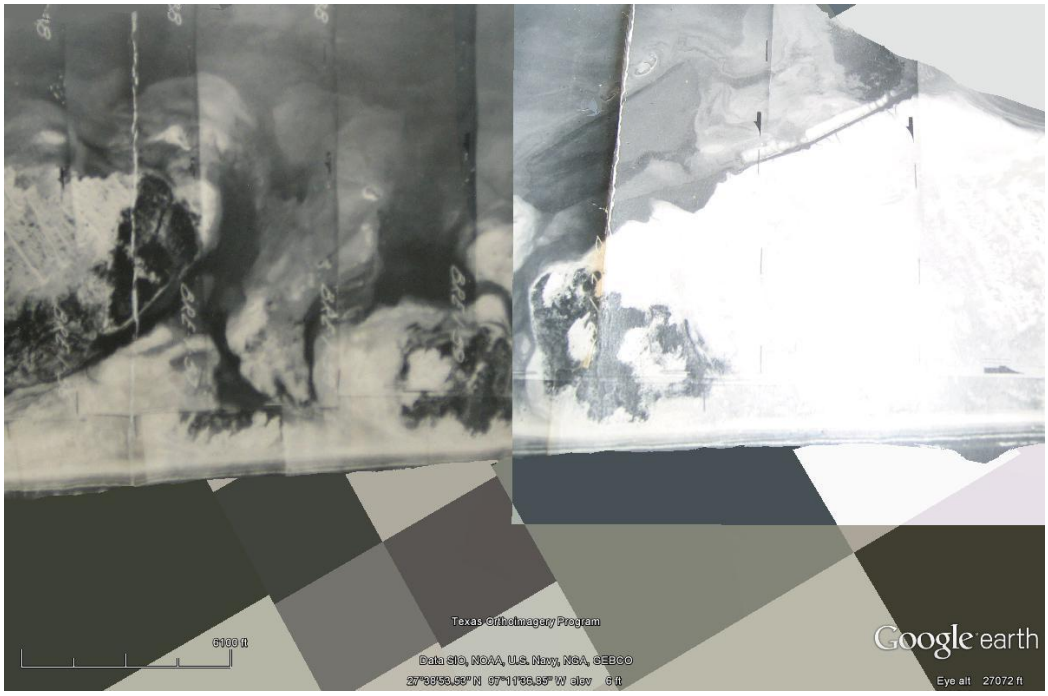


Figure 3: Mustang Island Packery Channel to Fish Pass 1938, Primarily San Flats

Figure 4: Mustang Island, Packery Channel to the Fish Pass 2009, Primarily Dunes

II. Setback Line Determination

A key finding of this plan is the determination of the setback line. The setback line is measured from the line of vegetation on the beach landward to a specified point which will become known as the Erosion Response Plan Setback Line. The purpose of the setback line is to minimize storm damage to structures on the island by preserving the area seaward of the Setback Line and minimizing the number of structures in the area. The plan is also intended to target for improvement, those foredune areas where the dune system is narrow or contains the lowest elevation of dunes, providing little protection against storm surge.

II.A. Setback Line Goals

- Minimize future erosion, storm and flood losses;
- Allow development to occur while providing sufficient seaward lands to accommodate public access along the gulf beach;
- Preserve dune system width to sustain the existing and future critical dune system;
- Identify criteria, uses and structures where no practicable alternative exists for construction seaward of the setback line.

II.B. Assessment of Erosion Rates

The criteria for establishing the setback line is based on scientific studies of the shoreline erosion along the Texas Coastline based during the last 70 years (Bureau of Economic Geology). State law provides that a determination of erosion rates shall be based on the University of Texas at Austin, Bureau of Economic Geology (BEG) or other sources approved by the Texas General Land Office. Along the Texas Coast the highest erosion rate by county is -2.80 meters or -9.19 feet per year in Jefferson County . The lowest average rate on the Texas Coast is-.28 meters or -0.92 feet per year for Nueces County. In Kleberg County the erosion rate is -0.54 meters or -1.77 feet per year.

Figure 5: Erosion Rates Comparison

			Erosion Rates (Ft/Yr)			Accreation Rates (Ft/Yr)	
Shoreline Trend	Mean Shoreline Change (average of all transects in ft/yr)	% of Coast Eroding	Max	Mean	% of Coast Accreting	Max	Mean
Texas Shoreline (1850's 2000)	-2.3	64	-30.2	-5.9	36	48.8	3
Mustang Island (Inside Corpus Christi City Limits)	-0.4	96.7	-4.4	-0.4	3.3	1.8	0.3
North Padre Island (ICL / OCL)	-2.6	96.7	-4.6	-3	3.3	1.9	0.9
Note: Erosion rate information for Mustang and North Padre Island is from the Bureau of Economic Geology, 2007 Erosion Rates.							
Mustang Is. is the area north of Packery Channel. North Padre Is. includes Nuece County and Kleberg County Areas in the City and ETJ.							

Figure 5 is an adaptation from the State Erosion Response Plan modified to include a summary of Mustang Island and North Padre Island erosion and accretion rates.

An analysis of the shoreline erosion rates (BEG 2007) indicates that over 90% of the gulf shoreline in the City and its Extraterritorial Jurisdiction is eroding compared with 64% of the Texas Gulf Coast. However, the average erosion rate on Mustang Island at -0.4 is significantly less than the average rate of -2.3 feet per year for the Texas Coast. The following is a brief summary of the Bureau of Economic Geology's erosion rates depicted on 20 map exhibits in Appendix 2: Dune Assessment and Mitigation Maps.

II.B.1. Exhibits 1 thru 7:

Starting with the southern portion of the study area, Exhibits 1 thru 7 are located in Kleberg County with Exhibits 1 thru 4 encompassing a portion of the Padre Island National Seashore. Overall, Exhibits 1 thru 7 show a gradually increasing erosion rate in a south to north direction along the public beach. The most southerly point in Exhibit 1 shows the highest accretion rate in the first seven Exhibits with a change rate of +0.71 feet per year. Exhibit 1 also is the only exhibit in the study area with more accretion change rates than erosion change rates. However, erosion begins to dominate change rates starting with Exhibit 2 and continuing to Exhibit 7. Erosion rates gradually increase proceeding northward to a point in Exhibit 7 where erosion is over -4 feet per year.

II.B.2. Exhibits 8 and 9:

Exhibits 8 and 9 are located immediately south of the Kleberg and Nueces County Line. Erosion rates quickly increase to the -5 and -6.5 foot plus range. However, erosion rates begin to creep back downward at the northern end of Exhibit 9, where rates fall under -6 feet per year.

II.B.3. Exhibits 10 thru 12:

Exhibits 10 thru 12 encompass beaches abutting Padre Balli Park (Exhibit 10), the Padre Island Sea Wall (Exhibit 11 and 12), and Packery Channel / State land leased to the City (Exhibit 12). Erosion rates are generally in the -4 and -5 foot range with a few exceptions. The Erosion Rates published by the Bureau of Economic Geology for the areas on either side of Packery Channel do not take into account the 2003 construction of Packery Channel jetties. Recent studies of the area suggest that erosion south and north of the jetty has been reduced or even changed to an accreting beach. The City is monitoring beach erosion in the area and recent aerial photos of the jetties also depict accumulation of beach sand.

II.B.4. Exhibits 13 thru 17:

County park land is located in Exhibit 13 and Mustang Island State Park beaches appear in Exhibits 14 thru 17. Except for 0.25 miles on either side of the Fish Pass in Exhibit 16 showing accretion rates, the beaches in this area are eroding. Erosion rates north of the Fish Pass increase significantly from a low near the

Fish Pass of -0.17 feet per year to -1.94 feet per year at the north end of Mustang Island State Park.

II.B.5. Exhibits 18 thru 20:

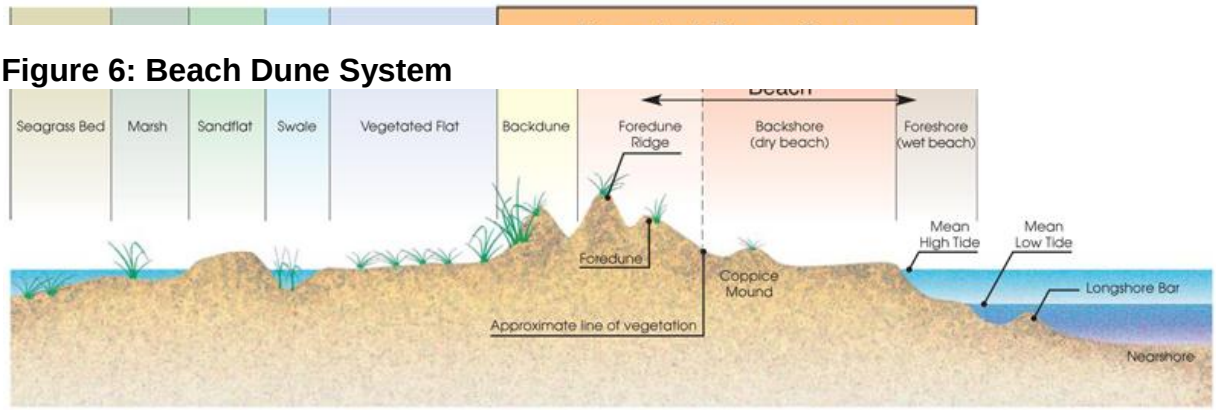
For Exhibits 18 thru 20 on Mustang Island, the erosion /accretion rates fluctuate from -1.0 to 1.5 feet per year. However, there are a few exceptions located on the northern edge of the study area (Exhibit 20) which exceed -1.5 feet with a maximum rate of -2.32 feet per year.

II.C. Projected Shoreline

The map exhibits in Appendix 2, contain the Bureau of Economic Geology's projected 2060 shoreline that incorporates predicted erosion rates and sea level rise data. Each of these data items provides an indicator of future change along the shoreline based on scientific data and begins to paint a picture of the future of the shoreline in terms of factual, measurable and quantitative data. For additional information, see the Texas Erosion Response Plan located on the Texas General Land Office website: http://www.glo.texas.gov/what-we-do/caring-for-the-coast/_documents/coastal-erosion/response-plans.

II.D. Foredune Ridge Assessment

Figure 6: Beach Dune System



Typical cross section of a Texas barrier island. Actual conditions may vary.

While many factors impact the viability and strength of the dune system, this study addresses the minimum desired height, width and vegetative cover of the foredune ridge in the dune system and the minimum desired beach width. Studies have shown that a foredune ridge of approximately ten feet in height offers significant protection to beachfront construction.[3] In a study prepared in 2009 for the Texas General Land Office (TGLO), one of the conclusions was that damage to beachfront construction will be minimal where there is a ten foot high foredune ridge with a

[3] "Defining and Mapping Foredunes, the Line of Vegetation, and Shorelines along the Texas Gulf Coast", James C. Gibeaut, Harte Research Institute for Gulf of Mexico Studies, Texas A & M University-Corpus Christi and Tiffany L. Caudle, Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas at Austin.

width of approximately 200 feet. Figure 6, taken from the TGLO[4] Dune Protection and Improvement Manual, illustrates a typical cross section of the dune system on the Texas coast. The barrier island, and in particular the near shore beach is the first line of defense and the foredune ridge is the second line of defense from the impact of a hurricane and associated storm surge.

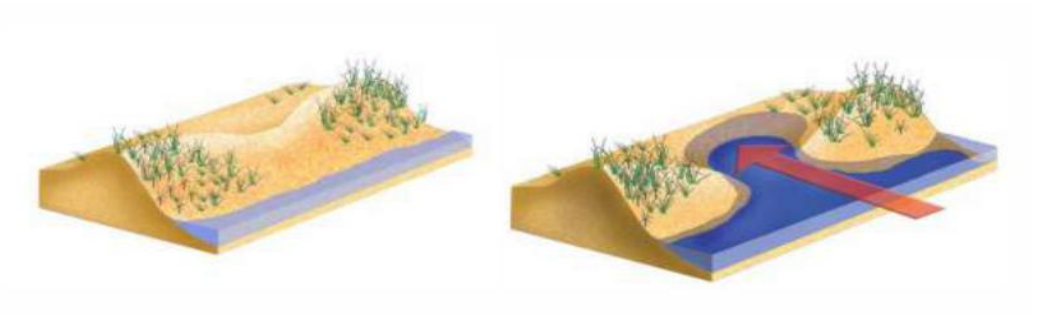


Figure 7: Washover Damage to the Dune System

Regarding beach width, a wide beach can keep the storm waters or storm surge from cutting away the base of the dune system. After Hurricane Ike in 2008, there was a clear shearing away of coppice mounds to the Line of Vegetation (LOV).

Figure 8: Hurricane Ike Dune Erosion

[4] Texas General Land Office Dune Protection and Improvement Manual for the Texas Gulf Coast, Fifth Ed., page 4.

The beach typically will act as a buffer where sediment can be deposited and the wind can then transport the sediment toward the dune system. Where the beach has eroded away and is very narrow, normal wave action can erode away the base of the foredune ridge much like a sand castle on the beach is washed away with an incoming tide.

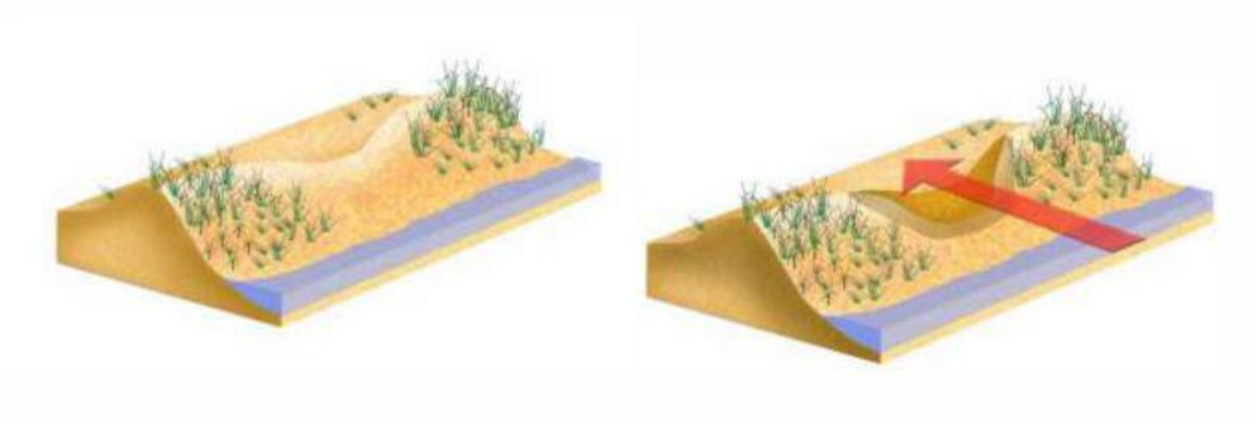


Figure 9: Blowing Wind Eroding the Dune System

Vegetative cover holds the dune system in place. Where the dune system contains less than 75% coverage, the dune system is much more susceptible to creation of a "blow out" from high winds. Figure 9, from the GLO Dune Protection and Improvement Manual helps to illustrate how a sparsely vegetated dune is eroding by coastal winds. Healthy dune vegetation helps to protect dunes, by catching blowing sand and creates biological diversity.

The following is a brief description of the height, width and vegetative coverage characteristics of the foredune ridge illustrated on Exhibits 1 thru 20. Aerial photos or field surveys where used to assess dune vegetative coverage.[5]

II.D.1. Exhibits 1 thru 7:

Exhibits 1 thru 7 show a nearly continuous line of dunes of 15 to 20 foot in height exist. The width of the dune system varies widely but is generally at least 200 to 400 feet or more in width.

II.D.2. Exhibits 8 and 9:

Dunes in Exhibits 8 and 9 are characterized by dune heights of 8 to 15 feet with an occasional dune of 20 feet in height. The width of the foredune ridge is approximately 200 to 300 feet in width and vegetative cover is over 75% or more based on 2009 aerial photos.

[5]Aerial photos were not available for Exhibits 1 and 2. 2003 aerial photos where used to evaluate vegetative cover for Exhibits 3-9. 2009 Aerial photos where used to evaluate vegetative cover in the dune system for Exhibits 10-20.

II.D.3. Exhibits 10 thru 12:

Except for the area behind the Padre Island Sea Wall, the dune system is approximately 15 feet in height with a trend toward a taller and wider dune system in Exhibit 12. The width of the foredune ridge is in the 200 to 350 foot width range. Vegetative cover appears to be over 75% except in the dune mitigation area on the north side of Zahn Road. The dune mitigation area is part of a Dune Protection Permit for the Preserve at Mustang Island subdivision. Currently, the vegetative cover is approximately 50% and expected to fill in over the next year as part of the compliance for the existing Dune Protection Permit.

II.D.4. Exhibits 13 thru 17:

Exhibits 13 - 17 encompass County Park land and Mustang Island State Park (Exhibits 14-17). Two historical washout areas also exist, Newport Pass (Exhibit 13) and Corpus Christi Pass (Exhibit 14). The foredune ridge in these exhibits is not as continuously parallel with the line of vegetation as in Exhibits 1-12. Exhibits 13 and 14 show a combination of dune heights from 8 to 20 feet in height with a foredune ridge of approximately 350 feet wide. A varying pattern in the foredune ridge can be observed in Exhibits 14 thru 17 with isolated 15 and 20 foot high dunes. In several areas a line of 15 to 20 foot high dunes have migrating in a finger like pattern to the west. North of the Fish Pass in Exhibits 16 and 17 the foredune ridge appears to grow in height with a slightly more defined 200 to 250 wide foredune ridge parallel with the Line of Vegetation. Vegetative cover appears to be nearly continuous at 75% coverage or more.

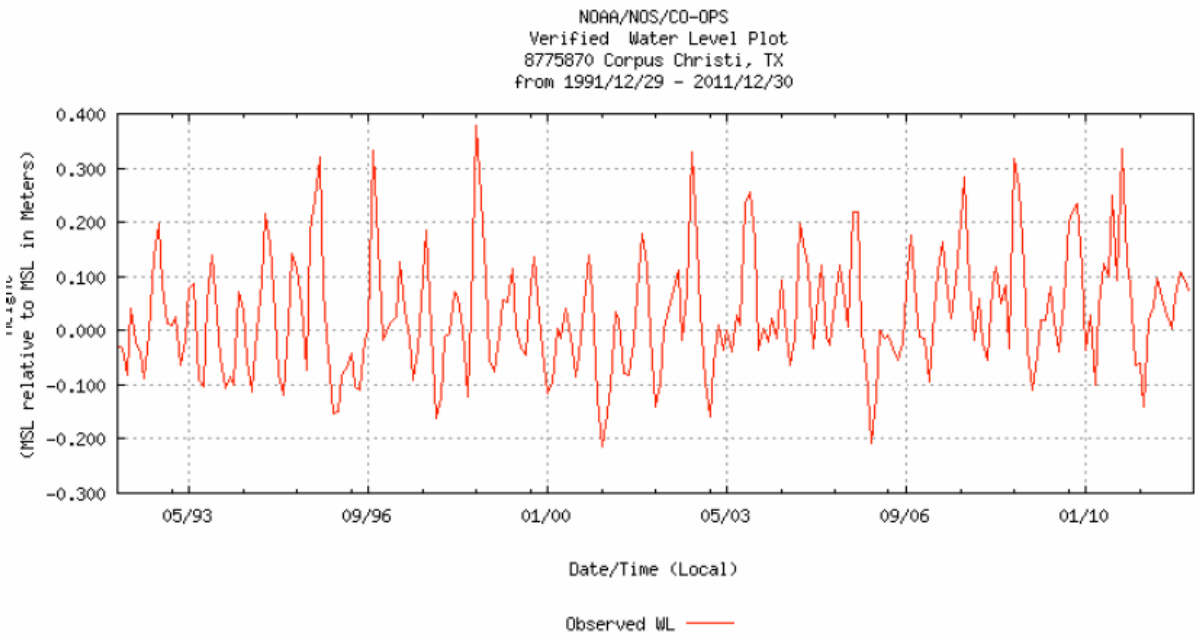
II.D.5. Exhibits 18 thru 20:

Exhibits 18 through 20 encompass private lands north of Mustang Island State Park. The foredune ridge is characterized by a shorter dune system in the south half of Exhibit 18 with dunes of about 8 to 10 feet in height with several isolated taller 15 to 20 foot dunes. About mid-point in Exhibit 18 the dune heights increase to 15 to 20 feet in height and continue thru Exhibits 19 and 20. The width of the Foredune Ridge appears less defined but ranging from 200 feet to 400 feet in width. The Foredune Ridge is not continuous, but contains several gaps or breaks with shorter dune heights. Vegetative cover appears to be 90 to 100% excluding areas of development.

II.E. Federal Emergency Management Agency (FEMA) and the National Oceanic and Atmospheric Administration (NOAA)

The Federal Emergency Management Agency (FEMA) flood zone determination maps indicate that the foredune ridge is located in a Velocity Zone 14 (Elevation 14 feet). A velocity zone is an area predicted by FEMA, to contain high velocity flowing flood water during a major storm event. Within a V-Zone along the Gulf Beach the minimum designated structural height, measured from the lowest horizontal structural member, is 14 feet above mean sea level.

Other factors to consider when assessing the risk to development in island areas are the potential impact from hurricane storm surge and sea level rise. Studies of storm surge by NOAA show that predicting storm surge is a complex series of factors dependent on a particular location. The wave height of a hurricane storm surge is sensitive to the "slightest changes in storm intensity, forward speed, size (radius of maximum winds-RMW), angle of approach to the coast, central pressure (minimal contribution in comparison to the wind), and the shape and characteristics of coastal features such as bays and estuaries." However, one key factor is the width and slope of the continental shelf, which can double the size of a storm surge depending on the location. For example, an 8 or 9 foot storm surge where the continental shelf drops off quickly like Miami Beach, Florida could translate to a 20 feet high storm surge along the Louisiana coastline where there is a very wide and shallow continental shelf. One of the characteristics of Mustang and North Padre Island is a moderately sloping drop off that could magnify the storm surge height.[6]



Bob Hall 1993 - 2012

Figure 10: Water Levels at Bob Hall Pier 1992 - 2012

[6]NOAA, National Hurricane Center, Storm Surge Overview: http://www.nhc.noaa.gov/surge/

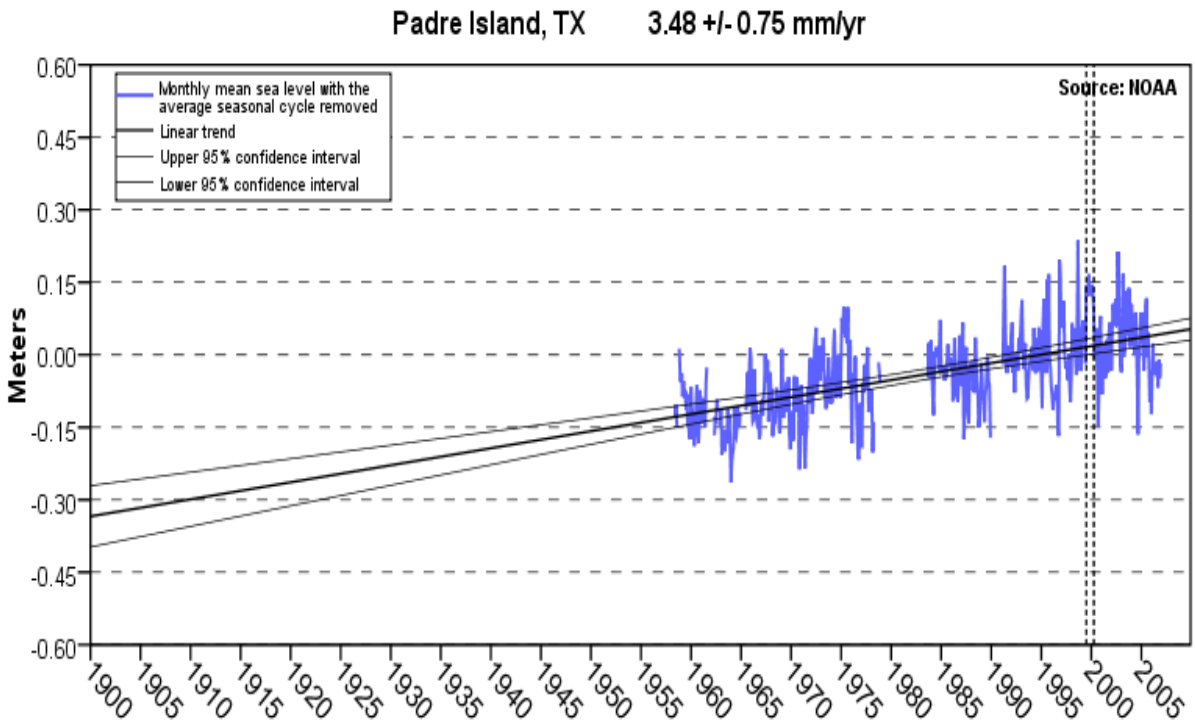


Figure 11: Bob Hall Pier Sea Level 1958 - 2006

The major findings of this study concerning the foredune ridge are:

- That a foredune ridge of at least 10 feet in height and 200 feet in width offers substantial protection from storm losses;
- That FEMA requires a minimum base flood elevation for structures of 13 to 14 feet in the V-Zones within the foredune ridge on Mustang and North Padre Island;
- That a moderately sloping continental shelf contributes to storm surge height; and
- That there is a 47 year historical trend of sea level rise of approximately 1.14 feet per 100 years.

Based on these findings, this plan establishes the minimum design criteria for a dune system as a dune system with a foredune ridge height of 14 feet mean sea level (msl) and a minimum desirable width of the dune system of 350 feet with at least 50% vegetative coverage. This criteria is defined as having been achieved if within any 100 foot segment, measured linearly along the public beach, there are dunes of the prescribed height, the dune system contains the required width, and the dune system is at least 50% vegetated.

Studies have shown that natural washouts provide a valuable function to allow flood waters to flow past the dune system or to allow flood waters to recede back out to the ocean. Where it can be demonstrated that an area's lack of a dune system meeting minimums for height, width and vegetative cover are due to the area being part of a natural washout, the area will not be targeted for mitigation. [7]

Primary historical washouts were located between the north Jetty and the current Packery channel. A 3,000' washover area existed from the beginning at the north Jetty of the Fish Path and running south 9,000' from the Packery Channel north and a 900' wash beginning 12,500' north of the Packery Channel. (See Figure 14)

Figure 12: 2007 Aerial Photo Overlaid with a 1948 Aerial Photo

II.F. Line of Vegetation (LOV)

The beach setback line in Nueces and Kleberg Counties within the Corpus Christi jurisdiction shall use the Line of Vegetation (LOV) obtained from the most current available registered aerial photos. For purposes of this study, 2003 and 2009 aerial

[7] Mapping and Characterization of Significant Washover Features: Texas Gulf Shoreline, Kimberly K. McKenna, P.G., Final Report ot the Texas General Land Office, August 2007.

photos have been used to delineate the Line of Vegetation for planning purposes. The LOV used in the ERP cannot be used for permit applications for construction.

II.G. Building Setback Line (SBL)

A 350 foot Building Setback is established by this plan to reduce future storm damage to public and private properties. The 350 foot Building Setback Line shall be measured landward of the Line of Vegetation but shall not extend beyond the 1,000 foot Dune Protection Line. In addition, the setback line shall not apply to exempted areas or landward of the toe of the seawall on North Padre Island.

II.H. Useable Public Beach

Sea level rise on the Gulf Mexico over the last 20 years has been estimated to be 1.6 millimeters per year for a total sea level rise of 32 millimeters or 1.2598 inches. [8]Given the prediction of continued sea level rise and erosion of the public gulf beach, a minimum desired standard for public beach width is also established by this plan. Establishing the criteria for what is the public beach is also addressed in Gibeaut and Caudle's study[9]. According to the study, the useable portion of the public beach can generally be defined as that area between the Line of Vegetation[10] and the wet/dry line of the aerial photography. Many studies[11] note that a wide beach in addition to a healthy dune system provides protection from erosion caused by seasonal high tide and storm surge events.

Using 2009 aerial photos for Nueces County and 2003 aerial photos for Kleberg County, a visual determination of the Line of Vegetation and the wet/dry line has been used to establish the area of useable beach on North Padre Island and Mustang Island. This determination is for planning purposes only and shall not be used for issuance of Beachfront Construction Certificates or Dune Permits.

In the study area the average width of the public beach, measured between the line of vegetation and wet/dry line, on Mustang Island is 126 feet wide (North of State Park 89 feet) and on North Padre Island is 117 feet wide (Nueces County only). For purposes of assessment of the beach, a minimum desirable beach width to protect the foredune ridge shall be at least 100 feet in width measured from the wet/dry line to the line of vegetation. It is noted however, that the minimum width established by this plan will not be used as a standard to allow mitigation and

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[8] Sea level history of the northern Gulf of Mexico coast and sea level rise scenarios for the near future, Department of Earth, Ocean and Atmospheric Science, Florida State University, Tallahassee, FL 32306, USA, Joseph F. Donoghue

[9] Defining and Mapping Foredunes, the Line of Vegetation, and Shorelines along the Texas Gulf Coast
James C. Gibeaut, Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi, Tiffany L. Caudle, Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas at Austin, 2009.

[10] Line of Vegetation - The extreme seaward boundary of natural vegetation which spreads continuously inland. The line of vegetation is typically used to determine the landward extent of the public beach. Title 31. Natural Resources and Conservation Part 1.Chapter 15.Subchapter A.15.2(41)

[11] Shore Protection Manual Volume 1, Engineering Research Center, USACE 1984.

placement of beach maintenance materials in a method that will minimize the public beach easement. The minimum width standard will be used to assess areas where the beach has narrowed due to erosion and will assist the City in prioritizing areas where beach renourishment may be needed to widen the beach.

III. New Construction Guidelines

To the maximum extent practicable, all structures should be constructed landward of the building setback line.

Construction of structures landward of the building setback line must comply with mitigation sequence requirements for avoidance and minimization of effects on dunes and dune vegetation as specified in Texas Administrative Code (TAC) §15.4(f) Mitigation. The permittee is not exempt from compliance with compensatory mitigation requirements for unavoidable adverse effects on dunes and dune vegetation.

III.A. New Residential or Commercial Structures. Require new residential dwellings or commercial structures to be located at least 350 feet landward from the Line of Vegetation unless no practicable development alternatives are possible;

III.B. Restrict New Development Landward 200 feet to 350 feet. Restrict new development in the area between 350 and 200 feet landward of the Line of Vegetation to recreational amenities such as pools and picnic areas. In any case, applicants must demonstrate that every attempt has been made to minimize the use of impervious surfaces in this zone.

III.C. Community Benefit Projects. Application of these guidelines shall not prohibit public community benefit projects, including, but not limited to, water exchange passes, beach renourishment projects, recreational structures, or other projects in the public interest.

III.D. Exempt Projects and Properties. Dune walkovers, beach access roadways, public parking and associated public facilities shall be constructed in accordance with the GLO construction guidelines, to the extent applicable.

The City of Corpus Christi and Nueces County shall consider exemptions from the prohibition of residential and commercial construction seaward of the setback line for:

III.D.1. Properties Where There Is No Practicable Alternative

Properties for which the owner has demonstrated to the satisfaction of the City and County that no practicable alternatives to construction seaward of the building setback line exist. For purposes of this section, practicable means available and capable of being done after taking into consideration existing building practices, site alternatives, and the footprint of the structure in relation to the area of the buildable portion of the lot, and considering the overall development scheme for the property.

III.D.2. Pre-existing Permits, Certificates or Master Plan Developments

Projects for which construction is permitted, in the area seaward of the 350' Building Setback, under a Dune Permit, Beachfront Construction Certificate or Master Plan Development prior to the effective date of this Erosion Response Plan are exempt if there are no material changes to the site and provided the permit, certificate or Master Plan has not expired.

III.D.3 Existing Structures

Structures located seaward of the building setback line prior to the effective date of this section for which modifications are sought that do not increase the footprint of the structure. However, structures seaward of the building setback line that are damaged more than 50% or abandoned for a period of more than 12 months should be subject to Section III.E. Construction Requirements for Exempt Properties.

III.E. Construction Requirements for Exempt Properties

Where the City allows an exemption from the prohibition for building seaward of the building setback line, the City will require the following conditions of construction or provide a reasoned justification for a variance from the minimal standards that will demonstrate that the provisions will reduce public expenditures due to erosion and storm damage.

III.E.1. Sealed Plans. Plans and certifications for the structure shall be sealed by a registered professional engineer licensed in the State of Texas, providing evidence of the following:

III.E.1.i. Freeboard. A minimum of two-foot freeboard above FEMA's BFE to the finished floor elevation of the lowest habitable floor;

III.E.1.ii. Enclosures. No enclosures exceeding 300 square feet below BFE;

III.E.1.iii. Design Standards. Consistency with the latest edition of specifications outlined in American Society of Civil Engineers, Structural Engineering Institute, Flood Resistant Design and Construction, ASCE 24-05;

III.E.1.iv. Relocateable Structures. That habitable structures will be feasible to relocate; and

III.E.1.v. Hydrology. All construction shall be designed to minimize impacts to natural hydrology.

III.E.2. Location of Construction. Location of all construction should be landward of the landward toe of the foredune ridge and as far landward as practicable.

IV. Goals for Enhancement of the Dune System and Beach

IV.A. Dune Goals

Promote the formation of a continuous foredune ridge of at least 14 feet in height, with a minimum width of 350 feet wide measured perpendicular to the gulf beach and which contains at least 50% of vegetative cover. The methods used to achieve this goal will be determined by City and County beach maintenance operations on a case by case basis depending on various factors, including but not limited to, the current width of the dune system, access to the dune system (beach only or back access), beach width, and other appropriate on site criteria. The current methods of disposing of seaweed include: front stacking, back stacking and placement of seaweed in beach maintenance material storage areas. As new techniques for addressing seaweed maintenance evolve the City and County shall evaluate their potential use, benefits and limitations and incorporated these new techniques as appropriate.

IV.B. Beach Goals

Recognizing that the public beach is the first line of defense against storm surge, any efforts to widen the public beach should be promoted to reduce storm damage and to enhance public beach access. The minimum desirable width of the public beach should be at least 100 feet in width from the Line of Vegetation seaward to mean high tide.

IV.B.1. Minimum Two-Way Travel

Motor vehicles are not allowed to operate within 50 of the waters edge of any gulf beach and the minimum two-way travel width for motor vehicles is 24 feet provided that the two-way travel lanes are not within 20 feet of the Line of Vegetation.

IV.B.2. Corp of Engineers Permit.

Beach cleaning methods shall be in accordance with a Corp of Engineers Permit and use the least impactive method for removal of seaweed in order to prevent the grading down of the public beach and or narrowing of the public beach. Wherever possible, the City and County will seek permits that are as similar as possible. In addition, the ability to place sand below mean high tide, to widen the beach, should be pursued by the City and County in their respective permits.

IV.B.3. Low Beach Usage Areas.

Maintaining the public beach in a natural state without mechanized beach cleaning is encouraged in areas of low usage. The public goal for these areas should be to keep two travel lanes open for beach access.

IV.B.4. Periodic Beach Width Assessment.

The City should conduct an assessment of the public beach width at least every five years unless there is evidence of significant erosion then annual assessment maybe necessary. Portions of the public beach that currently warrant an annual assessment include the beach in front of the seawall and the beach between the Packery Channel and the State Park.

IV.C. Vegetation Goals (Seaward of the Setback Line)

Mowing / cutting of vegetation within the setback area will not be allowed except for exempt areas. For mitigation projects requiring revegetation appropriate dune vegetation includes:

IV.C.1. Seaward Face of Dunes: Bitter Panicum (grass), Sea Oats (grass), Marsh Hay Cordgrass (grass), beach morning glory (vine) and seagrapes (vine).

IV.C.2. Landward side of dunes: Low-growing plants and shrubs found on the back side of the dunes include seacoast bluestem, cucumber leaf sunflower, rose ring gallardia, partridge pea, prickly pear, and lantana. Many of these are flowering plants, an attractive alternative to dune grasses though less effective as dune stabilizers.[12]

IV.C.3. Native Hay: A sometimes more effective technique is to place a layer of native hay, composed of the above listed dune vegetation, on bare sand areas. This technique provides immediate protection from blowing sand and will start the natural process of re-seeding from the seeds in the hay. The best time to cut the hay and place the layer of hay is in the fall and winter. This technique is generally less costly and more effective than traditional methods since the grass is readily available on the island and due to the large quantity of seeds compared to individual hand plantings.

IV.D. Sand Fencing

Encourage the use of sand fencing, in limited applications, to build up the dunes were revegetation alone is unlikely to be sufficient to create the appropriate height and width of the dune system. Sand fencing should be used as a first step toward building up low areas and creating coppice dunes, prior to revegetation.

V. Mitigation

V.A. Definition of Mitigation

Mitigation may be any construction project which either enhances the dune system or beach access, consistent with this plan.

[12] Coastal Dunes: Dune Protection and Improvement Manual for the Texas Gulf Coast.

V.B. Scope of Mitigation

Mitigation construction projects will usually result in the enhancement or building up of the dune system. However, a mitigation project may also be for enhancement of public beach access or to provide public education benefits concerning proper care of the public beach, i.e., litter pick-up, proper disposal of fishing bait, information on protecting wildlife and native habitats contained in the beach/dune system or other beneficial projects which meet to goals of the Erosion Response Plan.

V.C. Mitigation Location

A mitigation construction project shall be located within the 1,000 foot Dune Protection Area except where a mitigation project will enhance public access, then the limits of the project may extend to the first paralleling public road.

V.D. Dune System - Mitigation Prioritization

An assessment of the beach / dune system was based on on-site inspections, local historical knowledge, and the data contained on the Exhibits in this plan (contours, 2009 aerial photos, etc.).

V.D.1. Mitigation Prioritization.

Opportunities for mitigation to enhance the dune system or public beach are prioritized based on the following criteria.

Priority 1: Protection of existing development seaward of the erosion area line.

Priority 2. Protection of existing vacant platted lots located seaward of the erosion area line.

Priority 3. Protection of existing development landward of the erosion area line.

Priority 4. Protection of existing vacant lots platted landward of the erosion area line.

V.D.2. Beach / Dune System Criteria.

Under these four priorities the dune system has been evaluated to look for portions of the dune system where the foredune ridge is:

- Is less than 14 feet in height[13];
- Is less than 350 feet wide;
- Contains less than 50% vegetated coverage;
- Is not a historical washover area.

In addition, a primary concern is where the Gulf beach is narrower than 100 feet measured from the mean high tide to the Line of Vegetation.

Appendix 2 identifies areas for dune enhancement based on the above criteria.

[13] Fourteen feet exceeds 75% of the FEMA Base Floor Elevation

V.E. Funding for Dune Mitigation Projects

The City will seek funding in partnership with Nueces County or other agencies to promote protection of or enhancement of the dune system within the City's area of jurisdiction. (Nueces County inside city limits and Kleberg County inside city limits and in the Five Mile Extraterritorial Jurisdiction)

The City will pursue grants for Dune Mitigation Projects from the GLO or other state and federal agencies if local matching funds can be identified.

VI. Enhancement of Public Beach Access

VI.A. Existing Public Beach Access Inventory

Within Corpus Christi's Beachfront Construction Certificate authority and the Nueces County's Dune Permitting authority there are 12 existing public beach access roads and three (3) beach parking lots. (See Appendix 3) These beach access points are composed of:

VI.A. 1. City Owned Public Beach Access

Four (4) City owned/maintained public beach access roads and, one (1) beach parking lot on the Padre Island Seawall

- **Beach Access Road 2** is located 7.3 miles south of City of Port Aransas Beach Access Road 1A on Mustang Island
- **Zahn Road**, is located 1.2 miles south of Newport Pass Road on the north side of Packery Channel
- **Beach Access Road 3-A** is located on the south side of Packery Channel via Windward Drive
- **Whitecap Boulevard** is located 0.8 miles south of Beach Access Road #3-A at the south end of the concrete seawall on North Padre Island
- **The Sea Wall Beach Parking** L**ot** is located between Beach Access Road #3-A and Whitecap Boulevard on North Padre Island

VI.A.2. County Owned Public Beach Access.

Five (5) County owned/maintained public beach access roads and, one (1) beach parking lot at Padre Balli Park

- Newport Pass Beach Access Road is located 1 mile south of Mustang Island State Park Beach Access Road 3 on Mustang Island
- Beach Access Road 4 is located 0.3 miles south of Whitecap Boulevard on North Padre Island, within Padre Balli Park
- Beach Access Road 5 is located 0.4 miles south of Beach Access Road #4 on North Padre Island, within Padre Balli Park
- Padre Balli Park entrance road is located 0.3 miles south of Beach Access Road Five on North Padre Island
- Beach Access Road 6 is located 0.4 miles south of the Padre Balli Park entrance road on North Padre Island, within Padre Balli Park

- Padre Balli Beach Parking Lot is located between the Padre Balli Park entrance road and Beach Access Road #6 on North Padre Island

VI.A.3. State Owned Public Beach Access.

Two (2) State owned/ maintained public beach access roads and one beach parking lot are located on Mustang Island State Park

- Mustang Island State Park Entrance Road is located 206 miles south of Beach Access Road 2 on Mustang Island and terminates at beach parking lot.
- Beach Access Road 3 is located 2.2 miles south of the Mustang Island State Park entrance on Mustang Island

VI.A.4. Federally Owned Public Beach Access.

One (1)Federally owned/maintained beach access road is located on North Padre Island and is located 7.5 miles south of Beach Access Road #6 in Padre Balli Park.

VI.B. Existing Standard for Access along the Public Beach

For the foreseeable future the County and the City have no intention of closing any public beach access roadways. However, temporary closure of public beach access is allowed for the purpose of protecting the public during times of seasonal high tides, proceeding landfall of a tropical storm or during times of any other public emergency where travel on the public beach presents a public risk.

By Chapter 10 of the City Code the public beach is safely passable if there is sufficient room for two travel lanes and provided that the travel lanes cannot be closer to mean high tide than 50 feet and not closer to the Line of Vegetation than 25 feet.

VI.C. Beach Access Road Assessment

VI.C.1. Beach Access Road #2

Beach Access Road #2 is located approximately 7.2 miles south of Beach Access Road 1A in the City of Port Aransas. Beach Access Road #2 connects directly with State Highway 361 and the gulf beach for a total length of approximately 1,450 feet. The road contains asphalt pavement with a width of 20-24 feet and 5 foot to 8 foot wide gravel shoulders. There is a slight rise in elevation of the roadway cresting approximately 300 feet landward of the public beach. The roadway then gradually slopes to its terminus at the Gulf Beach. The slight elevation of Beach Access Road #2 at its approach to the beach provides protection to inland properties during a storm surge.

Figure 13: Beach Access Road 2 on Mustang Island

Figure 14: Beach Access Road 2, Seaward View Near State Highway 361

Beach Access Road 2 does not contain a GLO recommended "switch back" that turns away from the prevailing winds at the approach to the beach. If the roadway were improved with the necessary turn away from prevailing winds, the

accumulation of sand in the roadway would be reduced. Vacant privately owned properties are located on either side of Beach Access Road #2, which when platted may allow the realignment of the roadway to include a small switchback. The construction of the switch back may require public grant funding with a local match.

Figure 15: Mustang Island State Park Entrance, Google Aerial

VI.C.2 Mustang Island Park Entrance Road

Mustang Island Park Entrance Road connects State Highway 361 with a beach parking lot. The entrance road has a length of approximately 0.30 miles and a width of 22 feet with several pull out parking areas along its length. The roadway also connects with an Recreation Vehicle Park. The roadways contains a switch back but does not have a raised speed hump elevation for storm surge protection at the approach to the beach. The entrance roadway is owned and maintained by the state and is exempt from the Erosion Reponses Plan.

Figure 16: Beach Access Road 3, Mustang Island State Park

VI.C.3 Beach Access Road 3

Beach Access Road 3 is located on Mustang Island State Park and connects State Highway 361 with the gulf beach. Beach Access Road #3 is not subject to the Erosion Response Plan. The approximate length of the Beach Access Road #3 is 0.50 miles. The roadway consists of two travel asphalt lanes with a width of 20 to 24 feet, 5 to 8 foot wide gravel shoulders and roadside drainage. The roadway does not have the GLO recommended switch back alignment away from prevailing winds and does not have an "elevated hump" at the approach to the beach. Beach Access Road 3 is owned by the State of Texas and is exempt from the Erosion Response Plan.

VI.C.4 Newport Pass Road

Newport Pass Road connects with State Highway 361 and the gulf beach and is located approximately 1 mile south of Beach Access Road #3. The total length of the roadway is approximately 0.50 miles. The roadway is composed of asphalt pavement with a width of 20 feet for two travel lanes. The roadway contains two switch-backs consistent with GLO design guidelines.

Figure 17: Newport Beach Access Road, Photos and Google Aerial

While the roadway does not contain the GLO recommended roadway hump at the approach to the beach, there is a moderate elevation grade leveling off roughly 100 feet before connecting with the beach. Damage to the roadway from previous hurricanes and tropical storms has been minimal. The possibility of future damage to commercial or residential property adjacent to the roadway is negligible as the County owns all adjacent property. However, if the roadway sustains major storm damage in the future, the County would address a more prominent elevation similar to that of an exaggerated speed hump if funding were available.

VI.C.5 Zahn Road

Figure 18: Zahn Road at Packery Channel, Google Aerial

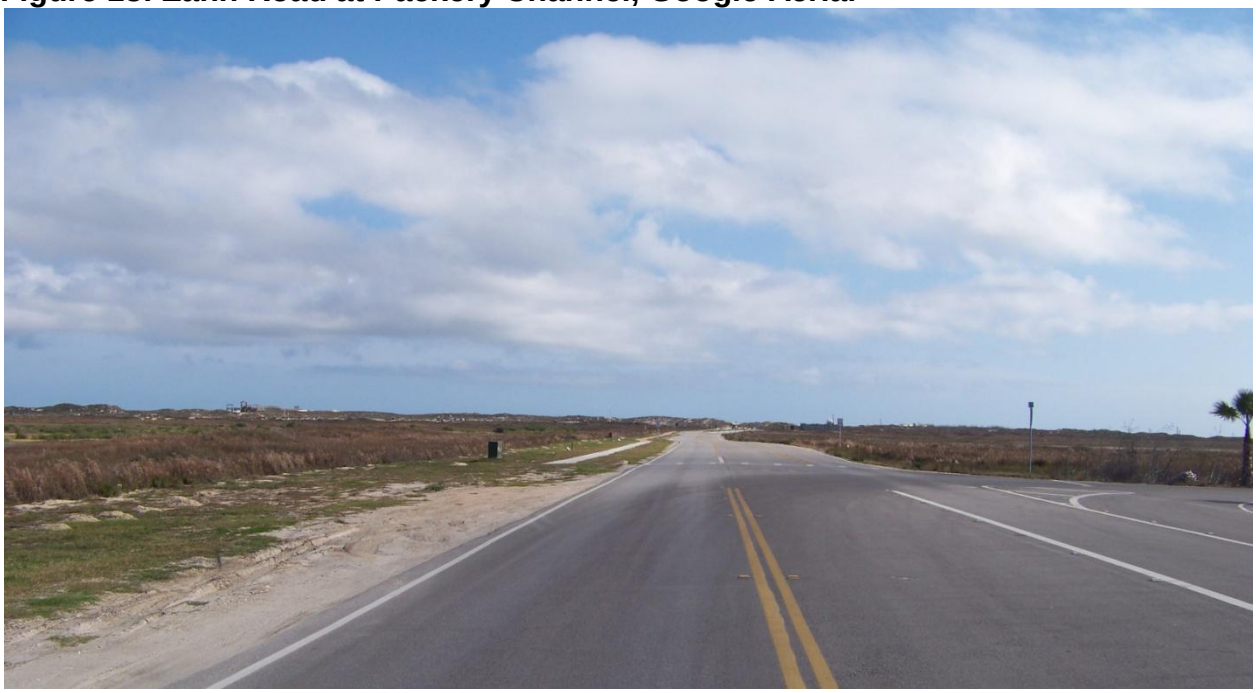


Figure 19: Zahn Road at Packery Channel

Zahn Road is located approximately 1 mile south of Newport Pass Road and connects State Highway 361 to the beach. Roadway length is 950 feet with a right-of-way of 85 feet and two travel lanes. A five foot sidewalk is located on the northern edge of the right-of-way. The roadway does not have a GLO

recommended switchback or an elevated section near the approach to the beach. In the future, if the roadway is substantially damaged then an elevated section would be pursued if funds are available. Due to the adjacent residential subdivision and dune system, a realignment to include a switch back may not be feasible.

VI.C.6 Beach Access Road 3A

Figure 20: Beach Access Road 3A, Google Aerial

Beach Access Road #3A on North Padre Island is located immediately south of the Packer Channel and connects with the gulf beach via Park Road 22, Whitecap Boulevard and Windward Drive. The approximate length of the Beach Access Road #3A is 0.14 miles or 750 feet. The roadway consists of two asphalt travel lanes with a width of 20 feet. The roadway alignment is generally consistent with GLO standards with a steep drop off within 100 feet of the beach. In addition, there is at least 10 feet of elevation from the beach landward to Beach Access Road 3A's connection with Windward Drive.

Figure 21: Beach Access Road 3A, Seaward View

VI.C.7 Seawall Parking Lot

The seawall parking lot was constructed in 2006 and contains approximately 300 parking spaces. Since construction the parking lot has been improved with several enhancements that include public restrooms, landscaping and an ADA beach access ramp from the seawall to the beach.

Figure 22: Seawall Parking Lot

VI.C.8 Whitecap Boulevard

Whitecap Boulevard on North Padre Island is located 0.85 miles south of the Beach Access Road 3A and connects the gulf beach with Windward Drive. The approximate length of the Whitecape Boulevard between the beach and Windward Drive is 1,100 feet. The roadway pavement consists of two asphalt travel lanes, parallel on street parking with a width of approximately 44 feet. The roadway contains curb and gutters with sidewalks on both sides of the street, ranging in width from 10 feet to five feet at the approach to the beach. The roadways length and alignment are generally consistent with GLO standards. The msl elevation at Windward Drive is 7 feet with a gradual slope to the sea level at the beach. In the event of storm damage, if funds are available, the City would reconstruct the roadway with an exaggerated speed hump at the approach to the beach per GLO design guidelines.

Figure 23: Whitecap Boulevard, Google Aerial

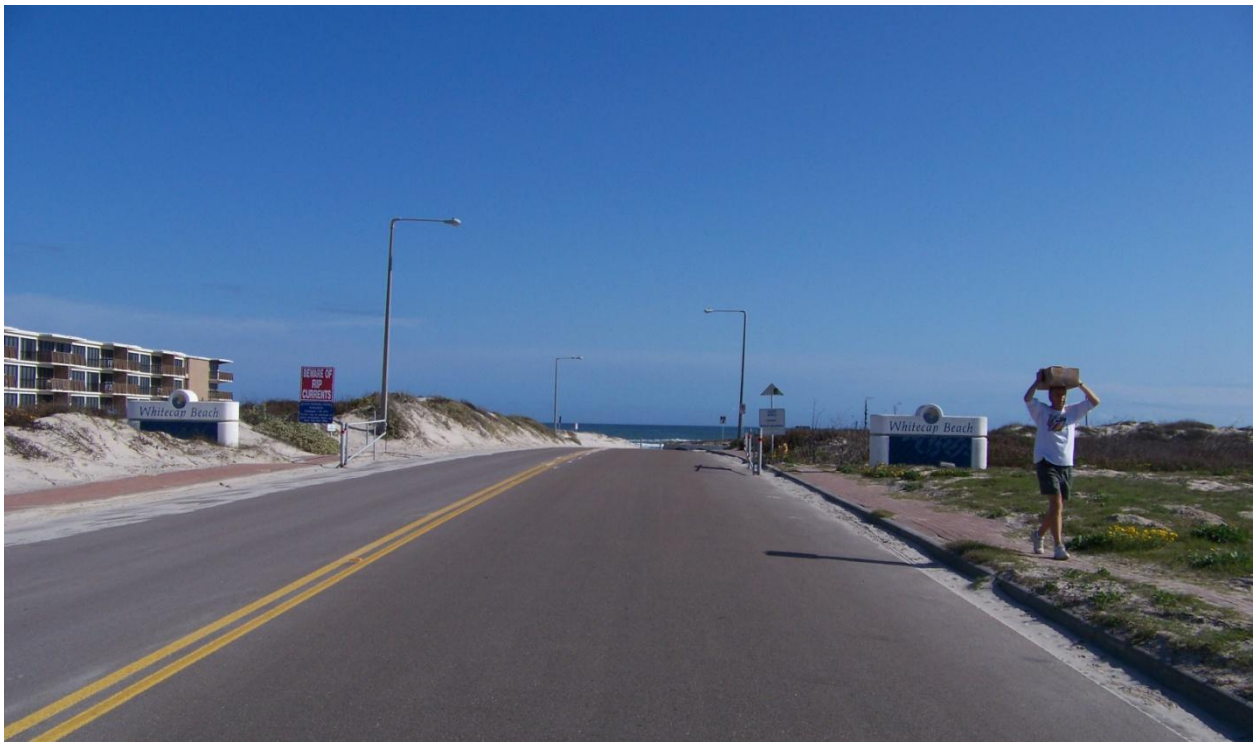
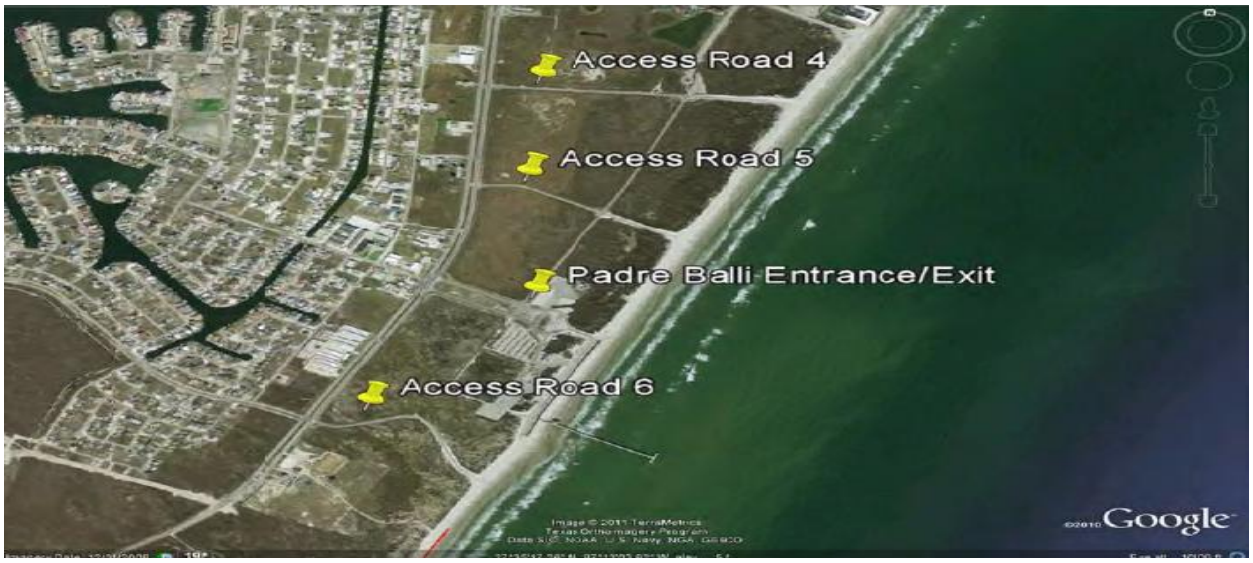


Figure 24: Whitecap Boulevard, Seaward View

VI.C.9 Beach Access Roads 4, 5, 6 and Padre Balli Park Entrance/Exit Road

These access roads connect directly to State Highway Park Road 22, providing public access within the park along North Padre Island. (Figure 27)

Figure 25: Beach Access Roads 4, 5, 6 and Padre Balli Park Entrance / Exit Road



Beach Access Road 4 is located approximately 0.20 miles south of Whitecap Road and connects the beach with Park Road 22. Beach Access Road 4 is 0.5 miles in length and 24 feet in width and contains two travel lanes. Elif Road

intersects Beach Access Road 4 approximately 950 landward of the Gulf Beach to form a T-intersection. Beach Access Road 4 has a straight alignment without switchbacks but is oriented at an angle to the prevailing winds.

Due to Beach Access Road 4's relatively flat grade and low elevation, if the roadway sustained major storm damage, then Nueces County would seek funding to address construction of a more prominent elevation and possibly a switchback consistent with GLO design guidelines.

Figure 26: Beach Access Road 4, Seaward View at the Intersection of Elif Road

VI.C.10 Beach Access Road 5

Beach Access Road 5 is located approximately 0.5 miles south of Beach Access Road 4 and also connects the beach with Park Road 22. The total length of the roadway is 0.4 miles and contains a width of 24 feet. The roadway is not consistent with GLO design guidelines for a switchback and an elevated hump at the approach to the beach. If

Beach Access Road 5 sustained major storm damage, the county would seek funding to address construction of a more prominent elevation similar to that of

the exaggerated speed hump and some road realignment to ensure that its culminating point onto the beach was at more prominent angel to the prevailing wind direction. Because Beach Access Road 5 is within the Park, there are no impacts to private property.

Figure 27: Beach Access Road 5, Seaward View

VI.C.11 Padre Balli Park Entrance/Exit

The Padre Balli Park Entrance/Exit is located approximately 0.28 miles south of Beach Access Road 5 and also connects the beach with Park Road 22. The total length of the roadway is 0.38 miles. The entrance and exists along this roadway are divided by a large median. The entrance and exit roadways are each 24 feet in width.

As the park entrance, the roadways connects to the beach, beach parking facilities, RV Camping facilities, County Park Offices, and Bob Hall Pier. Reorientation of the access road would require major redesign of the park.

Figure 28: Padre Balli Park Entrance/Existing Road, Seaward View

In order to deflect a direct storm surge a large grassy area has been highlighted in Figure 31 with the recommendation to create a large dune on this site. The unused grassy surface is 51,340 or about 1.1 acres. Dunes could be built on the area by placing sargassum seaweed from nearby beach areas.

Figure 29: Padre Balli Park Entrance - Potential 1.1 Acre Dune Construction Site

VI.C.12 Beach Access Road 6

Beach Access Road 6 is located 0.45 miles south of the Padre Balli Park Entrance/Exit Road and is very near the southern most boundary of Padre Ballie Park. The roadway connects with Park Road 22 and has a total length of 0.4 miles and contains a switchback alignment but at its approach to the beach faces into the prevailing wind. While there is a gentle rise in elevation as the roadway approaches the beach, there is not the pronounced rise in road elevation suggested by GLO guidelines.

Figure 30: Beach Access Road 6, Google Aerial

Figure 31: Beach Access Road 6, Seaward View

VI.C.13 Padre Island National Sea Shore North Beach Access Road

Padre Island National Sea Shore North Beach Access Road located 7.5 miles south of Beach Access Road 6. The roadway connects with Park Road 22 and has a total length of 0.42 miles and contains a switchback alignment but at its approach to the beach faces into the prevailing wind. The orientation of the roadway at the beach is facing into the wind and not consistent with GLO Guidelines. There is a gradual elevation up to the foredune ridge with a sloping drop off to the beach. The roadway is owned and maintained by the U.S. Park Service.

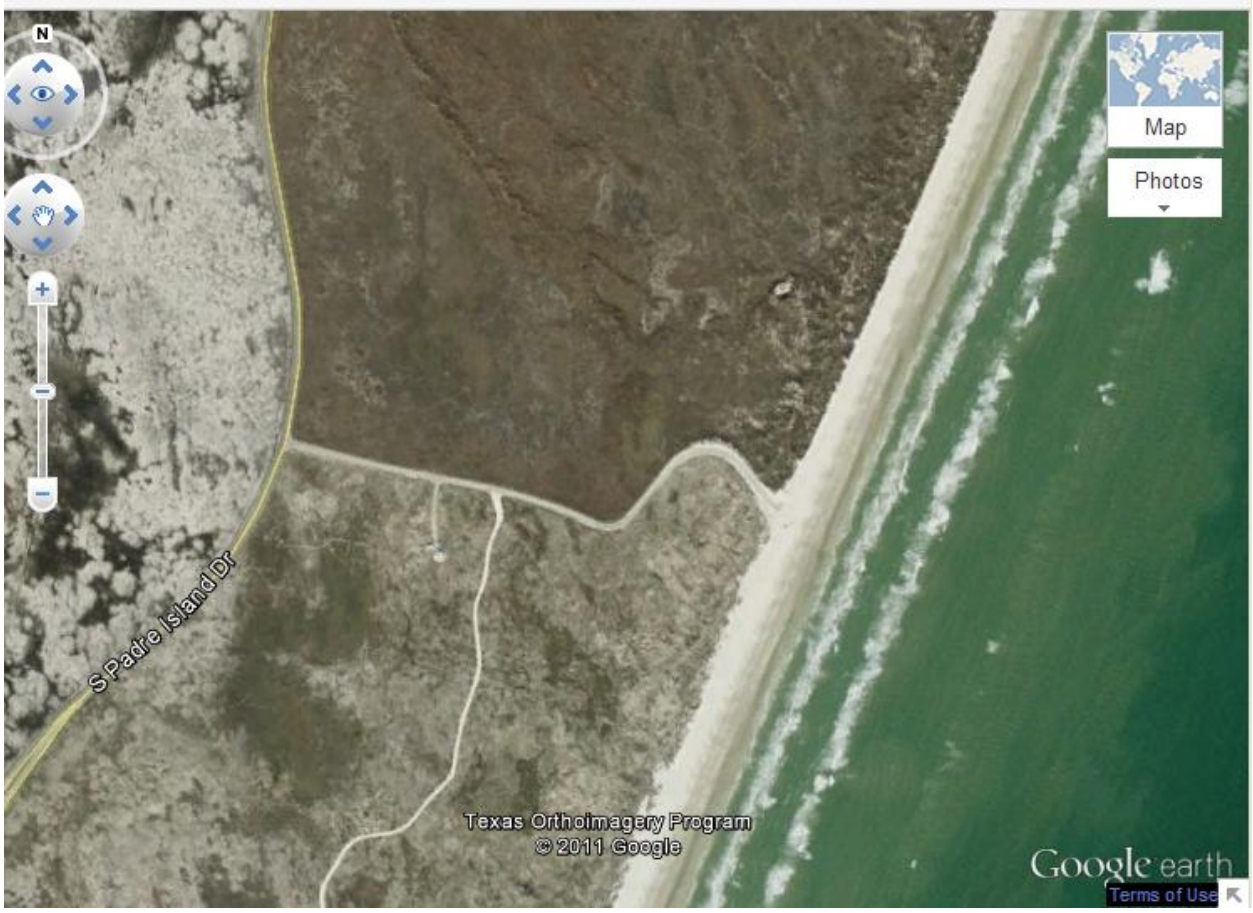


Figure 32: Padre Island National Sea Shore North Beach Access Road

VI.D. Recent Enhancements to Public Beach Access

Recent city improvements to enhanced beach access include reconstruction of a portion of Zahn Road, beach renourishment in front of the seawall, the Padre Island Sea Wall Parking lot, resurfacing /sidewalk improvements to Whitecap Boulevard and Packery Channel recreational improvements.

VI.D.1 Zahn Road Improvements

Zahn Road, located immediately north of Packery Channel, was reconstructed in 2009 as part of a development agreement between the developer of Tortuga Dunes Subdivision and the City. Total project costs for the City where approximately $1,291,538 and $523,837 for the developer. Improvements made to the street included: a gravel sidewalk along the northern edge of the roadway, resurfacing, etc.

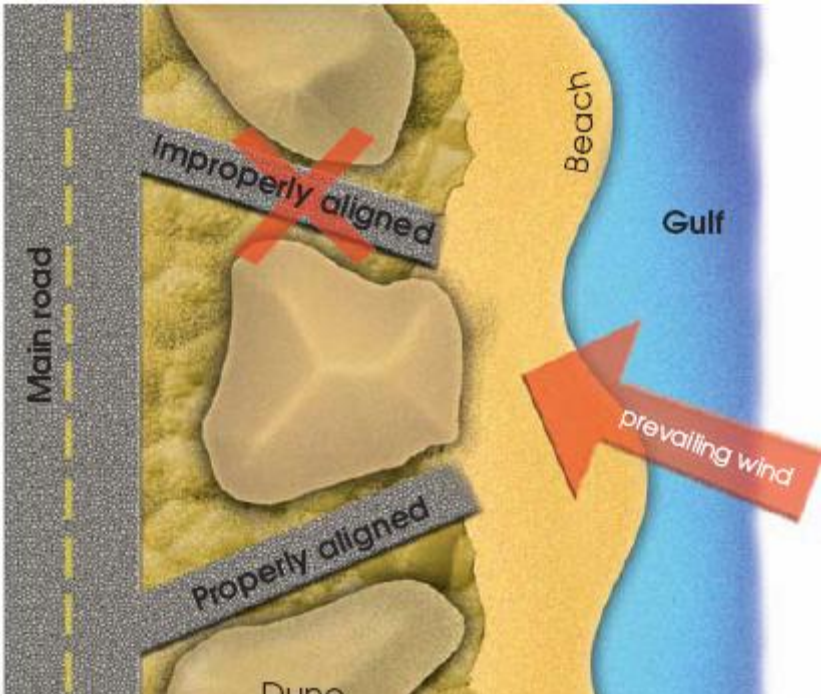


Figure 33: Beach Access Road Alignment

VI.D.2 Beach Renourishment / Padre Island Seawall

As part of the Packery Channel Project, the beach in front of the Padre Island Sea Wall was renourished with a grant from the Texas General Land Office in 2003. The cost of the renourishment was $1.3 million.

VI.D.3 Seawall Parking Lot

A 300 space seawall parking lot was constructed in 2006. The parking lot is landscaped, contains an ADA access ramp from the sea wall to the beach and in 2008 public restrooms and outdoor showers were added to the facility. The cost of the parking lot, ADA access ramp and the restrooms was $1.2 million.

VI.D.4 Whitecap Boulevard Resurfacing and Sidewalk Improvements

In 2010, Whitecap Boulevard was resurfaced and curbs where repaired. The project also included a new 10 foot wide stamped concrete sidewalk from Windward Drive to the 200 foot Erosion Area Line Boundary. Seaward of the Erosion Area Boundary the existing five foot wide brick paver sidewalk was repaired and refurbished. The cost of the project was approximately $540,000.

VI.D.5 Packery Channel Recreational Improvements

The Packery Channel was constructed in 2002-2005. The Packery Channel project was a 21.4 million dollar project to dredge a channel between the Laguna Madre and the Gulf of Mexico and to construct two 1,400 foot jetties.

In addition, 1.1 million was spent to provide an access road, large car and trailer parking and two boat ramps.

Parking, overlooks, restroom facilities, ADA access ramps and a pavilion are planned for construction by 2014. Costs for these improvements are estimated to be approximately $4.8 million dollars.

The City of Corpus Christi also has other significant costs associated with the beach including beach cleaning at an annual cost of over $700,000 per year, fire protection costs include the city newest Fire Station at the north end of Mustang Island State Park and police patrol for the beach area.

VI.E. Priority for Beach Access Road Improvements

The prioritization for beach access improvements should be based on:

VI.E.1 Enhancing Public safety.

VI.E.1.i Beach Access Road Spacing. Spacing of beach access roadways to allow quicker access to on beach emergencies – where beach access roadways are spaced at intervals of greater than 1 mile

Signage at beach access points to warn the public of natural hazards, rip tides, etc.

VI.E.1.ii Beach Access Road Realignment and Raised Humps. Improvements to protect the access and surrounding developed property from storm surge damage By realignment of the beach access in accord with GLO Guidelines; and by placing a raised hump in the roadway landward of the beach per GLO Guidelines.

VI.E.1.iii Beach Renourishment. Beach Renourishment where the narrow width of the beach becomes a safety hazard and/or is less than 100 feet wide.

VI.E.1.iv Beach Amenities.

Amenities to benefit the general public's beach access experience at high use areas including public showers and restrooms landward of the public beachPackery Channel improvements for access to the channel walkway, outlooks, channel fishing amenities, etc.

Based on the criteria above the following is a list of beach access improvements.

VI.E.2. Short Term Goals (Three years or less)

VI.E.1.i. New Beach Access Road on Mustang Island. Obtain right-of-way for a new beach access roadway north of Mustang Island State Park.

Currently there is a 7.3 mile distance between Beach Access Road 1 in City of Port Aransas and the Beach Access Road 2 in the City of Corpus Christi.

VI.E.1.ii New Beach Access Road on North Padre Island. Obtain right-of-way for a new beach access roadway south of Access Road 6. Currently, there is 7.5 mile spacing between Beach Access Road 6 and the National Sea Shore Beach Access Roadway.

VI.E.1.iii. Beach Monitoring. Continue monitoring of the beach at Packery Channel.

VI.E.1.iv. Packery Channel. Packery Channel Improvements – parking, outlooks, restrooms, ADA access improvements, etc.

VI.E.1.v. Corp of Engineers Permit for Beach Cleaning. Propose revisions to the existing Corp of Engineers permit for beach cleaning which allows widening of the beach by placement of beach sand seaward of mean high tide.

VI.E.1.vi. Beach Bollards. Install beach bollards in front of the seawall to delineate vehicular and non-vehicular beach access areas.

VI.E.3. Long Term Goals (greater than two years)

VI.E.3.i. Construct New Beach Access Road on Mustang Island. Construct a new beach access roadway north of Beach Access Road 2 to reduce emergency response times to beach emergencies at the northern end of Mustang Island inside the City of Corpus Christi.

VI.E.3.ii. Construct New Beach Access Road on North Padre Island. Construct a new beach access roadway south of Beach Access Road 6 to reduce emergency response times to beach emergencies between Beach Access Road 6 and the National Sea Shore Beach Access Roadway.

VI.E.3.iii. Seawall Beach Renourishment. Renourishment of the beach in front of the Padre Island Seawall.

VI.E.3.iv. Monitoring Mustang Island Beaches. Monitoring and renourishment of the beach north of Mustang Island State Park.

VI.E3.v. Packery Channel Improvements. Packery Channel fishing and outlook amenities.

VII. Acquisition of Property Seaward of Setback Line

The City of Corpus Christi and Nueces County have developed criteria for identifying properties for voluntary acquisition of fee simple title or a lesser interest acquisition by donation or potential purchase. These properties, which may have structures located entirely seaward of the building setback line, experience severe damage during storms,

impede the development of a natural dune system and restrict the use of the public beach. To be considered for acquisition, a structure must:

- be entirely seaward of the building setback line,
- impede beach access,
- be more than 25% on the public beach,
- affect hydrology as determined by a registered professional geologist/engineer licensed in the State of Texas,
- deemed to be a hazard to health and safety, or
- cause erosion of adjacent property.

Property to be acquired will be prioritized based on the severity and amount of criteria met. Acquisition strategy will consist of:

- acquisition by voluntary donation to the City or County,
- identification of potential property,
- negotiation of acquisition,
- available funding including potential grants,
- agreement execution, and
- removal or relocation of structure.

VIII. Post Storm Recovery

Following the land fall of a hurricane, City staff will conduct the following measures to ensure public access to and use of the public beach.

VIII.A. Inspections

Conduct inspections of all designated beach access points to determine whether the public is able to access the beach.

VIII.B. List Required Repairs

Compile a list of required repairs and replacements, including but not limited to parking areas, pedestrian pathways, vehicular access ways, and signage.

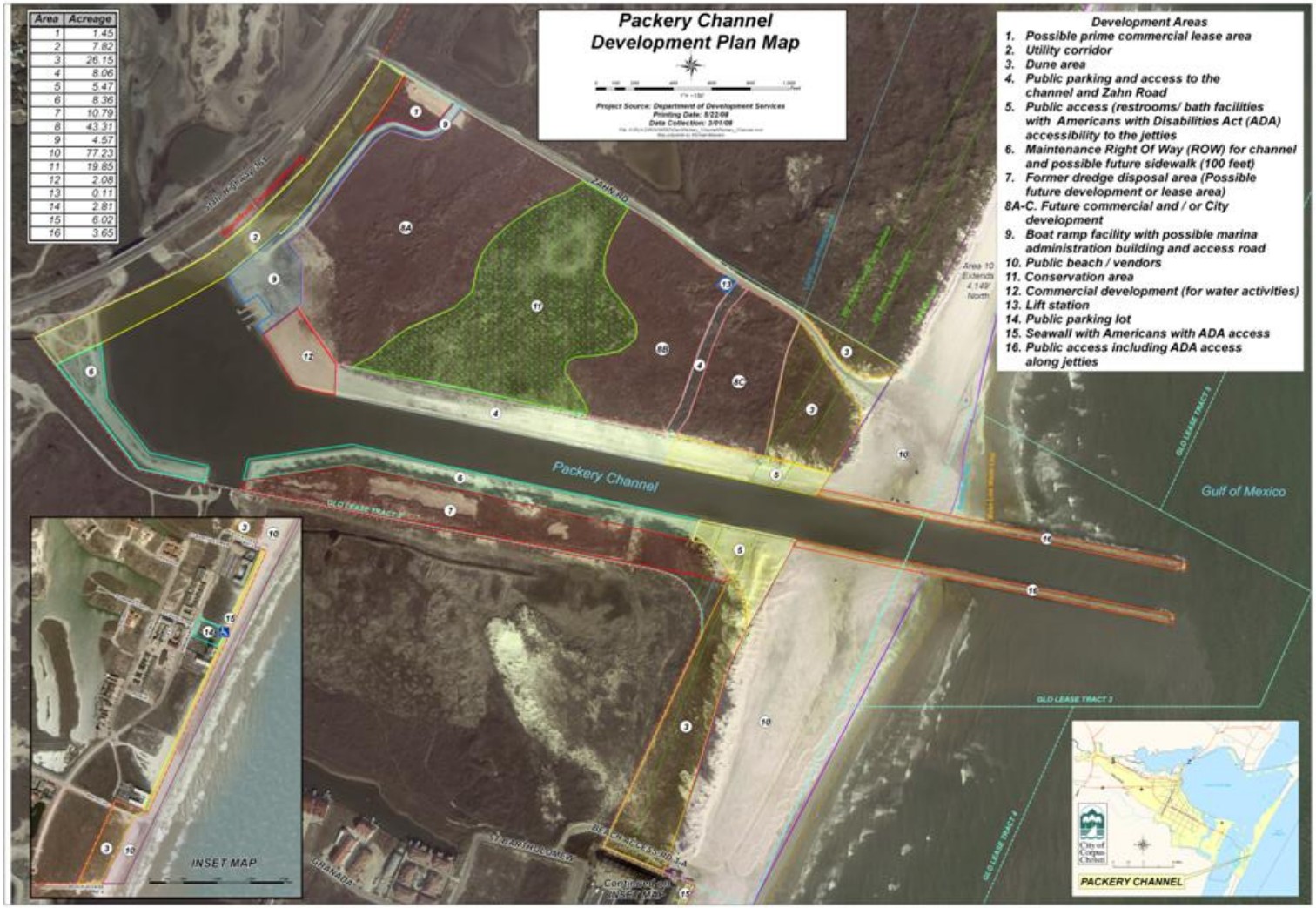
VIII.C. Repair Schedule

Create schedules for public access area repairs and replacements based on local funding and grant requests.

Appendix 1: Packery Channel Development Plan

Packery Channel Development Goal - to facilitate development of a world-class recreational destination on the Texas Gulf Coast.

Development of the area will provide a significant economic stimulus to the island, the city, the region and the State of Texas.



Development of the Packery Channel area (Packery Channel Development Plan, will be in a manner that is consistent with this Erosion Response Plan, Nueces County Dune Protection and Beach Access Regulations and all other applicable city, state and federal requirements.

Appendix 2: Dune Assessment and Mitigation Map Exhibits 1-20

Appendix 3: Beach Access Assessment and Mitigation Map Exhibit 21
EROSION RESPONSE PLAN
Beach Access
Laguna Madre
Corpus Christi Bay
Gulf of Mexico
Padre Balli Park Entrance Rd
Whitecap Blvd
Zahn Rd
Beach Access Rd 3
Newport Pass Beach Access Rd
Beach Access Rd #3A
Beach Access Rd #4
Beach Access Rd #5
Beach Access Rd #6
Beach Access Rd North
Proposed Beach Access Rd
Proposed Beach Access Rd
Proposed Beach Access Rd
Collector Beach Access Rd 2
Proposed Beach Access Rd
Mustang Island State Park Entrance Rd
Proposed Beach Access Rd
Proposed Beach Access Rd
Proposed Beach Access Rd
Proposed Collector Beach Access Rd (Porto Villageo)
Proposed Beach Access Rd
FREE
Legend
Collector Existing
Collector Proposed
Beach Access Rd Existing
Beach Access Rd Proposed
Rural Arterial
Gulf Beach Vehicle Access
Free Beach
Milepoint Markers
Beach Parking
City Limits
ETJ
Parks
Gulf of Mexico
City of Corpus Christi